



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

ACADEMIC YEAR
2023-2024



**PONNAIYAH RAMAJAYAM INSTITUTE OF
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M.A.,
ENGLISH

SYLLABUS

2023 REGULATION

TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION, CHENNAI – 600 005

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1. Preamble

Taxonomy forms three learning domains: the cognitive (knowledge), affective(attitude), and psychomotor (skill). This classification enables to estimate the learning capabilities of students.

Briefly, it is aimed to restructure the curriculum as student-oriented, skill-based, and institution-industry-interaction curriculum with the various courses under “Outcome Based Education with Problem Based Courses, Project Based Courses,and Industry Aligned Programmes” having revised Bloom’sTaxonomy for evaluating students skills.

Three Domains:

(i) Cognitive Domain

(Lower levels: K1: Remembering ; K2: Understanding ; K3: Applying;
Higher levels: K4: Analysing ; K5: Evaluating; K6: Creating)

(ii) Affective Domain

(iii) Psychomotor Domain

TANSICHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR UNDERGRADUATE EDUCATION	
Programme:	M.A. English
Programme Code:	23PGENGGE
Duration:	2 years for PG
Programme Outcomes:	<p>PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form part of Post graduate programmes of study.</p> <p>PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p>PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real-life situations.</p> <p>PO4: Analytical & Scientific Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.</p> <p>PO5: Research related skills: Ability to analyze, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open-minded and reasoned research perspective; develop sense of inquiry and capability for asking relevant questions / problem arising / synthesizing / articulating / ability to recognize cause and effect relationships / define problems. Formulate hypothesis, Test / analyze / Interpret the results and derive conclusions.</p> <p>PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.</p> <p>PO7: Participation & Research: Participate as critical and active citizens in society and at work; and pursue career and research in English studies and allied disciplines.</p> <p>PO8: Reading & Projects: Document their reading and interpretive practices in assignments, translation works, and independent projects.</p> <p>PO9: Confidence & Effectiveness: Confidently and effectively articulate their literary and textual experiences.</p> <p>PO 10: Social Skills & Empathetic Approach: Reorganize a professional and reflective approach to leadership, responsibility, personal integrity, empathy, care and respect for others, accountability and self regulation.</p>

<p>Programme Specific Outcomes:</p>	<p>PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different areas of the specific discipline of study.</p> <p>PSO2: Understand, formulate, develop arguments logically to address issues arising in social sciences, business and other context /fields.</p> <p>PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. To encourage practices grounded in research that comply with employment laws, leading the organization towards growth and development.</p> <p>PSO4: Developing a research framework and presenting their independent ideas effectively.</p> <p>PSO5: Equipping their employability skills to excel in professions like teaching and exposing them to various activities to empower them through communication skills.</p> <p>PSO6: Enabling a holistic perspective towards the socio-political inequalities and environmental issues</p>
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1. Structure of Course

Course Code		Course Name		Credits
Lecture Hours: (L) per week		Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week
Course Category :		Year & Semester:	Admission Year:	
Pre-requisite				
Links to other Courses				
Learning Objectives: (for teachers: what they have to do in the class/lab/field)				
Course Outcomes: (for students: To know what they are going to learn) CO1: CO2: CO3: CO4: CO5:				
Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)				
Units	Contents			Required Hours
I				17
II				17
III				17
IV				17
V				17
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved(To be discussed during the Tutorial hour)			
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill			
Learning Resources:				
<ul style="list-style-type: none"> ● Recommended Texts ● Reference Books ● Web resources 				
Board of Studies Date:				

3. Learning and Teaching Activities

3.1. Topic wise Delivery method

Hour Count	Topic	Unit	Mode of Delivery

3.2. Work Load

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

Activity	Quantity	Workload periods
Lectures	60	60
Tutorials	15	15
Assignments	5	5
Cycle Test or similar	2	4
Model Test or similar	1	3
University Exam	1	3
Total		90 periods

4. Tutorial Activities

Tutorial Count	Topic

5. Laboratory Activities

Language lab facilitates the students to upgrade their learning on a technological scale in this tech savvy world.

6. Field Study Activities

Projects and research works are done with a lot of field work and through research of their study. This is done through surveys and questionnaires which facilitate their research activity.

7. Assessment Activities

7.1. Assessment Principles:

Assessment for this course is based on the following principles

1. Assessment must encourage and reinforce learning.
2. Assessment must measure achievement of the stated learning objectives.
3. Assessment must enable robust and fair judgments about student performance.
4. Assessment practice must be fair and equitable to students and give them the opportunity to demonstrate what they learned.
5. Assessment must maintain academic standards.

Assessment Details:

Assessment Item	Distributed Due Date	Weightage	Cumulative Weightage
Assignment 1	3 rd week	2%	2%
Assignment 2	6 th Week	2%	4%
Cycle Test – I	7 th Week	6%	10%
Assignment 3	8 th Week	2%	12%
Assignment 4	11 th Week	2%	14%
Cycle Test – II	12 th Week	6%	20%
Assignment 5	14 th Week	2%	22%
Model Exam	15 th Week	13%	35%
Attendance	All weeks as per the Academic Calendar	5%	40%
University Exam	17 th Week	60%	100%

8. TEACHING METHODOLOGIES

Traditional Teaching method like Chalk and Board, Virtual Class room, LCD projector, SmartClass, Video Conference, Guest Lectures.

Asking students to formulate a problem from a topic covered in a week's time
Assignment, Class Test, Slip test

Asking students to use state-of-the-art technologies/software to solve problems
Applications, Use of Language enhancement software.

Introducing students to applications before teaching the theory

Training students to engage in self-study without relying on faculty

(for example – library and internet search, manual and handbook usage, etc.)

Library, Net Surfing, Manuals, NPTEL Course Materials published in the website

Other university websites.

9. Faculty Course File Structure

CONTENTS

- a. Academic Schedule
- b. Students Name List
- c. Time Table
- d. Syllabus
- e. Lesson Plan
- f. Staff Workload
- g. Course Design(content, Course Outcomes (COs), Delivery method, mapping of COs with Programme Outcomes(POs), Assessment Pattern in terms of Revised Bloom's Taxonomy).
- h. Sample CO Assessment Tools.
- i. Faculty Course Assessment Report(FCAR)
- j. Course Evaluation Sheet
- k. Teaching Materials (PPT, OHP etc)
- l. Lecture Notes
- m. Home Assignment Questions
- n. Tutorial Sheets
- o. Remedial Class Record, if any,
- p. Project related to the course
- q. Laboratory Experiments related to the Courses
- r. Internal Question Paper
- s. External Question Paper
- t. Sample Home Assignment Answer sheet
- u. Three best, three middle level and three average answer sheets
- v. Result Analysis (CO wise and whole class)
- w. Question Bank for Higher Studies Preparation (GATE / Preparation)
- x. List of mentees and their academic achievements

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10. Template for PG Programme in English

M.A. English Curriculum Design

Semester-I	Credit	Semester-II	Credit	Semester-III	Credit	Semester-IV	Credit
1.1. Core-I	4	2.1. Core-IV	4	3.1. Core-VII	4	4.1. Core-X	4
1.2 Core-II	4	2.2 Core-V	4	3.2 Core-VII	4	4.2 Core-XI	4
1.3 Core – III	4	2.3 Core – VI	4	3.3 Core – IX	4	4.3 Core – XII	4
1.4 Elective (Generic / Discipline Centric)- I	3	2.4 Elective (Generic / Discipline Centric) – III	3	3.4 Elective (Generic / Discipline Centric) – V	3	4.4 Elective (Generic / Discipline Centric) – VI	3
1.5 Elective (Generic / Discipline Centric)-II	3	2.5 Elective (Generic / Discipline Centric)-IV	3	3.5 Core Industry Module	3	4.5 Project with Viva-Voce	3
1.6 Ability Enhanceme nt Course- Soft Skill -1	2	2.6 Ability Enhance ment Course - Soft Skill -2	2	3.6 Ability Enhancement Course- Soft Skill -3	2	4.6 Ability Enhancement Course- Soft Skill -4	2
Skill Enhancem ent Course SEC 1	2	2.7 Skill Enhancement Course SEC 2	2	3.7 Skill Enhancement Course – Term Paper and Seminar Presentation SEC 3	2	4.7 Skill Enhancement Course - Professional Competency Skill	2
				3.8 Internship/ Industrial Activity	2	4.8 Extension Activity	1
	22		22		24		23
	Total Credit Points						91

Credit Distribution for all PG Courses

S.No	Course Details	Credit
1	Core Course [12 Courses X 4 Credits]	48
2	Elective Course [6 Courses X 3 Credits]	18
3	Skill Enhancement Course [3 Courses X 2 Credits]	6
A	Professional Competency Course & Industry	4
B	Module Project Work VIVA VOCE	4
5	Discipline specific elective course [3 Courses X 3]	9
6	Internship	2
		91



**DEPARTMENT OF ENGLISH
MA ENGLISH – REGULATION 2023
COURSE STRUCTURE
First Year Semester-I**

COURSE CODE	LIST OF COURSES	L	T	P	C
23211AEC11	English Poetry	5	1	0	4
23211AEC12	English Drama	5	1	0	4
23211AEC13	English Fiction	5	1	0	4
23211GEC14	Indian Writing in English	5	0	0	4
23211DSC15_	Discipline specific Elective-I	5	0	0	3
23211RMC16	Research Methodology	2	0	0	2
		27	3	0	21

Semester-II

	List of Courses	L	T	P	C
23211AEC21	American Literature	4	1	0	4
23211AEC22	Shakespeare Studies	4	1	0	4
23211AEC23	Post-colonial Theory and Literature	4	1	0	4
23211GEC24	Approaches to English Language Teaching	4	0	0	4
23211DSC25_	Discipline specific Elective-II	4	0	0	3
23211SEC26	Industry Training & Expectations	3	0	0	3
23211SEC28	Internship* / Tourism	2	0	0	2
23211BRC27	Participation In Bounded Research	2	0	0	2
		27	3	0	26

**Second Year
Semester-III**

COURSE CODE	LIST OF COURSES	L	T	P	C
23211AEC31	Contemporary Literary Criticism	4	1	0	4
23211AEC32	Canadian Studies	4	1	0	4
23211AEC33	Literature of the Marginalized in India	4	1	0	4
23211SEC34	Translation Studies	3	1	0	3
23211DSC35_	Discipline specific Elective-III	4	1	0	3
23211SEC36	Leadership Skills	3	0	0	3
23211SEC37	Internship / Industrial Activity	3	0	0	3
		25	5		24

Semester-IV

COURSE CODE	LIST OF COURSES	L	T	P	C
23211AEC41	Twenty First Century Millennial Literature and Culture	4	1	0	4
23211AEC42	Subaltern Studies	4	1	0	4
23211AEC43	Film and Media Studies	4	1	0	3
23211GEC44	English for Careers	4	1	0	3
23211PRW45	Project	0	0	5	4
23211SEC46	English Teaching methods, Aptitude, Attitude for competitive examination	4	1	0	2
		20	5	5	20
	Total credit				91

Credit distribution

SEM	AEC	SEC	GEC	DSC	Research	Total Credits
I	12	-	4	3	2	21
II	12	5	4	3	2	26
III	12	9	-	3	-	24
IV	11	2	3	-	4	20
Total	47	16	11	09	08	91

Discipline Specific Electives

Semester	Discipline Specific Elective Courses
I	23211DSC15A- Theatre Art
	23111DSC15B- Technical Writing
II	23111DSC25A- A Glimpse Of Nobel Laureates
	23111DSC25B- Technology In Teaching English
III	23111DSC35A - Functional English
	23111DSC35B - Employability skills

HOD

DEAN

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Different Types of Courses

(i) Core Courses (Illustrative)

1. English Poetry
2. English Drama
3. English Fiction
4. American Literature
5. Shakespeare Studies
6. Post Colonial Theory and Literature
7. Contemporary Literary Criticism
8. Canadian Studies
9. Subaltern Studies
10. British Literature

(ii) Elective Courses (ED within the Department Experts) (Illustrative)

1. Theatre Art
2. Approaches to English Language Teaching
3. A Glimpse of Nobel Laureates
4. Translation Studies
5. English Literature for NTA, NET,SET & GATE
6. Indian Writing in English

(iii) Skill Development Courses

1. Technical Writing
2. English for Competitive exams
3. Business English
4. Leadership Skills
5. Employability skills

FIRST YEAR - SEMESTER I
CORE -1 ENGLISH POETRY – From Chaucer to 20th Century

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC11	English poetry	5	1	-	-	4	6	25	75	100
Learning Objectives										
LO1	To familiarize students with English Poetry starting from Medieval England to 17 th Century.									
LO2	To focus on the evolution of Poetic forms such as Sonnet, Ballad, Lyric, Satire, Epic etc.									
LO3	Good comprehension of History of English literature is enhanced									
LO4	Differentiation among the various stages of English could be identified by students.									
LO5	Critical approaches towards various literary forms can be learnt.									
Details										
UNIT I Middle English Poetry-Chaucer: "The General Prologue": Pardoner, The Nun: Doctor, Friar										
UNIT II Elizabethan Poetry- Spenser: "Epithalamion" Donne: "A Valediction: Forbidding Mourning""The Canonization"										
UNIT III Seventeenth Century Poetry- John Milton "Paradise Lost" Book IX Marvell: "To His Coy Mistress"										
UNIT IV Gray "Elegy" Wordsworth: Tintern Abbey										
UNIT V Dylan Thomas: "Do Not Go Gentle Into That Good Night" Seamus Heaney: "Digging" Carol Ann Duffy: "Standing Female Nude"										

Course Outcomes		Programme Outcomes
C O	On completion of this course, students will	
1	Gain ideas about the old English writing style.	PO1, PO2
2	Acquire knowledge about various forms of poetry during different centuries.	PO5,PO6
3	Evaluate various poets as representatives of their periods	PO7
4	Trace the evolution of various literary movements	PO8
5	Justify British Poetry as an aesthetic record of the societies concerned	PO9, PO10
Text Book		
1	1973, The Oxford Anthology of English Literature Vol. I. The Middle Ages Through the 18th century. OUP, London	
2	Standard editions of texts	
Reference Books		
1.	T.S. Eliot, 1932, "The Metaphysical Poets" from Selected Essay; Faber and Faber limited, London.	
2.	H.S. Bennett, 1970, Chaucer and the Fifteenth Century, Clarendon Press, London.	
3.	Malcolm Bradbury and David Palmer, ed., 1970 Metaphysical Poetry, Stratford - upon – Avon Studies Vol. II, Edward Arnold, London.	
4.	William R. Keats, ed., 1971, Seventeenth Century English Poetry: Modern Essays in Criticism, Oxford University Press, London.	
5.	A.G. George, 1971, Studies in Poetry, Heinemann Education Books Ltd., London.	
6	David Daiches, 1981, A Critical History of English Literature Vols. I &II., Secker &Warburg, London.	
7	Thomas N. Corns, ed., 1993, The Cambridge Companion to English Poetry: Donne toMarvell, Cambridge University Press, Cambridge.	
Web Resources		
1.	http://www.english/.org.uk/chaucer/htm	
2.	https://www.britannica.com/topic/The-Canonization	
3.	https://www.worldhistory.org/Elizabethan_Theatre/https://www.britannica.c om/to pic/Paradise-Lost-epic-poem-by-Milton	
4.	https://www.britannica.com/topic/Absalom-and-Achitophel	
5.	https://www.cs.mcgill.ca/~rwest/wikispeedia/wpcd/wp/m/Modernist_poetry_in_English.htm	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	3	3	3	2
CO2	2	3	3	2	2	3	2	2	2	3
CO3	3	3	2	2	3	2	3	2	3	2
CO4	3	3	3	3	2	3	3	2	3	2
CO5	3	2	3	3	3	3	2	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage ofCourse Contributio nto Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

**FIRST YEAR - SEMESTER I
CORE- II - ENGLISH DRAMA**

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC12	English drama	5	1	-	-	4	6	25	75	100
Learning Objectives										
LO1	To acquaint the students with the origin of drama in Britain									
LO2	Different stages of British Drama and its evolution in the context of theatre can be understood by the students.									
LO3	Socio-cultural scenario can be well comprehended through a study of representative texts from the Elizabethan age to 20th century.									
LO4	Evaluating different forms of drama from the historical background could be learnt.									
LO5	Understanding dramatic techniques implied by the pioneers of English drama									
Details										
UNIT I Beginnings of Drama - Miracle and Morality Plays -Everyman Thomas Kyd - The Spanish Tragedy UNIT II Elizabethan Theatre - Christopher Marlowe: The Jew of Malta Ben Jonson :Volpone										
UNIT III Jacobean Drama -John Webster: The White Devil										
UNIT IV Restoration -William Congreve- The Way of the World, J.M Synge- The Playboy of the Western World										
UNIT V Epic Theatre Bertolt Brecht -Mother Courage and her Children Harold Pinter :Birthday Party										
Course Outcomes								Programme Outcomes		
CO	On completion of this course,students will									
1	Appraise various aspects of drama and theatre									
2	Identify drama and performance as a cultural process and an artistic discourse									
3	Evaluate plot structure, characterization and dialogue									
								PO1, PO2		
								PO3,PO5		
								PO4		

4	Interpret drama texts as aesthetic records of their times viz., Elizabethan, Restoration, Victorian and Early Modern ages	PO6,PO7,PO8
5	Examine the sequential course dealing with Modern and Postmodern British Drama	PO9,PO10
Text Book		
1	Bradbrook, M.C., 1955, The Growth and Structure and Elizabethan Comedy, London.	
2	Tillyard E.M.W., 1958, The Nature of Comedy & Shakespeare, London.	
Reference Books		
1.	Una Ellis-Fermor, 1965, The Jacobean Drama: An Interpretation, Methuen & Co., London.	
2.	Allardyce Nicoll, 1973, British Drama, Harrap, London.	
3.	Bradbrook, M.C., 1979, Themes and Conventions of Elizabethan Tragedy, Vikas Publishing House Pvt., Ltd., (6 th ed) New Delhi.	
4.	Michael Hathaway, 1982, Elizabethan Popular Theatre: Plays in Performance, Routledge, London.	
5.	Kinney, Arthur.F., 2004, A Companion to Renaissance Drama, Oxford: Blackwell Publishing https://www.britannica.com/art/epic-theatre	
Web Resources		
1.	http://www.questia.com (online library for research)	
2.	http://www.clt.astate.edu/wmarey/asste%	
3.	https://nosweatshakespeare.com/resources/era/jacobean-drama-theatre/	
4.	https://www.britannica.com/art/English-literature/The-Restoration	
5.	https://www.britannica.com/art/epic-theatre	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER I
CORE III - ENGLISH FICTION

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC13	English Fiction	5	1	-	-	4	4	25	75	100
Learning Objectives										
LO1	To familiarize the students with the origin and development of the British Novel up to the 20 th Century.									
LO2	The contents of the paper are meant to throw light on various concepts and theories of the novel.									
LO3	To understand the social background base on the prescribed novels.									
LO4	Identifying and differentiating various forms of novels.									
LO5	Trying hands in writing a piece of work on their own.									
Details										
UNIT I - Allegorical Novel and Satire John Bunyan The Pilgrim's Progress Jonathan Swift Gulliver's Travels UNIT II - The New World Novel : Robinson Crusoe: Tristram Shandy. UNIT III - Middle Class Novel of Manners : Jane Austen-Emma UNIT IV - Women's Issues : Charlotte Bronte- Jane Eyre UNIT V - D.H.Lawrence : The Rainbow										
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Gain wide knowledge about different types of novels.							PO1, PO10		
CO2	Learn the art of writing different forms of novel with the learned notions.							PO2, PO3		
CO3	Explore Social, domestic and gothic novels.							PO4, PO5		
CO4	Assess philosophical and political underpinnings of Victorian morality, anti Victorian realities and the aesthetic movement.							PO4, PO5, PO6		
CO5	Infer themes relating to the turn of the century events through close reading of text.							PO7, PO8, PO10		
Text Books (Latest Editions)										
1.	Wayne C. Booth, 1961, The Rhetoric of Fiction, Chicago University Press, London.									
2.	F.R. Leavis, 1973, The Great Tradition, Chatto & Windus, London.									

References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Ian Watt, 1974, Rise of the English Novel, Chatto&Windus, London.
2.	Frederick R Karl, 1977, Reader's Guide to the Development of the English Novel till the 18 th Century, The Camelot Press Ltd. Southampton.
3.	Arnold Kettle, 1967, An Introduction to English Novel Vol. II, Universal BookStall, New Delhi.
4.	Raymond Williams, 1973, The English Novel: From Dickens to Lawrence, Chatto&Windus, London.
5.	Ian Milligan, 1983, The Novel in English: An Introduction, Macmillan, HongKong.
Web Resources	
1.	http://en.wikipedia.org/wiki/English_literature
2.	http://en.wikipedia.org/wiki/novel
3.	https://www.britannica.com/art/picaresque-novel
4.	https://www.britannica.com/art/novel-of-manners
5.	https://www.britannica.com/topic/Jane-Eyre-novel-by-Bronte

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

**FIRST YEAR - SEMESTER I
ELECTIVE- I INDIAN WRITING IN ENGLISH**

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211GEC14	Indian writing in English	5	0	-	-	4	4	25	75	100
Learning Objectives										
LO1	Enabling the students to understand the evolution of Indian Writing in English.									
LO2	To enable the learners to get exposed to the historical movements of the Indian subcontinent.									
LO3	Comprehending different genres through the representation of different texts.									
LO4	To inculcate in the students the cultural significance of Indian English literature.									
LO5	To comprehend Indian writing in English with its dual focus on the influence of classical Indian tradition and the impact of the West.									
Details										
<p>UNIT I - Aurobindo: Tiger and the Deer, Sarojini Naidu: Palanquin Bearers, Coromandel Fishers</p> <p>UNIT II - Kamala Das: Looking Glass Nissim Ezekiel: Morning Prayer,</p> <p>UNIT III - Asif Currimbhoy: Inquilab.</p> <p>UNIT IV – Dr. S. Radhakrishnan : Emerging World Society, Dr. A. P. J. Abdul Kalam : Orientation (Wings of Fire).</p> <p>UNIT V - Anita Desai: Where Shall we go this Summer?</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the themes of Indian Writing in English	PO1
CO2	Identify the major trends in Indian Writing in English	PO1, PO2
CO3	Examine the background and settings of the prescribed texts	PO4, PO6
CO4	Evaluate the cultural significance of Indian English Literature	PO4, PO5, PO6
CO5	Gain exposure to diverse culture and literature and further enlighten them about socio-cultural scenario in the contemporary era.	PO3, PO8
Text Books (Latest Editions)		
1.	Ramamurti, K.S. (ed.). Twenty five Indian Poets in English Macmillan. 1995.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	K.R. SrinivasaIyengar, 1962, –History of Indian Writing in English, Sterling Publishers, New Delhi.	
2.	Herbert H. Gowen, 1975, A History of Indian Literature, Seema Publications, Delhi.	
3.	K. Satchidanandan, 2003, Authors, Texts, Issues: Essays on Indian literature, Pencraft International, New Delhi.	
4.	AmitChandri, 2001, The Picador Book of Modern Indian Literature, Macmillan, London.	
5.	TabishKhair, 2001, Babu Fictions: Alienation in Contemporary Indian English Novels., OUP.	
Web Resources		
1.	http://en.wikipedia.org/wik/indian_writing_in_english	
2.	https://www.thehindu.com/books/books-children/short-history-of-indian-writing-in-english/article5226149.ece/amp/	
3.	https://www.britannica.com/biography/Sri-Aurobindo	
4.	https://www.literaryladiesguide.com/author-biography/kamala-das-indian-poet/	
5.	https://www.britannica.com/biography/Anita-Desai	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	3	3	3	2
CO2	2	3	3	2	2	3	2	2	2	3
CO3	3	3	2	2	3	2	3	2	3	2
CO4	3	3	3	3	2	3	3	2	3	2
CO5	3	2	3	3	3	3	2	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping Specific Outcome:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

**FIRST YEAR - SEMESTER I
ELECTIVE II -THEATRE ART**

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211DSC15A	Theatre art	5	0	0	-	3	4	25	75	100
Learning Objectives										
LO1	To introduce the learners to the literary aspect of dramas.									
LO2	To familiarize Theatre as an art form.									
LO3	To introduce the concepts of directing and stage management.									
LO4	To inculcate in the students the role of Theatre in society.									
LO5	To familiarize the students with the components of acting.									
Details										
<p>UNIT I - Drama as a performing art, Relation between drama and theatre, The role of theatre, The need for permanent theatres.</p> <p>UNIT II - Greek theatre, Shakespearean theatre, The Absurd theatre, The Epic theatre, The Multipurpose theatre, Designing for a particular theatre, The Eastern theatre - Folk theatre, urban theatre, third theatre, other theatres in vogue.</p> <p>UNIT III - Fundamentals of Play directing: Concept, technique, physical balance, demonstration The director and the stage</p> <p>UNIT IV - Components of acting: Gesture, voice, costume, make-up, mask and different styles in acting as an art form, violence in the theatre, need for censorship, managing time and space.</p> <p>UNIT V - Theatre of illusion, Expressionism and dramatic symbolism, Stage design in the modern world, Lighting in the modern world, Word versus spectacles.</p>										
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Understand a broad range of theatrical disciplines and Experiences							PO2		
CO2	Identify the diversity of theatrical experiences and the role of theatre in society							PO1, PO2		
CO3	Discover the relationships among the various facets of Theatre							PO4, PO5		
CO4	Estimate drama as a performing art and the aspects of Stagecraft							PO4, PO5, PO6		
CO5	Gain exposure to diverse components of acting and techniques							PO8, PO9		

Text Books (Latest Editions)	
1.	Sangeetha, K and A.Selvalakshmi. An Introduction to Theatre Art. New CenturyBook House (P) Ltd., 2015.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Balme, Christopher B. <i>The Cambridge Introduction to Theatre Studies</i> . Cambridge University Press, 2008.
2.	Leach, Robert. <i>Theatre Studies: The Basics</i> . Routledge, 2013.
Web sources	
1.	https://paradisevalley.libguides.com/the111/theatre_history_websites
2.	https://www.britannica.com/place/England/Performing-arts
3.	https://www.worldhistory.org/Greek_Theatre/
4.	https://archive.org/details/fundamentalsopl0000dean_y3x3
5.	http://scriptclickcreate.weebly.com/acting.html
6.	https://www.britannica.com/art/theater-building/Production-aspects-of-Expressionist-theatre

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	3	3	3	2
CO2	2	3	3	2	2	3	2	2	2	3
CO3	3	3	2	2	3	2	3	2	3	2
CO4	3	3	3	3	2	3	3	2	3	2
CO5	3	2	3	3	3	3	2	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER I

TECHNICAL WRITING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211DSC15B	TECHNICAL WRITING	5	0	0	-	3	3	25	75	100

Learning Objectives

LO1	Technical Writing is ultimately important as it provides information on a company's products and services
LO2	Good documentation forms a major part of the sales and marketing strategies, services and training and other related administrative inputs.
LO3	The course in technical writing focuses on the discoursal features and functions of technical writing including the technical reports, project reports and related documents.
LO4	The knowledge of computing appropriate to the discipline.
LO5	The ability to use current technologies, skills, and tools necessary for computing practices.

Details

UNIT I- Technical Writing: A Curtain Raiser, P-W-R and BPS, From Sentences to paragraphs

UNIT II – The Know-How of Technical Description, Document Design ,Graphics: Enhancing Content

UNIT III – Data Interpretation, Presentation, News Reports, Proposals, Brochures, User Manuals.

UNIT IV – Blogging, Vlogging, Posting on Social Media

UNIT V - White Paper, CVs: Drafting the Blueprint of Your Future, On the Track: You a Tech-Writer!

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Understand and know how to follow the stages of the writing process and apply them to technical and workplace writing tasks.	PO1

CO2	Be able to produce a set of documents related to technology and writing in the workplace and will have improved their ability to write clearly and accurately.	PO1, PO2
CO3	Understand the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.	PO4, PO6
CO4	Be Familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.	PO4, PO5, PO6
CO5	Be able to read, understand, and interpret material on technology.	PO3, PO8

Text Books (Latest Editions)

1.	Baker, Mona, In Other Words: A Coursebook on Translation. London: Routledge
2.	Bassnet, Susan. Translation Studies. London & New York: Routledge, 1991.

References Books

(Latest editions, and the style as given below must be strictly adhered to)

1.	Catford, J.C. A Linguistic Theory of Translation: An Essay in Applied Linguistics
2.	Duff, Alan, Translations. Oxford: OUP, 1989. London: OUP, 1965.

Web Resources

1.	https://www.tech-tav.com/technical-writing-resources
2.	https://guides.library.unt.edu/c.php?g=528500&p=6841451
3.	https://pressbooks.bccampus.ca/technicalwriting/part/documentdesign/
4.	https://en.m.wikipedia.org/wiki/Technical_writing
5.	https://www.utleystrategies.com/blog/proposal-writing?format=amp

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2

CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 – Low

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211RMC16	Research Methodology	3	0	0	-	2	2	25	75	100

Aim: To create a training in research process to carry out independent literary research work

Objectives:

To develop suitable methods of data collection and interpretation

To use literary resource base for evaluation and support literary hypothesis and validation To carry out basic literature survey using the common data-bases

Outcome:

Ability to develop research hypothesis and carry out independent literature survey

Corresponding to the specific publication type.

Assess basic literary research tools.

UNIT I

Research – Definition, Objectives, Elements of Literary research, Ethics & Misconduct in research,

Plagiarism

UNIT II

Planning the thesis-selecting a topic, reviewing the literature, designing the study, the chapter outline

Writing the thesis- the general format, the page and chapter format

Mechanics of writing-Spelling, Punctuation, Italics, Names, Numbers, Titles, Capitalisation, paragraphs, quotation, work cited, bibliography Revising the thesis-editing, evaluating, proof reading

UNIT III

Data collection-Primary data- works of the author/s, autobiography, Interviews, articles in newspapers, magazine, letters, data collected through surveys, tools for questionnaire, interviews. Secondary data-Articles in journals, books, critical books on the author, magazines, e-articles, websites.

UNIT IV

Rhetoric and its devices, jargon, terminology, slang, colloquialism, formal writing, vague, concrete words, denotation, connotation, verbosity, precision, sentence structure

UNIT V

Practical exercise to prepare a paper for a journal-poem, short story, novel, drama

Use of computer in research-literary tools used in research

Text Books

Name of the Author	Title of the book	Edition / Year	Publisher
Joseph Gibaldi	M LA Hand Book Seventh Edition	Seventh Edition 2009	East-West Press
C.R Kothari	Research Methodology- Methods and technique	Second Edition 2005	New age International Publishers

FIRST YEAR - SEMESTER II
AMERICAN LITERATURE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC21	American literature	4	1	-	-	4	6	25	75	100

Learning Objectives

LO1	To introduce the learners to the development of American literature.
LO2	To familiarize social and political events that have a bearing on American writing
LO3	To introduce the concepts and emerging themes in American literature
LO4	To inculcate the movements and trends that shaped American literature,
LO5	To familiarize the students with the relation between aesthetics and racism in Fiction

UNIT I

POETRY

Emily Dickinson “The Last Night That She Lived”,
Wallace Stevens “Anecdote of the Jar”
Anne Sexton “Wanting to Die”

UNIT II - Prose

Emerson - The American Scholar,
Amy Tan- Mother Tongue,

UNIT III Drama

Arthur Miller - Death of a Salesman,
Ntozake Shange – For Colored Girls.

UNIT IV Fiction/Short Story

Edgar Allan Poe - “The Cask of Amontillado”
Kate Chopin - The Awakening

UNIT V Autobiography - Excerpts from – Malcolm X,
Cherrie Moraga - Getting Home Alive

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Analyze the movements and trends that shaped American literature	PO2
CO2	Estimate various speeches and concepts of living which changed American history	PO1, PO3

CO3	Evaluate the relation between aesthetics and racism in fiction	PO4, PO5
CO4	Validate representative socio-political, cultural, racial and gender perspectives in theatrical works	PO4, PO5, PO6
CO5	Gain exposure to the different literary genres and its evolution in American Literature	PO8, PO10
Text Books(Latest Editions)		
1.	Willis Wagner : American Literature - A World View	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	, Marcus Cunliffe : Sphere History of Literature - American Literature to 1900.	
2.	Boris Ford : The New Pelican Guide to English Literature - Vol.9. American Literature.	
Web Sources		
1.	https://www.thoughtco.com/american-literary-periods-741872	
2.	https://www.poetryfoundation.org/poets/walt-whitman	
3.	https://blog.eyewire.org/emerson-vs-thoreau-transcendentalist-battle/	
4.	https://www.britannica.com/art/American-literature	
5.	https://ivypanda.com/essays/edgar-allan-poes-and-herman-melville-comparison/	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution toPos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER II
CORE- V SHAKESPEARE STUDIES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC22	Shakespeare studies	4	1	-	-	4	5	25	75	100
Learning Objectives										
CO1	To examine, understand and enjoy Shakespeare's plays and Criticism of Theatre.									
CO2	Analyzing the context of Elizabethan England from the evolving contemporary perspective down the ages									
CO3	Undertake textual analysis of Shakespeare's Plays and Sonnets									
CO4	Appraise Shakespeare's contribution to English language and literature									
CO5	Critically understanding the appreciations by critics on Shakespeare									
Details										
<p>UNIT I - Shakespeare Theatre; Sources; Problems of categorization; Trends in Shakespeare Studies up to the 19th Century; Sonnet and court politics; famous actors; theatre criticism; Shakespeare into film & play production.</p> <p>UNIT II – Sonnets – 12, 65 Comedies -Much Ado About Nothing, Winter's Tale.</p> <p>UNIT III – Tragedy Othello</p> <p>UNIT IV – History Henry IV Part I</p> <p>UNIT V Shakespearean Criticism –</p> <ol style="list-style-type: none"> A.C. Bradley - Shakespearean Tragedy (Chapter V & VI) Ania Loomba Sexuality and Racial Difference in Gender, Race, And Renaissance Drama, Manchester UP, 1989. 										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Critically understand the appreciations by critics on Shakespeare	PO1
CO2	Understand Elizabethan theatre and the theatre's development.	PO3
CO3	Be familiarized with critical perspectives on Shakespeare's Plays and Sonnets	PO4, PO5
CO4	Understand the trends in Shakespeare studies	PO6
CO5	Learn Modern Approaches in Shakespearean criticism	PO7, PO10
Text Books (Latest Editions)		
1.	Stephen Greenblatt, ed., 1997, The Norton Shakespeare, (Romances & Poems, Tragedies, Comedies), W.W. Norton & Co., London.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Harrison, 1951, G.B. Shakespeare's Tragedies, Routledge, London.	
2.	Knight G.W., 1957, The Wheel of Fire: Essays in Interpretation of Shakespeare's Sombre Tragedies, New York.	
3	Knight G.W., 1947, The Crown of Life: Essays in Interpretation of Shakespeare's Final Plays, Oxford.	
4	John f. Andrews, ed., 1985, William Shakespeare: His World, His Work, His Influence, Charles Scribner's Sons.	
5	Jonathan Dollimore, ed., 1984, The Radical Tragedy, The Harvester Press, Cambridge.	
Web sources		
1	http://www.shakespeare.bham.ac.uk/resources	
2.	https://www.folger.edu/shakespeares-theater	
3.	https://www.britannica.com/art/sonnet	
4.	https://www.sparknotes.com/shakespeare/othello/genre/	
5.	https://www.historytoday.com/archive/british_english_monarchs/henry-iv	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER II
CORE VI - POST-COLONIAL THEORY AND LITERATURE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC23	Post-colonial theory and literature	4	1	-		4	5	25	75	100
Learning Objectives										
LO1	To examine, understand current sociopolitical mood in `third-world' countries through the study of their fiction and poetry.									
LO2	To familiarize students about the basic concepts and theories related to post colonialism as expressed in different literary genres									
LO3	To focus on the problems and consequences of the decolonization of a country, especially relating to the political and cultural independence of formerly subjugated people									
LO4	Emphasis will be laid on tracing the development of post-colonial literatures and theory.									
LO5	Understanding the critical perspectives in Postcolonial literatures.									
Details										
<p>UNIT I: Prose Bill Ashcroft- Gareth Griffiths and Edward Said - Introduction to Orientation.</p> <p>UNIT II -Poetry Arun Kolatkar : An Old Woman, A.K.Ramanujan. : Returning, Kofi Awonoor , The Weaver Bird</p> <p>UNIT III-Drama Soyinka : Death and the King's Horseman Dougals Stuart : Ned Kelly</p> <p>UNIT IV – Fiction Arundathi Roy – God of Small things Bapsi Sidwa – Ice Candyman</p> <p>UNIT V – Short Stories Kate Grenville – Mate Chinua Achebe – Dead Men's path</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Critically understand the political and social background of the third world nations	PO 2
CO2	Understand the emerging trends in Post- Colonial Literature	PO1, PO3
CO3	Be sensitive towards the problems and consequences of the decolonization of a country,	PO4, PO5
CO4	Examine the ethnocentric perspective of different colonial cultures with respect to postcolonial literature	PO6,P10
CO5	Interpret the postcolonial concepts found in different literary genres	PO7, PO8

Text Books(Latest Editions)	
1.	Macaulay's Minute of 1831/35.
2.	Post-Colonial Studies: eds. Ashcroft et.al.
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Specific issues of Journal of Commonwealth Literature.
2.	Post-colonial Studies Reader. eds. Ashcroft, Griffiths and Tiffin.
3	Canadian Voices. ed. S. Kudchedkar and Jameela Begum.
4	Frantz Fanon : The Wretched of the Earth.
5	Ashish Nandy : The Fear of Nationalism.
Web Sources	
1	https://en.wikipedia.org/wiki/Postcolonial_literature#Postcolonial_feminist_literature
2.	https://www.thebritishacademy.ac.uk/blog/what-is-postcolonial-literature/
3.	https://www.britannica.com/biography/Chinua-Achebe
4.	https://www.tandfonline.com/doi/full/10.1080/1369801X.2020.1718532
5.	https://www.cambridge.org/core/books/abs/cambridge-history-of-postcolonial-literature/poetry-and-postcolonialism/E37B702EF39264C41C8CDB523DB74A1A

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER II
APPROACHES TO ENGLISH LANGUAGE TEACHING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211GEC24	Approaches to English language teaching	4	0	-	-	4	4	25	75	100
Learning Objectives										
LO1	To enhance the learning and teaching skills of English									
LO2	To familiarize students about the basic concepts and theories related to English language teaching									
LO3	To focus on the problems and consequences on language teaching									
LO4	Emphasis will be laid on tracing the development of language teachingskills									
LO5	Understanding the teaching aspects									
Details										
<p>UNIT I A Brief history of Language Teaching The Grammar – Translation method The Direct method The Audio lingual method, Language teaching innovations in the nineteenth century</p> <p>UNIT II Nature of approaches and methods in Language Teaching</p> <ol style="list-style-type: none"> 1. Definition of Approach and method 2. Objectives, Syllabus, learning activities, roles of learners, teachers and materials of thefollowing approaches: <ul style="list-style-type: none"> • Oral approach and situational language teaching • Community Language Learning. <p>UNIT III The Natural Approach Cooperative language learning Content basedinstruction ,Task-based language teaching</p> <p>UNIT IV Teaching Aspects Teaching Prose Teaching Poetry TeachingGrammar, Teaching of Non-Detailed Text.</p> <p>UNIT V Use of Media in ELT</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Know the brief history of language teaching methods	PO3
CO2	Understand the difference between the terms, methods, approaches and techniques used in teaching	PO1, PO2
CO3	Identify the objectives, active role of learners, teachers and materials of different approaches in teaching	PO4, PO5
CO4	Analyse the steps of teaching prose, poetry, grammar, non-detailed text etc and develop it.	PO3, PO7
CO5	Perceive the use of radio and television in language learning	PO8, PO9

Text Books(Latest Editions)	
1	Richards, Jack C., and Theodore S. Rodgers. Approaches and Methods in Language Teaching. Cambridge University Press, 2015.
2	The Use of Media in ELT . The British Council 1979 Produced in England by the British Council Printing and Publishing Department, London.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Dr. Shaikh Mowla Methods of Teaching English.
2	Dr. Gurav H.K Teaching Aspects of English Language.
Web Resources	
1	http://www.ehow.com/way-5557572_effective-teaching-strategies-prose.htm/
2	https://www.englishclub.com/efl/tefl-articles/tips/history-of-english-language-teaching/
3	https://tesoladvantage.com/methods-and-approaches-of-english-language-teaching/
4	https://www.cambridge.org/core/books/abs/approaches-and-methods-in-language-teaching/current-communicative-approaches/1A7EEF3288E7A5688C36E1504138AF17
5	https://www.teachingenglish.org.uk/sites/teacheng/files/F044%20ELT-48%20The%20Use%20of%20the%20Media%20in%20English%20Language%20Teaching_v3.pdf

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER II
ELECTIVE - IV A GLIMPSE OF NOBEL LAUREATES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211DSC25A	Glimpse of nobel laureates	4	0	-	-	3	4	25	75	100
Learning Objectives										
LO1	To introduce the learners to the Nobel Laureates of various genres of Literature									
LO2	To familiarize students on various Nobel Laureates									
LO3	To focus on interpreting the works of various Nobel Laureates									
LO4	Focus on evaluate critically and aesthetically the prescribed texts									
LO5	Understanding the Nobel Laureates contribution to the society									
Details										
UNIT I -Detailed Poetry										
Pablo Neruda- If You Forget										
Non-Detailed Poetry										
As One Listens to the Rain - Octavio Paz										
Oracle - Seamus Heaney										
UNIT II Detailed Prose										
Loot - Nadine Gordimer										
Disorder and Early Sorrow - Thomas Mann										
UNIT III										
Detailed Drama										
The Caretaker - Harold Pinter										
Man and Superman - George Bernard Shaw										
UNIT IV										
Short Stories										
Alice Munro										
The Turkey Season Differently Runaway										
The Bear Came Over the Mountain Boys and Girls										
UNIT V										
Novels										
The Pearl - John Steinbeck										
One Hundred Years of Solitude - Gabriel Garcia Marquez										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Relate the outstanding works of Nobel Laureates in an idealistic direction that adds the greatest benefit to humankind	PO1
CO2	Interpret the works of various Nobel Laureates	PO1, PO2, PO3
CO3	Analyse the different themes with regard to social, political and cultural aspects.	PO4, PO6
CO4	Evaluate critically and aesthetically the prescribed texts.	PO3, PO8
CO5	Perceive the influence of Nobel Laureates in Literature	PO9, PO10

Text Books(Latest Editions)	
1.	Nine Nobel Laureates in English Literature. Omega Publications, 2012.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Nine Nobel Laureates in English Literature. Omega Publications, 2012.
Web Resources	
1	https://en.wikipedia.org/wiki/List_of_Nobel_laureates_in_Literature
2	https://www.britannica.com/biography/Pablo-Neruda
3	https://www.britannica.com/topic/Nobel-Prize
4	https://interestingliterature.com/2021/07/harold-pinter-the-caretaker-summary-analysis/amp/
5	https://www.britannica.com/biography/Alice-Munro

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weight age	15	15	15	15	15
Weighted percent age of Course Contrib ution toPos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER II
TECHNOLOGY IN TEACHING ENGLISH

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211DSC25B	Technology in Teaching English	4	0	-	-	3	2	25	75	100

Learning Objectives

LO1	Acquaint participants with technology tools, learn to implement network-related programs with concepts of Web Developing.
LO2	Integrate these tools into their English language teaching.
LO3	Enhance English language teaching professionals around the world acquire and maintain basic knowledge and skills in technology for professional purposes.
LO4	Help participants utilize technology in lesson planning, materials development, feedback, and assessment. Practice different phases of software/system development.
LO5	Facilitate professional communication, collaboration, and efficiency improvement by participating in online discussions. Students will be able to demonstrate adequate skills in oral and written communication for technical English language, actively participate in group discussions and interviews and exhibit evidence of vocabulary building

Details

UNIT I

Definition -Virtual- Learning Environment: 1.Meaning- Web-Based Learning Environment 2.Virtual-Learning Environment 3. Web Tools 4. Effective Web Tools in Teaching 5.Classroom Tools.

UNIT II

Webpage Development:

How to develop a webpage, Hosting A Web page, Meta Data Development. Content Writing, Creating Ads, Wikipedia Development: How to develop and edit Wikipedia.

UNIT III

Computational Linguistics: Introduction to speech recognition (SR) systems, text-to-speech (TTS) synthesizers, Interactive voice response (IVR) systems, search engines, text editors and language instruction materials.

UNIT IV

Lexicography- Introduction to Lexicography, Dictionary Development (e- Dictionary), WorldNet, Thesaurus. Language Teaching: First Language and Second Language Teaching, Various methods of Language Teaching.

UNIT V

E-Learning- Asynchronous E-Learning Vs Synchronous E-Learning of Language E-Learning Challenges and Solutions. Application: Machine Translation.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the digital system, its organization and architecture	PO2,PO3
CO2	Identify needs and aspirations on a broader spectrum, Able to recognize the evolving role of Digital Technologies.	PO1, P04
CO3	Discuss how technology affects language learning and teaching today	PO5, PO6
CO4	Use strategies to teach vocabulary growth through social media.	PO7, PO8, PO9
CO5	Identify appropriate grammar activities that include opportunities for learners to discover, analyze, and produce English grammar during language interactions.	PO10
Text Books (Latest Editions)		
1.	Anderson, T. (ed.) The Theory and Practice of Online Learning Athabasca AB: Athabasca University Press, 2008.	
2.	Bates, A. and Sangrà, A. Managing Technology in Higher Education San Francisco: Jossey-Bass/John Wiley and Co, 2011.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Butcher, N. and Wilson-Strydom, M.) A Guide to Quality in Online Learning Dallas TX: Academic Partnerships, 2013	
2.	Batson, T., & Bass, R. Teaching and learning in the computer age. Change, Mar-Apr., 1996.	
Web sources		
1.	https://englishpost.org/tools-teach-english-technology/	
2.	https://www.britishcouncil.in/teach/resources-for-teachers/technology-teachers-series	
3.	https://www.techtarget.com/whatis/definition/virtual-learning-environment-VLE-or-managed-learning-environment-MLE?amp=1	
4.	https://en.m.wikipedia.org/wiki/Web_development	
5.	https://plato.stanford.edu/entries/computational-linguistics/	
6.	https://en.m.wikipedia.org/wiki/Lexicography	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER II
ENTREPRENEURSHIP DEVELOPMENT

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211SEC26	Entrepreneurship development	2	2	-	-	4	4	25	75	100
Learning Objectives										
LO1	To help students acquire necessary knowledge and skills required for organizing and carrying out entrepreneurial activities.									
LO2	To develop the ability of analysing and understanding business situations in which entrepreneurs act.									
LO3	To aid them in analysing various aspects of entrepreneurship – especially of taking over the risk, and the specificities as well as the pattern of entrepreneurship development									
LO4	To bring in them the ability to contribute to their entrepreneurial and managerial potentials.									
LO5	To help them master the knowledge necessary to plan entrepreneurial activities.									
Details										
<p>UNIT I Introduction-Meaning and Importance- Evolution of term ‘Entrepreneurship’-Factors influencing Entrepreneurship-Psychological factors-Social factors-Economic factors-Environmental factors.</p> <p>UNIT II Characteristics of an entrepreneur-Types of entrepreneur: business, use of technology, motivation, growth, stages- New generations of entrepreneurship vs social entrepreneurship.</p> <p>UNIT III Entrepreneurship -health entrepreneurship-tourism entrepreneurship- women entrepreneurship- barriers to entrepreneurship.</p> <p>UNIT IV Motivation-Maslow’s theory, Herzberg’s theory, McGregor’s theory- Culture and society- Risk taking behavior.</p> <p>UNIT V Creativity and entrepreneurship- Steps in creativity- Decision making and problem solving-assistance to an entrepreneur-Incentives and facilities-New ventures.</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Define basic terms and understand basic concepts in the area of entrepreneurship	PO1
CO2	Analyse the business environment in order to identify business opportunities	PO1, PO2
CO3	Identify the elements of success of entrepreneurial ventures	PO4, PO6
CO4	Consider the legal and financial conditions for starting a business venture	PO4, PO5, PO6
CO5	Evaluate the effectiveness of different entrepreneurial strategies and specify the basic performance indicators of entrepreneurial activity	PO3, PO8
Text Books (Latest Editions)		
1.	C J Cornell .The Age of Metapreneurship: A journey into the future of Entrepreneurship. Venture Point Press (11 April 2017)	
2.	Joe Carlen. A Brief History of Entrepreneurship. Columbia Business School Publishing (1 October 2016)	
3.	Harpreet S. Grover. Let's build a company, Vibhore Goyal, Penguin Books, 2020.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Kashyap, Karan. Go Startup. Fingerprint Publishing, 2021.	
Web Resources		
1.	https://www.cmu.edu/swartz-center-for-entrepreneurship/education-and-resources/project-olympus/pdf/entrepreneurship-101.pdf	
2.	https://byjus.com/commerce/what-is-entrepreneurship/	
3.	https://in.indeed.com/career-advice/career-development/types-of-entrepreneurship	
4	https://www.modernhealthcare.com/article/20150221/MAGAZINE/302219978/health-entrepreneurship-on-the-rise	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR - SEMESTER II
SOFT SKILL II - COMMUNICATION SKILLS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211SEC26	Communication skills	2	0	-	-	2	2	25	75	100
Learning Objectives										
LO1	To provide an overview of prerequisites to Business Communication.									
LO2	To impart the correct practices of the strategies of Effective Business Writing.									
LO3	To equip the students with the knowledge of written and oral communication.									
LO4	To familiarize the learners to various oral and written skills.									
LO5	The ability to communicate effectively with a range of audiences.									
Details										
UNIT I										
COMMUNICATION: AN INTRODUCTION										
1. Definition, Nature and Scope of Communication 2. Types of Communication Process of Communication Barriers to Communication										
UNIT II										
ORAL/AURAL COMMUNICATION										
1. Describing directions and routes in English Congratulating people on their success 3. Expressing Opinions										
UNIT III										
CORPORATE COMMUNICATION										
1. Demanding explanations 2. Giving Instructions 3. Requesting and responding to requests										
UNIT IV										
VERBAL COMMUNICATION- WRITTEN										
1. Circular 2. Memorandum 3. Minutes										
UNIT V										
PRACTICAL ASSESSMENT										
1. Making Comparisons 2. Reporting what others say 3. Persuading										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the role of communication in professional success.	PO1
CO2	Develop an awareness of appropriate communication strategies.	PO1, PO2
CO3	Analyze a variety of communication acts with reference to written and oral skills.	PO4, PO6
CO4	Prepare and present messages with a specific intent.	PO4, PO5, PO6
CO5	Gain an understanding of professional, ethical and social responsibilities.	PO3, PO8
Text Books (Latest Editions)		
1.	Brent C. Oberg. Interpersonal Communication	
2.	John Seely. The Oxford Guide to Writing and Speaking	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Asha Kaul. Effective Business Communication	
2.	S.K. Mandel. Effective Communication and Public Speaking	
Web Resources		
1.	www.researchgate.net	
2.	https://business.tutstplus.com/tutorials/effective-public-speaking-skills-techniques-cms-308048	
3.	https://wikieducator.org/INTRODUCTION_TO_COMMUNICATION	
4.	https://akpsi.org/what-is-oral-communication/	
5.	https://www.northeastern.edu/graduate/blog/what-is-corporate-communications/	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER III
CORE VII -CONTEMPORARY LITERARY CRITICISM

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC31	Contemporary literary criticism	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To enable the students to comprehend that criticism is not merely an understanding of literary text but also a rapidly increasing body of knowledge									
LO2	To provide knowledge about the different schools in contemporary literary Criticism									
LO3	To focus on interpreting the works of various literary critics									
LO4	Focus on evaluate critically and aesthetically the prescribed texts									
LO5	Understanding the principles of criticism									
Details										
<p>UNIT I Structure, Sign and Play in the Discourse of HumanSciences : Derrida</p> <p>UNIT II The Deconstructive Angel : M.H. Abrams</p> <p>UNIT III Against Interpretation : Susan Sontag Crisis (In Orientalism) : Edward Said</p> <p>UNIT IV Irony as Principle of Structure :Cleanth Brooks Creative Writers and Day Dreaming : Sigmund Freud</p> <p>UNIT V From Work to Text: Roland Barthes Capitalism, Modernism and Post Modernism: Terry Eagleton</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand a literary text by applying various critical theories.	PO2, PO3
CO2	Develop analytical understanding of the subject matter	PO4
CO3	Analyze a literary text with reference to socio-political issues	PO5
CO4	Evaluate critically and aesthetically the prescribed texts.	PO6, PO8
CO5	Appreciate a text at emotional, intellectual and aesthetic levels	Q
Text Books(Latest Editions)		
1.	Eagleton, T. (2008). Literary theory: An introduction. U of Minnesota Press.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Wood, Nigel, and David Lodge. Modern Criticism and Theory. TaylorandFrancis, 2014.	
2.	Lodge, David. Twentieth Century Literary Criticism: A Reader. Routledge, 2016.	
Web Resources		
1	https://courses.lumenlearning.com/suny-britlit1/chapter/literary-criticism/	
2	https://www.atlassociety.org/post/deconstructing-derrida-review-of-structure-sign-and-discourse-in-the-human-sciences	
3	https://fs.blog/susan-sontag-against-interpretation/	
4	https://www.studocu.com/in/document/madurai-kamaraj-university/manglis/h/the-deconstructive-angel/4517560	
5	https://www.britannica.com/biography/Roland-Gerard-Barthes	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

**SECOND YEAR - SEMESTER III
CORE - VIII CANADIAN STUDIES**

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC32	Canadian studies	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Expose students to Canadian Social, Cultural, Historical and Aboriginal traditions									
LO2	To provide knowledge about the different trends in Canadian studies									
LO3	To focus on interpreting the prescribed works critically									
LO4	Focus on important dimensions to understanding Canada including multicultural and immigrant experience.									
LO5	Understanding the folklore and its influence on Canadian Literature									
Details										
<p>UNIT I Poetry Journey to the interior- M. Atwood Adolescence- P.K. Page</p> <p>UNIT II Fiction Survival-M. Atwood Truth and Bright water (1999)- Thomas King.</p> <p>UNIT III The Ecstasy of Rita Joe-George Ryga. Dry Lips- Tom Highway.</p> <p>UNIT IV Short Story Sunshine sketches of a little down-Stephen Leacock. In Search of April Rain tree. Beatrice Mosonior(Culleton)</p> <p>UNIT V Criticism The Canadian Post-Modern. Linda Hutcheon "Godzilla vs Post-Colonial", Thomas King Last Essay from The Bush Garden, Northrop Frye</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the historical and political background of Canadian Literature	PO1, PO3
CO2	Be familiarized with the folklore and its influence in Canadian Literature	PO1
CO3	Analyze a literary text with reference to socio-political Issues	PO4
CO4	Appreciate critically and aesthetically the prescribed texts.	PO6, PO8
CO5	Evaluate a text at emotional, intellectual and aesthetic levels	PO9, PO10
(Text Books in Latest Edition)		
1.	Media : Selections from Understanding Media: The extensions of Man Marshall McLuhan, London: Routledge, 2002.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1. Rioux Marcel 1978 Quebec in Question James Borke, Trans, Toronto: Lorimer		
2. Multiculturalism in Canada ed. Elspeth Cameron (Toronto Canadian Scholar Press 2004)		
3. A short History of Canada, Desmond Morton, Edmonton: Hurtig 1983		
Web sources		
1	www.india.gc.ca	
2	www.canada.justice.gc.ca	
3	www.thecanadianencyclopedia.com	
4.	https://www.cse.iitk.ac.in/users/amit/books/narasimhaiah-1990-anthology-of-commonwealth.html	
5.	https://www.britannica.com/biography/Margaret-Atwood	
6.	https://canadianliteraryfare.org/bibliography/drama/	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER III
CORE IX - LITERATURE OF THE MARGINALIZED IN INDIA

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC33	Literature of the marginalized in India	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Sensitizing students in the history of anti-caste and anti-discrimination Discourses									
LO2	To provide knowledge about the Dalit's uprising in the literary, social and cultural spheres.									
LO3	To focus on studies caste, reflecting upon the history of anti-caste struggle in India.									
LO4	Focus on important dimensions to understanding political spheres in India									
LO5	Understanding the disciplines and covers a range of disciplines including history, sociology, ethnography, anthropology and literature.									
Details										
<p>UNIT I Studies on Caste (colonial/postcolonial): Study on Caste - Lakshmi Narasu Homo Hierarchicus - Louis Dumont</p> <p>UNIT II Gendering Caste: Through a Feminist Lens –Uma Chakravarti; Caste and Gender - Anupama Rao</p> <p>UNIT III History and Theory of Dalit Uprising “Power of Invisibility” - Ravikumar</p> <p>UNIT IV Poetry 1. Koshal Parwar – Life 2. J.V. Pauer – Birds in Prison 3. Arun Kamble – Which language I should speak</p> <p>UNIT V: Fiction Untouchable Spring - Kalyan Rao Short stories – Kisumbukaran - Bama</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the historical and political background of Caste	PO1
CO2	Focus on understanding the dimensions of discriminations	PO2
CO3	Analyze a literary text with reference to socio-political Issues	PO3,PO4
CO4	Evaluate the prescribed texts critically.	PO6, PO8
CO5	Be exposed to a range of disciplines including history,sociology, ethnography, anthropology and literature.	PO9
Text Books(Latest Editions)		
1.	Caste and Tribes by Risley	
References Books (Latest editions, and the style as given below must be strictly adheredto)		
1.	Caste and Tribes by Edgar Thurston	
2.	Castes of Mind by Nicholas B Dirks	
3	Nationalism without a Nation in India by G.Aloysius	
Web sources		
1	www.ambedkar.org	
2	www.saxakali.org	
3	https://www.frontiersin.org/articles/10.3389/fpsyg.2017.00487/full	
4	https://www.jstor.org/stable/2053672	
5	https://www.sciencedirect.com/science/article/abs/pii/S2214629620301079	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

**SECOND YEAR - SEMESTER III
TRANSLATION STUDIES**

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211GEC34	Translation studies	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	To enable students to get a glimpse of the rich diversity of Indian culture and literature									
LO2	To provide knowledge about the regional languages through representative texts in English translation									
LO3	To equip the students in the skills as well as the politics of translation.									
LO4	Focus on important dimensions of culture through the prescribed texts									
LO5	Understanding the nuances of translations									
Details										
<p>UNIT I Translation- definition, nature, scope Translator and his qualities</p> <p>UNIT II Types of Translation</p> <p>UNIT III Problems in Translation</p> <p>UNIT IV History of translation</p> <p>UNIT V Workshops on Translation</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the systematic study of translation	PO1, PO3
CO2	Appreciate better the dimensions of language and its nuances essential for translation	PO2, PO5
CO3	Gain exposure to effective translation	PO4
CO4	Be equipped in the skills as well as the politics of translation.	PO6, PO8
CO5	Gain knowledge in the regional languages through representative texts in English translation	PO9
Text Books(Latest Editions)		
1.	Lalita and Susie Tharu. <u>Introduction to Women Writing in India</u> . Penguin	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Bassnett, Susan and Harish Trivedi. eds. 1999. <u>Post-colonial Translation</u> . London. Routledge	
2.	Amit Choudhury, 2001, The Picador Book of Modern Indian Literature, Macmillan, London	
3	R. Azhagarasan&Ravikumar Anthology of Tamil Dalit Writing (OUP)	
Web sources		
1	https://en.wikipedia.org/wiki/Translation_studies#:~:text=Translation%20studies%20is%20an%20academic,of%20study%20that%20support%20translation	
2	https://www.tandfonline.com/toc/rtrs20/current	
3	https://complit.fas.harvard.edu/translation-studies	
4	https://www.seagullbooks.org/our-authors/p/indira-parthasarathy/	
5	https://www.lit-across-frontiers.org/about-translation-workshops/	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER III
EXTRA DISCIPLINARY COURSE: FUNCTIONAL ENGLISH

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211DSC35A	Functional English	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	To expose the learners towards the organizing and delivery of speech									
LO2	To train the learners in various language skill in Public Speaking									
LO3	Creating awareness about using language according to the situation									
LO4	Helping learners overcome common problems of Indian speakers of English									
LO5	Introducing major features of spoken English									
Details										
<p>UNIT I Public Speaking 1.Characteristics of a good speaker 2.Methods of Speaking 3.Preparation and Delivery of Speech</p> <p>UNIT II Speech for Situations 1. Speech to inform 2.Speech to Persuade 3.Speeches for Special occasions</p> <p>UNIT III Occupational Skills 1. Email 2. Resume 3.Official memo</p> <p>UNIT IV Interview Skills 1.Prepare and practice for Interviews 2.Some General Questions in an Interview 3.Profile Writing for a Job 4.Presentation Skills</p> <p>UNIT V Interpersonal Skills 1.Team Development 2.Relationship and Communication 3.Negotiation</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Define communicative skills	PO2
CO2	Utilize the nuances of English language in publicspeaking	PO1, PO2
CO3	Evaluate language skills in day to day life	PO3, PO4
CO4	Develop different styles of occupational skills	PO5, PO6
CO5	Learn to analyze the usage of English words in different contexts and acquire considerable flair inusing broad range of vocabulary	PO8
Text Books(Latest Editions)		
1.	Mohan, Krishna, et al. <i>Developing Communication Skills</i> . MacmillanPublishers India Ltd., 2009.	
2.	Mitra, Barun K. <i>Effective Technical Communication: a Guide for Scientists and Engineers</i> . Oxford University Press, 2006.	
References Books (Latest editions, and the style as given below must be strictly adheredto)		
1.	Sudha,S. <i>Job Fair Keys</i> , Jayalakshmi Publications, 2017.	
2.	Functional English Grammar: An Introduction for Second Language Teachers (Cambridge Language Education)	
Web sources		
1.	Team Development- https://blog.vantagecircle.com/team-development/5 . Relationship and Communication- https://2012books.lardbucket.org/books/a-primer-on-communication-	
2.	Negotiation-https://www.pon.harvard.edu/daily/negotiation-skills-daily/what-is-negotiation/	
3.	https://in.indeed.com/career-advice/interviewing/interviewing-skills	
4.	https://careerwise.minnstate.edu/careers/occupational-skills.html	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER IV
EMPLOYABILITY SKILLS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211DSC35B	Employability skills	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	To help students identify the knowledge and skills required for obtaining employment.									
LO2	To emphasize on individual skill assessments and interpersonal communication skills.									
LO3	To help them understand workplace responsibilities, teamwork skills, safety issues and personal management skills required for the workplace.									
LO4	To assist them in understanding long term and short-term goals									
LO5	To aid them in understanding decision making strategies and setting priorities in work and personal life.									

Details
<p>UNIT I Behavioural Skills- Personal Strength Analysis-Ethics, Values & Etiquette- Social Etiquette- Role Modeling.</p> <p>UNIT II English Literacy- Functional English-Reading-Written English- Communication skills- Self Introduction-Verbal and Non-Verbal Communication-Campus to work.</p> <p>UNIT III IT Literacy- Basics of Computers-Operating System- Ms Word-Ms Excel-Web browsers and search engines-email-mobile application.</p> <p>UNIT IV Entrepreneurship Skills- Maintaining Efficiency at Workplace-Occupational Safety, Health and Environment Education.</p> <p>UNIT V Career plan-basic professional skills-resume preparation- mock interview- career pathways-search and apply for job.</p>

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Get to know their personal strengths and weaknesses.	PO1
CO2	Understand factors that contribute to confidence and self-esteem	PO1, PO2
CO3	Gain knowledge on the skill of communicating effectively with employers, supervisors and co-workers.	PO4, PO6
CO4	Understand teamwork approach to completing tasks.	PO4, PO5, PO6
CO5	Be aware on the strategies for handling stress and work pressure.	PO3, PO8
Text Books (Latest Editions)		
1.	Arvind M Nawale, Mahesh M Nivargi, An Introduction to Employability Skills-A text book for College Students. Macmillan Publications.	
2.	A. K. Xavier and S. Radhakrishnan, A Textbook of Employability Skills, JKPPublications.	
3.	Manojkumar C Shimpi, Employability Skills. Neelam Publications.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Soft Skills & Employability Skills by Sabina Pillai & Agna Fernandez. Cambridge University Press.	
Web sources		
1.	https://cbseacademic.nic.in/web_material/Curriculum21/publication/secondary/Employability_Skills10.pdf	
2.	https://leverageedu.com/blog/behavioural-skills/	
3.	https://in.indeed.com/career-advice/career-development/professional-skills	
4.	https://www.countryliving.com/life/g15915245/social-etiquette/	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POS	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER III
SOFT SKILL III - LEADERSHIP SKILLS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
	Elective	Y	Y	-	-	2	2	25	75	100
Learning Objectives										
LO1	To introduce the students to all aspects of leadership and organizations.									
LO2	Enable them to master Soft Skills.									
LO3	Help them improve their body language and Non - Verbal Communication skills.									
LO4	To make them become good leaders.									
LO5	Teach them organizational behavior, Conflict management, strategy and entrepreneurship.									
UNIT I INTRODUCTION										
<ol style="list-style-type: none"> 1. Role of a Leader 2. Leadership Development and Behavior 3. Trust, Integrity and Ethics Personality and Leadership 										
UNIT II										
SELF-ASSESSMENT										
<ol style="list-style-type: none"> 1. Work/Life Balance 2. Leader/Follower Relationship Making /Leading change 										
UNIT III										
LEADERSHIP SKILLS										
Time Management (The Priority Matrix – Minimizing Distractions - Avoiding Procrastination – Action Planning)										
Delegation Skills (Successful Delegation – Barriers to delegation – The who and how of delegating – The SMART acronym)										
UNIT IV										
NEGOTIATION SKILLS										
1. Definition of negotiation 2. Types of negotiation 3. Stages of negotiation										
UNIT V										
CONFLICT RESOLUTION										
1. Reasons for conflict 2. Consequences of conflict 3. Resolution Strategies										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Demonstrate an understanding of leadership qualities	PO2, PO10
CO2	Identify the different aspects of leadership.	PO1, PO3
CO3	Exhibit their mastery in body language and Non Verbal Communication	PO4, PO6
CO4	Master negotiation skills	PO5, PO6, PO7
CO5	Be able to analyse organizational behavior, conflicts and entrepreneurship skills	PO8, PO9
Text Books (Latest Editions)		
1.	Maxwell, John. Developing the Leader Within You. New Delhi, Three ESS Publication	
2.	Maxwell, John. The 21 Irrefutable Laws of Leadership Dana Daniel. Conflict Resolution	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Schiffman, Stephen. Negotiation Techniques (That Really Work)	
2.	<u><i>Open Journal of Leadership - SCIRP</i></u> ISSN Print: <u>2167-7743</u> ISSN Online: <u>2167-7751</u> Journal of Leadership & Organizational Studies (JLOS).	
Web Resources		
1.	https://www.skillsyouneed.com/leadership-skills	
2.	https://www.mindtools.com/Leadership Skills	
3.	https://www.techtarget.com/searchcio/definition/leadership-skills?amp=1	
4.	https://www.skillsyouneed.com/leadership-skills.html	
5.	https://haiilo.com/blog/what-are-the-top-leadership-skills-that-make-a-great-leader/	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER IV
TWENTY-FIRST CENTURY MILLENNIAL LITERATURE AND CULTURE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC41	Twenty-first century millennial literature and culture	4	1	-	-	4	5	25	75	100
Learning Objectives										
CO1	To sensitize the students to various aspects of new studies in twenty first century millennial literature.									
CO2	Understanding important ideas, movements and systems of thought that effectively contributes to the rich diversity of 21 st century life of people at the global level.									
CO3	Identify the possibilities for multidisciplinary analysis of literary texts.									
CO4	Analyze literary texts by employing appropriate interdisciplinary theories.									
CO5	Evaluate the viability of interdisciplinary analyses of literary and cultural forms.									
Details										
<p>UNIT I- Blue Studies The Hungry Tide - Amitav Ghosh The Life of Pi - Yann Martel</p> <p>UNIT II- Animal Studies Margo DeMello “Human Animal Studies” from <i>Animals and</i> “What is it like to be a trope?” from <i>Literature and Animal Studies</i></p> <p>UNIT III- Medical Humanities Thomas R. Cole et al “Introducing Medical Humanities” from <i>Medical Humanities: An Introduction-</i> Dan Millman Way of the Peaceful Warrior</p> <p>UNIT IV- Climate Studies Introduction to Climate Change and Studies Barbara Kingsolver Flight behavior</p> <p>UNIT V- Disability Studies Lennard J. Davis “Introduction: Disability, Power and Culture” From the Disability Studies Reader. Clarke Barker and Stuart Murray “Introduction: On Reading Disability in Literature” from The Cambridge Companion to Disability Studies</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Analyse contemporary issues and its immediate requirement	PO3
CO2	Effectively understand their social responsibility	PO2, PO6
CO3	Gain exposure to the emerging trends in 21 st century millennial literature.	PO4. PO5
CO4	Be equipped in the interdisciplinary theories.	PO6
CO5	Appreciate the viability of interdisciplinary analyses of literary and cultural forms.	PO10
Text Books (Latest Editions)		
1.	Bates, Victoria, et al. <i>Medicine, Health and the Arts: Approaches to the Medical Humanities</i> . 1st ed., Routledge, 2015.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Bleakley, Alan. <i>Medical Humanities and Medical Education: How the Medical Humanities Can Shape Better Doctors</i> . Routledge, 2016.	
2.	DeMello, Margo. <i>Body Studies: An Introduction</i> . 1 st ed., Routledge, 2013	
3	Nocella II J, Antony., Sorenson, John. Socha, Kim., and Atsuko Matsuoka. <i>Defining Critical Animal Studies: An Intersectional Social Justice Approach for Liberation</i> . Peter Lang Publishing Inc., 2014.	
Web sources		
1	http://www.criticalanimalstudies.org/students-for-cas/journal-for-critical-animal-studies/archives/	
2	http://www.jstor.org/stable/25614299.	
3.	https://www.timeshighereducation.com/student/student-services/blue-studies-ii nternational	
4.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2746847/	
5.	https://en.m.wikipedia.org/wiki/Medical_humanities	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 – Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

**SECOND YEAR - SEMESTER IV
CORE XI - SUBALTERN STUDIES**

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211AEC42	Subaltern studies	4	1	-	-	4	5	25	75	100

Learning Objectives

LO1	To train and prepare students for enhancing their skills to understand the issues related to socially excluded and marginalised groups
LO2	Develop strategies to deal with these issues successfully.
LO3	Analysis of literary texts in Subalten lens
LO4	To examine the defined role of social constructions that affecting the space of the marginalized
LO5	Critically analyzing subaltern writing.

Details

UNIT I

POETRY – DETAILED

Rokade, L.S. – To Be or Not to Be Born Jagtap,

Sirumalesh, K.V. The Untouchables

(From Indian Poetry Today Volume II published by Indian Council for Cultural Relations)

UNIT II

PROSE – DETAILED

Martin Luther King (Jr) – I Have a Dream

NON-DETAILED

GayatriC.Spivak - Can the Subaltern Speak ?

UNIT III

DRAMA – DETAILED

C.T. Indra (Translation) - Nandan

DRAMA – NON - DETAILED

Vijay Tendulkar – Kanyadan

UNIT IV FICTION

Bama – Karukku

UNIT V Short Stories

1. Premchand – The Shroud
2. Mahasweta Devi – Breast Stories

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Remember the diverse concepts that address issues of subalterns.	PO2
CO2	Comprehend the meaning and nature of the Subaltern history.	PO3, PO6
CO3	Analyse various subaltern texts	PO1,PO2, PO5
CO4	Determine the sources and structures of social inequalities.	PO6
CO5	Develop strategies to deal with Maginalized issues successfully.	PO8, PO9
Text Books(Latest Editions)		
1.	Guha, R. S. of P. S. R. (1988). <i>Selected subaltern studies</i> . Oxford University Press.	
References Books (Latest editions, and the style as given below must be strictly adheredto)		
1.	Ludden, David, Reading Subaltern Studies: Critical History. Orient Blackswan Pvt Ltd, 2003.	
Web sources		
1	https://home.csulb.edu/~ssayeghc/theory/subalternstudies.htm#:~:text=Subaltern%20Studies%20emerged%20around%201982,had%20not%20been%20heard%20previous.	
2.	https://scholarblogs.emory.edu/postcolonialstudies/2020/02/17/subaltern-studies/	
3.	http://magazines.odisha.gov.in/Orissareview/2014/Nov/engpdf/82-87.pdf	
4.	https://www.sas.upenn.edu/~dludden/ReadingSS_INTRO.pdf	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 – Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER IV
FILM AND MEDIA STUDIES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks			
								CIA	External	Total	
23211AEC43	Film and media studies	4	1	-	-	3	5	25	75	100	
Learning Objectives											
LO1	Finding the popular interest in films with technical and socio-cultural dimensions of film appreciation.										
LO2	Understanding the bond between the films and literature.										
LO3	Analyzing the literary texts in comparison with the films.										
LO4	Critical appreciation of films in the background of literary theories.										
LO5	Tracing the differentiation in films from different parts of the world.										
	Details UNIT I William Rothman 1 - The 'I' of the Camera [OUP] A Norton Reader - Film Analysis An Intro-Kristin Thompson - Film History David Bordnell [Mc Grawhill. Edn] UNIT II Nathan Abrams - New Wave New Hollywood Reassessment, Recovery & Legacy Gregory Frame [eds] [Bloomsbury Publication] UNIT III Geoffrey - Oxford History of World Cinema Novel – Smith [Editor] [OUP] Shohini Chaudhri - Contemporary World Cinema [EUP] UNIT IV S. Krishnaswamy Yues Thoraval- Indian Cinema Theodore Baski - Adaptation of Lit. to Tamil Cinema Neelam Sidhar - Bollywood & Postmodernism Wright [EUP]V UNIT V Lit. to Tamil Cinema Linda Costanzo Cahir - Ory & Practical Approaches										
	Film Studies John Hill - Critical Approaches - Film studies [OUP] Movies for Appreciation A Few Good Men - Legal Drama by Aaron Sorkin's 1989 Confessions of a - Sophin Kinsella Shopaholic Bridge on River Kwai - Novel to Film										
		Total							90		
Course Outcomes											

Course Outcomes	On completion of this course, students will;	
CO1	Critically review films	PO1,PO2
CO2	Connect film and literature nuances effectively	PO3, PO4
CO3	Gain exposure to film techniques and genres	PO7
CO4	Critically appreciate cinema	PO6,PO8
CO5	Analyse film forms effectively	PO10
Text Books (Latest Editions)		
1.	Louis Giannetti, 1972, Understanding Movies, Prentice Hall, New Jersey.	
2.	Ed. S. Vasudevan, 2000, Making Meaning in Indian Cinema, OUP, New Delhi.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Ed. Bill Nichols, 1993, Movies and Methods Vol.I, Edition Seagull Books, Calcutta.	
2.	Ed. Bill Nichols, 1993, Movies and Methods Vol. II, Edition Seagull Books, Calcutta.	
3	Susan Hayward, 2004, Key Concepts in Cinema Studies, Routledge, London.	
Web Resources		
1	www.academicinfo.net/film.html .	
2.	https://www.norton.com/books/9780393420531	
3.	https://journalism.uoregon.edu/directory/faculty-and-staff/all/jwasko	

4.	https://m.economictimes.com/opinion/interviews/there-is-a-lot-of-power-in-tamil-cinema-because-of-its-closeness-to-everyday-life-anand-pandian-author-reel-world/amp_articles/51169927.cms
5.	https://guides.library.yale.edu/c.php?g=295800&p=1975065

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	1 5	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3. 0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER IV
ENGLISH FOR CAREERS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211SEC44	English for careers	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	Give the students an understanding of the scope of English Language Teaching as a discipline.									
LO2	Introduce key issues pertaining to Second Language Acquisition.									
LO3	Provide a broad overview of English language learning, teaching and testing.									
LO4	Make the students aware of the specific challenges of teaching English in India.									
LO5	Build job-related vocabulary									
Details										
<p>UNIT I Effective Writing 1.Features of Effective Writing 2.Business correspondence3.E-Mail 4.Report writing Technical Writing</p> <p>UNIT II Administrative Process 1.Agenda preparation 2.Preparing minutes</p> <p>UNIT III Communication 1.Presenting Data in Verbal modes Presenting Data in 2.Non- verbal modes</p> <p>UNIT IV Effective lecturing Preparing Lectures on Topics 2.Preparing Persuasion Talks</p> <p>UNIT V Telephone Etiquette 1. Business Talks over Telephone Discussion on Career Prospects and Advancements</p>										

Course Outcomes		
CO1	Gain knowledge of the various modes of official correspondence and presentation	PO2
CO2	Comprehend the right use of English at official works	PO1, PO3
CO3	Apply the acquired styles of occupational skills and practicing them	PO4, PO5
CO4	Pick up the official behavior and becoming better doers	PO6, PO7
CO5	Market the skill business correspondence and fixing themselves in better jobs	PO8

Text Books (Latest Editions)	
1.	V.Saraswathi&Maya.K.Mudbhatkal: English for Competitive Examinations, Emerald Publishers, Chennai 2000
2.	English for Careers: Business, Professional, and Technical Paperback by <u>Leila R.Smith Emeritus</u>
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Oxford English for Careers Technology 1 Student Book Paperback – Student Edition, 28 June 2007 by <u>Eric Glendinning</u>
2.	English for Careers: Business, Professional, and Technical
Web sources	
1.	https://www.worldcat.org/formats-editions/864901969?referer=di&editionsView=true
2.	https://www.academia.edu/34266181/Oxford_English_For_Careers_TECHNOLOGY_1_Teachers_Resource_book_David_Banamy
3.	https://www.nature.com/scitable/topicpage/effective-writing-13815989/
4.	https://libraryguides.mdc.edu/c.php?g=988097&p=7290942

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

3 – Strong, 2 – Medium, 1 - Low

SECOND YEAR - SEMESTER IV

English Teaching methods, Aptitude, Attitude for competitive examination

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23211SEC46	English Teaching methods, Aptitude, Attitude for competitive examination	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	Comprehending the nuances and question pattern to get through NET, SET and Gate Exams.									
LO2	Evaluating the knowledge of literature.									
LO3	Repeated practice to attend MCQs									
LO4	Profound understanding about the various movements in English Literature									
LO5	Tracing the growth of English literature and literary forms									
Details										
<p>UNIT I Teaching and Research Aptitude</p> <p>UNIT II Comprehension</p> <p>UNIT III communication</p> <p>UNIT IV Logical reseaning</p> <p>UNIT V Mathematical research and aptitude</p>										

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Succeed with ease in competitive exams.	PO2, PO3
CO2	Effectively attempt MCQs	PO1

CO3	Gain profound understanding about the various movements in English Literature	PO6
CO4	Understand the nuances of competitive exams	PO7
CO5	Relate to theory and literature	PO6, PO10
Text Books(Latest Editions)		
1.	Harpreet Kaur. Oxford NTA–UGC Paper I FOR NET/SET/JRF: Teaching and Research Aptitude. Oxford, 2020	
2.	Ronald Carter and John McRae. The Routledge History of English Literature: Britain and Ireland. Routledge	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	SrinivasaIyengar, Kodaganallur Ramaswami. Indian Writing in English. Sterling Publ., 2019	
2.	Maryemma Graham and Jerry Washington Ward. The Cambridge History of African American Literature. Cambridge University Press, 2015.	
3.	Henry Beers A. Brief History of English and American Literature. OUTLOOK VERLAG, 2020.	
4.	Peter Barey. An Introduction to Literary and Cultural Theory by Peter Barry.	
5.	M.H. Abrams – A Glossary of Literary Terms.	
Web Resources		
1.	https://ugcnetpaper1.com/books-recommended-nta-ugc-net-english/	
2.	https://byjusexamprep.com/ugc-net-english-books-i	
3.	https://journalism.uoregon.edu/directory/faculty-and-staff/all/jwasko	
4.	https://m.economictimes.com/opinion/interviews/there-is-a-lot-of-power-in-tamil-cinema-because-of-its-closeness-to-everyday-life-anand-pandian-author-reel-world/amp_articleshow/51169927.cms	
5.	https://guides.library.yale.edu/c.php?g=295800&p=1975065	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF ENGLISH

**B.A. ENGLISH
CURRICULUM**

FULL TIME

[Regulation 2023]

[Candidates admitted from the academic year 2023-2024 onwards]

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THE REGULATIONS ON LEARNING OUTCOMES BASED CURRICULUM FRAME WORK FOR UNDERGRADUATE EDUCATION

1. Preamble

The undergraduate programme B.A., English, aims for students to leverage their knowledge of the English Language for analyzing literature, history, and its modern aspects through the core subjects. In addition, the course explores the intricacies of the English Language and its implementation in diverse fields. Moreover, the subjects in a BA English course are composed by detail-oriented educators, providing a weighty syllabus related to diverse aspects of English literature and the language world.

The B.A., English subjects list's most significant and initial subject is the English Language. Initiating the three-year journey with the basics of English is necessary to further understand the in-depth concepts, complex language, and intricacies of world literature. The subject deals with a basic understanding of English grammar, with its origin, evolution, advancement, and further change with the modern world. The English language is also necessary to proceed toward complex study slowly. It also narrates the history of English, which can be very engaging and insightful for English learners. The subject allows learning the historical beginning and significance of English literature. Since the richness of English literature is heavily reliant on its history; therefore, this subject gathers the core English history modules covering the details of literature from different regions of the world. English literature also projects societal and cultural changes through the centuries that are reflected through its written works. As a student proceeds ahead, fields and specifications clear a lot better by possessing the knowledge and base of English literature, which is in its history.

A language's most significant trait is to communicate, and this B.A course English subject is added to the syllabus with the same intention. Communication in B.A., English grants students the depth of using English as a communication medium. Fundamentals, theories, and communication tools are provided to the students to further enhance their English skills and make them more accomplishable. Communication subject also comprises the study of creative writing and public relations, helping students get enrolled in communication-based courses with the right foundation.

**PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE
& TECHNOLOGY (PRIST)**

**REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM
FRAMEWORK FOR UNDERGRADUATE EDUCATION**

Programme:	B.A ENGLISH
Programme Code:	UGENGEC
Duration:	3 years [UG]
Programme Outcomes:	<p>PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.</p> <p>PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p>PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.</p> <p>PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.</p> <p>PO5: Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.</p> <p>PO6: Self-directed & Lifelong Learning: Ability to work</p>

	<p>independently, identify and manage a project. Ability to acquire knowledge and skills, including “learning how to learn”, through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.</p> <p>PO7: Reflective Thing: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society</p> <p>PO8: Reading & Projects: Document their reading and interpretive practices in assignments, translation works, and independent projects.</p> <p>PO9: Confidence & Effectiveness: Confidently and effectively articulate their literary and textual experiences.</p> <p>PO 10: Social Skills & Empathetic Approach: Reorganize a professional and reflective approach to leadership, responsibility, personal integrity, empathy, care and respect for others, accountability and self regulation.</p>
<p>Programme Specific Outcomes:</p>	<p>PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.</p> <p>PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.</p> <p>PSO3: To prepare the students who will demonstrate respectful engagement with other’s ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.</p> <p>PSO4: Developing a research framework and presenting their independent ideas effectively. PSO5: Equipping their employability skills to excel in professions like teaching and exposing them to various</p>

	<p>activities to empower them through communication skills.</p> <p>PSO6: Enabling a holistic perspective towards the socio-political inequalities and environmental issues.</p>
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PROGRAM OUTCOMES

PO1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
PO2	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO3	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO4	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.
PO5	Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO6	Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.
PO7	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society
PO8	Document their reading and interpretive practices in assignments, translation works, and independent projects.
PO9	Confidently and effectively articulate their literary and textual experiences.

PO10	Reorganize a professional and reflective approach to leadership, responsibility, personal integrity, empathy, care and respect for others, accountability and self regulation.
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PROGRAM SPECIFIC OUTCOMES

PSO1	Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.
PSO2	Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.
PSO3	To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
PSO4	Developing a research framework and presenting their independent ideas effectively. PSO5: Equipping their employability skills to excel in professions like teaching and exposing them to various activities to empower them through communication skills.
PSO5	Enabling a holistic perspective towards the socio-political inequalities and environmental issues

PROGRAMME EDUCATIONAL OBJECTIVE (PEO)

PEO1	To give students a basic knowledge in biochemistry and to teach on ethics.
PEO2	To develop analytical and critical-thinking skills that allows independent exploration of biological phenomena through the scientific methods.
PEO3	To acquaint knowledge on modern methods of biochemical experimentation to implement for future studies
PEO5	To motivate students for social responsibilities and to educate them on ethical values in addition to inculcating environmental awareness
PEO6	To enable them to execute a research objective through experimentation

3.Highlights of the Revamped Curriculum

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project

with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.

- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the ‘Training for Competitive Examinations’ course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

4. Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	<p>Foundation Course To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning Literature and analysing the world through the literary lens gives rise to a new perspective.</p>	<ul style="list-style-type: none"> ➤ Instill confidence among students ➤ Create interest for the subject
I, II, III, IV	<p>Skill Enhancement papers (Discipline centric / Generic / Entrepreneurial)</p>	<ul style="list-style-type: none"> ➤ Industry ready graduates ➤ Skilled human resource ➤ Students are equipped with essential skills to make them employable
		<ul style="list-style-type: none"> ➤ Training on language and communication skills enable the students gain knowledge and exposure in the competitive world.
		<ul style="list-style-type: none"> ➤ Discipline centric skill will improve the Technical knowhow of solving real life problems.
III, IV, V & VI	<p>Elective papers</p>	<ul style="list-style-type: none"> ➤ Strengthening the domain knowledge ➤ Introducing the stakeholders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and interdisciplinary nature ➤ Emerging topics in higher education/ industry/ communication network / health sector etc. are introduced with hands-on-training.

IV	Elective Papers	<ul style="list-style-type: none"> ➤ Exposure to industry moulds students into solution providers ➤ Generates Industry ready graduates ➤ Employment opportunities enhanced
V Semester	Elective papers	<ul style="list-style-type: none"> ➤ Self-learning is enhanced ➤ Application of the concept to real situation is conceived resulting in tangible outcome
VI Semester	Elective papers	<ul style="list-style-type: none"> ➤ Enriches the study beyond the course. ➤ Developing a research framework and presenting their independent and intellectual ideas effectively.
Extra Credits: For Advanced Learners / Honors degree		<ul style="list-style-type: none"> ➤ To cater to the needs of peer learners / research aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

7.Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	11	11	11	11	22	20	84
Part IV	6	6	5	8	4	2	31
Part V	-	-	-	-	-	1	1
Total	23	23	22	25	24	23	140

***Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree**

6. Credit Distribution for UG Programme in English

Sem I	Credit	Sem II	Credit	Sem III	Credit	Sem IV	Credit	Sem V	Credit	Sem VI	Credit
1.1. Language	3	2.1. Language	3	3.1. Language	3	4.1. Language	3	5.1 Core Course – CC IX	4	6.1 Core Course – CC XIII	4
1.2 English	3	2.2 English	3	3.2 English	3	4.2 English	3	5.2 Core Course – CC X	4	6.2 Core Course – CC XIV	4
1.3 Core Course – CC I	6	2.3 Core Course – CC III	6	3.3 Core Course – CC V	6	4.3 Core Course – CC VII Core Industry Module	6	5.3. Core Course CC -XI	4	6.3 Core Course – CC XV	4
1.4 Core Course – CC II	5	2.4 Core Course – CC IV	5	3.4 Core Course – CC VI	5	4.4 Core Course – CC VIII	5	Core Course XII Practical- V	4	6.4 Elective -II Generic/ Discipline Specific	4
								5.4 Elective I Generic/ Discipline Specific	4	6.3 Core Course – CC XVI- Project	4
1.5 Skill Enhancement Course SEC-1 (NME)	2	2.5 Skill Enhancement Course SEC-2 (NME)	2	3.5 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	4.5 Skill Enhancement Course SEC-6	2			6.6 Extension Activity	1
		2.6 Skill Enhancement Course –SEC-3	2	3.6 Skill Enhancement Course SEC-5	2	4.6 Skill Enhancement Course SEC-7	2	5.5 Value Education	2	6.7 Professional Competency Skill	2
1.6 Ability Enhancement Compulsory Course (AECC) Soft Skill-1	2	2.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-2	2	3.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-3	2	4.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-4	2	5.6 Summer Internship /Industrial Training	2		
1.7 Skill Enhancement - (Foundation Course)	2			3.8 E.V.S	-	4.8 E.V.S	2				
	23		23		22		25		24		23
Total Credit Points											140

DEPARTMENT OF ENGLISH
B.A ENGLISH- REGULATION 2023
COURSE STRUCTURE

SEMESTER – I

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC11/ 23111AEC11/ 23132AEC11/ 23135AEC11	Tami – I/Advanced English-I/Hindi-I/ French - I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23111AEC13	Introduction to English literature	4	1	0	3
23111AEC14	Indian writing in English	4	1	0	3
23111GEC15	Social history of England	3	0	0	3
23111GEC16	Myth and Literature	3	0	0	3
Skill Enhancement Course					
23111SEC17	Green literature	2	0	0	2
23111SEC18	Foundation Course (FC)	2	0	0	2
Ability Enhancement Compulsory course (AECC)					
231AECCINC	Indian Constitution	2	0	0	2
231LSCUV	Universal Human Values	0	0	0	1
	Total	26	4	0	25

SEMESTER – II

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Tami – II/Advanced English-II/Hindi-II/ French - II	3	1	0	3
23111AEC22	English-II	3	1	0	3
23111AEC23	British literature – I	4	1	0	3
23111AEC24	American literature – I	4	1	0	3
23111GEC25	History of English literature	3	0	0	3
23111GEC26	Film and Literature	3	0	0	3
Skill Enhancement Course					
23111SEC27	Philosophy for literature	2	0	0	2
23111SEC28	Spoken and Presentation Skills	2	0	0	2
Ability Enhancement Compulsory course (AECC)					
231AECCCMS	Communication Skills	2	0	0	2
231SSCBE	Basic Behavioural Etiquette	0	0	0	1
	Total	26	4	0	25

SECOND YEAR

SEMESTER – III

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC31/ 23132AEC31/ 23111AEC31/ 23135AEC31	Tamil – III/Hindi-III/Advanced English-III/ French – III	3	1	0	3
23111AEC32	English-III	3	1	0	3
23111AEC33	British literature - II	4	1	0	3
23111AEC34	Biographies, auto-biographies & memoirs	4	1	0	3
23111GEC35	Literary Genres and Terms	3	0	0	3
23111GEC36	ELT and Computer Assisted Language Learning	3	0	0	3
Skill Enhancement Course					
23111SEC37	Functional English	2	0	0	1
23111SEC38	Public speaking skills	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
23111RMC39	Research Methodology	2	0	0	2
231ACLSOAN	Office Automation	0	0	0	1
	Total	26	4	0	24

SECOND YEAR

SEMESTER – IV

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV	3	0	0	3
23111AEC42	English-IV	3	0	0	3
23111AEC43	American literature - II	4	1	0	3
23111AEC44	World literature in translation	4	1	0	3
23111GEC45	Film Studies	3	0	0	3
23111GEC46	Translation: Basic Concepts and Practice	3	0	0	3
Skill Enhancement Course					
23111SEC47	English for business	2	0	0	2
23111SEC48	English for careers	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
23111BRC49	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies-II	2	0	0	2
231LSCLS	Leadership and Management Skills	0	0	0	1
	Total	28	2	0	27

**THIRD YEAR
SEMESTER – V**

Course Code	Course Title	L	T	P	C
THEORY					
23111AEC51	Aspects of language and linguistics	4	1	0	4
23111AEC52	Authors in focus	4	1	0	4
23111AEC53	Women's writing in English and in translation	4	1	0	4
23111AEC54	Indian writing in translation	4	1	0	3
23111DSC55_	Discipline Specific Elective – I	3	1	0	3
23111DSC56_	Discipline Specific Elective – II	3	1	0	3
Skill Enhancement Course					
231AECVED	Value Education	2	0	0	2
23111SEC57	Internship/Industrial Visit/Field Visit	0	0	0	2
AUDIT COURSE					
231ACLSPSL	Professional Skills	0	0	0	1
Total		24	6	0	26

**THIRD YEAR
SEMESTER – VI**

Course Code	Course Title	L	T	P	C
THEORY					
23111AEC61	Shakespeare studies	4	2	0	4
23111AEC62	Literary Criticism	4	2	0	4
23111DSC63_	Discipline Specific Elective – III	4	2	0	3
23111PRW64	Project	0	0	6	4
23111SEC65	Professional Competency Skill- General awareness for competitive examination	4	2	0	2
231EXACT	Extension activity	0	0	0	1
AUDIT COURSE					
231ACSIKWS	Indian Knowledge System	0	0	0	2
Total		16	8	6	20
Total Credits -Programme					140
Total Credits - Audit Courses					07
Total Credits					147

Credit Distribution

Sem	AEC	SEC	GEC	DSC	AECC	Research	Others	Total
I	12	4	6	-	2	-	-	24
II	12	4	6	-	2	-	-	24
III	12	3	6	-	-	2	-	23
IV	12	4	6	-	2	2	-	26
V	15	2	-	6	2	-	-	25
VI	8	2	-	3	-	4	1	18
Total	71	19	24	9	8	8	1	140

AUDIT COURSE CREDIT DISTRIBUTION

Sem	Audit
I	1
II	1
III	1
IV	1
V	1
VI	2
Total	7

Discipline Specific Electives

Semester	Discipline Specific Elective Courses
V	23111DSC55A- Disaster management
	23111DSC55B- Writing for media
V	23111DSC56A- Art and literary aesthetics
	23111DSC56B- Introduction to Comparative Literature
VI	23111DSC63A -Fundamentals of Academic Writing
	23111DSC63B -Mass communicationand journalism

HOD

DEAN

I YEAR : SEMESTER I

Course Code	Course Title	L	T	P	C
23111AEC11	Advanced English - I	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To familiarize the students with the glossary terms, figures of speech
- To enhance vocabulary
- To learn how to edit and proof read
- To know the comparison and contrast and cause and effect forms
- To understand the impact of the speeches of famous people

Outcome:

- Development of vocabulary
- Learning to edit and do proof reading
- Reading and comprehending literature

UNIT–I: The Origin of Language - Development of Gesture, Sign, Words, Sounds, Speech and Writing Language History and the Process of Language Change Core Features of Human Language, Animals and Human Language

UNIT–II: Nature of Language Pure Vowels, Diphthongs and Consonants Language Varieties: Dialects, Idiolect, Pidgin and Creole Language and Gender, Language and Disadvantage

UNIT–III: Linguistic Form Morphology, Grammar, Syntax Saussurean Dichotomies: Synchronic and Diachronic Linguistics Semantics, Pragmatics

UNIT–IV: Branches of Linguistics Structural Linguistics, Sociolinguistics, Psycholinguistics, Neurolinguistics, Applied Linguistics

UNIT–V: Stylistics and Discourse Analysis: Relationship between Language and Literature, Style and Function, Poetic Discourse, Narrative Discourse and Dramatic Discourse

Reference book:

Author	Title of the book	Edition / Year	Publisher
Wren and Martin	English Grammar	2009	S.Chand & Company Ltd
Meenakshi Raman & Sangeetha Sharma	Technical Communication	Second Edition 2011	Oxford University Press
Sudhir Kumar Sharma	The World's Great Speeches	-	Galaxy Publishers

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC12	ENGLISH-I	3	1	-	-	3	6	25	75	100
Learning Objectives										
LO1	To enable learners to acquire the linguistic competence necessarily required in various life situations.									
LO2	To help them understand the written text and able to use skimming, scanning skills									
LO3	To assist them in creative thinking abilities									
LO4	To enable them become better readers and writers									
LO5	To assist them in developing correct reading habits, silently, extensively and intensively									
Unit No.	Unit Title & Text							No. of Periods for the Unit		
I	Poetry 1.1 A Patch of Land - Subramania Bharati 1.3 A Nation's Strength –William Ralph Emerson 1.4 Love Cycle - Chinua Achebe							20		
II	Prose 2.1 JRD - Harish Bhat 2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim							20		
III	Short Stories 3.1 The Faltering Pendulum- Bhabani Bhattacharya 3.2 How I Taught my Grandmother to Read- Sudha Murthy 3.3 The Gold Frame- R.K. Laxman							20		
IV	Language Competency 4.1 Vocabulary : Synonyms, Antonyms, Word Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction							15		
V	English for Workplace 5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions							15		

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	PO1
CO2	Understand the total content and underlying meaning in the context.	PO1,PO2
CO3	Form the habit of reading for pleasure and for information	PO4,PO6
CO4	Comprehend material other than the prescribed text	PO4,PO5,PO6
CO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	PO3,PO8

	Text books (Latest Editions)
1	Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi: Sahitya Akademi, 1967
2	How I taught my Grandmother to Read and other Stories, Murthy, Sudha, Penguin Books, India, 2004

WebResources	
1	A patch of land by Subramania Bharati translated by Usha Rajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
2	The Sparrow by Paul Laurence Dunbar https://poets.org/poem/sparrow-0
3	A Nation's Strength by Emerson https://poets.org/poem/nations-strength
4	Love cycle by Chinua Achebe : https://www.best-poems.net/chinua-achebe/love-cycle.html
5	JRD by Harish Bhat https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories
6	Us and Them by David Sedaris From Dress Your Family in Corduroy and Denim https://legacy.npr.org/programs/morning/features/2004/jun/sedaris/usandthem.html
7	Uncle Podger Hangs a Picture: http://rosyhunt.blogspot.com/2013/01/uncle-podger-hangs-picture.html
8	The Gold Frame: https://fybaenglish.blogspot.com/2018/12/the-gold-frame-r-k-laxman.html

Reference Books

(Latest Editions, and the style given must be strictly adhered to)

1.	English in use – A textbook for College Students (English ,Paper back, - T.Vijay Kumar, K Durga Bhavani, YL Srinivas
2	Practical English Usage – 4 th Edition By Michael Swan

I YEAR : SEMESTER I

CORE I – INTRODUCTION TO ENGLISH LITERATURE

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours
23111AEC13	INTRODUCTION TO LITERATURE	4	1	-	-	4	5
Learning Objectives							
LO1	To introduce the different forms of literature						
LO2	To provide learners with the background knowledge of literature						
LO3	To enable learners to understand the different genres of writing						
LO4	To examine the various themes and methodologies present in literature						
LO5	To create the ability of critically examining a text						
UNIT	Details						
I	Introduction: Poetry-Different forms of poetry- Sonnet, Ode, Elegy, Lyric Ballad.Prose-Short Story, Novella, Novel. Drama- Comedy, Tragedy, Tragi-Comedy.						
II	William Shakespeare - Sonnet 18, Sonnet 116. John Keats - Ode to Nightingale. Thomas Gray - Elegy Written in a Country Churchyard.						
III	J.M. Barrie - The Admirable Crichton. Lady Gregory - The Rising of the Moon.						
IV	Manohar Malgonkar - Spy in Amber. Don Quixote - Tilting at the Windmills.						
V	Katherine Mansfield - Bliss and other stories. Robert Frost - Mending Wall						
Course Outcomes							
Course Outcomes	On completion of this course, students will;						
CO1	Appreciate and analyse and the basic elements of poetry, including meter, rhyme, and theme.						PO1
CO2	Gain knowledge of the elements of fiction including narrative structure, character analysis and comparison between different but related texts.						PO1, PO2
CO3	Explore the dramatic storytelling including play structure, monologues, dialogue, and scene setting.						PO4, PO6
CO4	Use library resources to research and develop arguments about literary works.						PO4, PO5, PO6
CO5	Work skillfully within a team, respect coworkers, delegate work and contribute to a group project.						PO3, PO8

Text Books (Latest Editions)

1.	Backpack Literature: An Introduction to Fiction, Poetry, Drama, and Writing- X. J. Kennedy, by Pearson, 2016.
2.	Portable Literature: Reading, Reacting, Writing - 9th edition–LaurieKirschner, by Cengage Learning, 2016

References Books**(Latest editions, and the style as given below must be strictly adhered to)**

1	Henny Herawati et al., Introduction to Literature, Sanata Dharma University Press, October 2021.
2	Michael Meyer, D. Quentin Miller, The Compact Bedford Introduction to Literature with 2021 MLA Update, Bedford/St. Martin's, August 2021.
3	Janice Campbell., Introduction to Literature: Excellence in Literature English 1, 4th Ed, Everyday Education, LLC, January 2021.
4	Subhendu Mund., The Making of Indian English Literature, Taylor & Francis Ltd., 2021.
5	Adamson H. D. Linguistics and English Literature: An Introduction, Cambridge University Press, 2019.
6	Felicity Titjen et al.(ed), Teaching English Language and Literature, Taylor & Francis, 2020

Web Resources

1.	ASIATIC: IITUM Journal of English Language & Literature
2.	The English Historical Review (EHR)

CORE II - INDIAN WRITING IN ENGLISH

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours
23111AEC14	INDIAN WRITING IN ENGLISH	Y	Y	-	-	4	5
Learning Objectives							
LO1	To familiarize the students with the emergence and growth of Indian Writing in English in the context of colonial experience.						
LO2	To help in understanding issues concerning Indian Writing in English such as the representation of culture, identity, history, constructions of nation, (post)national and gender politics, cross-cultural transformations.						
LO3	To enable learners to appreciate Nation-Nationalism; Counter Discourse; Subalternity; Identity Movements.						
LO4	To closely examine the various themes and methodologies existing in Contemporary Indian Writing in English.						
LO5	To help learners apply the ideas encapsulated in Indian Aesthetics to literary texts						
UNIT	Details						
I	Ruskin Bond - Handful of Nuts, Night Train to Deoli K.A. Abbas - Sparrows						
II	Rabindranath Tagore - Khabhuliwala. Ruskin Bond - School Days						
III	Poetry- Toru Dutt - The Lotus Sri Aurobindo - The Tiger and the Deer.						
IV	Sarojini Naidu- The Village Song Shiv K Kumar - Indian Women Mirza Ghalib - It is not Love, it is Madness						
V	Rabindranath Tagore - Mukhthadhara. Nissim Ezeikel - Nalini: A Comedy in Three Acts Joginder Paul - Sleepwalkers.						
Course Outcomes							
Course Outcomes	On completion of this course, students will;						
CO1	Appreciate the historical trajectory of various genres of Indian Writing in English from colonial times to till the present					PO1	
CO2	Analyze Indian literary texts written in English in terms of colonialism, postcolonialism, regionalism, and nationalism					PO1, PO2	
CO3	Understand the role of English as a medium for political awakening and the use of English in India for creative writing					PO4, PO6	
CO4	Analyze how the sociological, historical, cultural and political context impacted the texts selected for study					PO4, PO5, PO6	

CO5	Evaluate critically the contributions of major Indian English poets and dramatists	PO3, PO8
Text Books (Latest Editions)		
1.	Rexroth, Kenneth. The New British Poets: An Anthology. Granger Books, 1976.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Bacon, Francis, and Michel Leiris. Francis Bacon. Ediciones Poligrafa, 2008.	
2.	MARLOWE, Christopher. Dr. Faustus. BOOK ON DEMAND LTD, 2021.	
3.	Shelley, Mary Wollstonecraft. Frankenstein. CreateSpace, 2015.	
4.	Swift, Jonathan, et al. Gulliver's Travels. Oxford University Press, 2019.	
Web Resources		
1.	Ranger, Paul. "Technical Features." She Stoops to Conquer by Oliver Goldsmith, 1985, pp. 51–68., https://doi.org/10.1007/978-1-349-07664-2_5.	
2.	Dickens, Charles. "Fifty-Two." A Tale of Two Cities, 2008, https://doi.org/10.1093/owc/9780199536238.003.0047 .	

SOCIAL HISTORY OF ENGLAND(ALLIED)

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours
23111GEC15	SOCIAL HISTORY OF ENGLAND (ALLIED)	3	1	-	-	4	4
Learning Objectives							
LO1	To provide students with a comprehensive idea about the development of English literature and language over the ages						
LO2	To help student trace the trajectory of the growth of English literature from the period of its inception, dating back to the seventh century, to the present era						
LO3	To help them develop an understanding of the structural development of the English language						
LO4	To inform them about the various external linguistic influences that have contributed to the making of the language						
LO5	To create the ability of critically examining a text						
UNIT	Details						
I	The Renaissance and its Impact on England, The Reformation - causes and effects						
II	The Commonwealth of Nations, The Restoration, Coffee-houses and their Social Relevance						
III	Impact of the Industrial, Agrarian and the French Revolutions on the English society, Humanitarian Movements in England						
IV	The Reform Bills and the Spread of Education- Social impact of the two World Wars, the Labour Movement, the Welfare State						
V	The Cold War (1945-1991)- The Falkland War (1982)-The Gulf War (1990).						
Course Outcomes							
Course Outcomes	On completion of this course, students will;						
CO1	Gain extensive insight into the history of English literature, while laying special emphasis on various literary movements, genres and writers that are held to be the representatives of their times.					PO1	
CO2	Evaluate the way socio-cultural and historical phenomena influence the literary production of a particular period					PO1, PO2	
CO3	Familiarize themselves with the socio-cultural ambience and the discursive frameworks of various ages					PO4, PO6	
CO4	Develop a nuanced appreciation of the literary stalwarts of those times.					PO4, PO5, PO6	

CO5	Gain in-depth understanding on the growth of the English language under the influence of various other languages including Latin and French, besides being mentored in the structural nitty-gritties of the language.	PO3, PO8
Text Books (Latest Editions)		
1.	Ed. Keith Wrightson, A Social History of England, 1500- 1750, 2018, NortonPress.	
2.	Ed. Julia Crick, Elisabeth Van Houts, A social History of England, 900-1200, 2012, Cambridge University Press.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Ed. Rosemary Horrox, A social History of England, 1200-1500, June 2012,Cambridge University Press	
Web Resources		
1	A social history of England : Briggs, Asa, 1921- : Free Download, Borrow, andStreaming : Internet Archive	

MYTH AND LITERATURE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111GEC16	Myth and literature	3	1	-	-	4	4	25	75	100

Learning Objectives

LO1	To help students at the origin and sources of myths in literature.
LO2	Provide them with a unique approach of interpreting critical analysis that has given rise to a need of understanding the concept 'Myth' in relation to man's life
LO3	Get an In-depth study of the theoretical approaches
LO4	Help them gain insight to myth, ritual, philosophy, methods and contemporary issues in religious studies from ancient times to modern times
LO5	Help them to understand the definition of symbolism with its different types and dimensions.

UNIT

Details

I	Introduction to Myth/ Mythology- Sources of Indian mythology – Types of story and its relation to myth
II	Ted Hughes Selections from Tales from Ovid i) Creation; Four Ages; Flood; Lycaon ii) The Rape of Proserpina iii) Birth of Hercules iii) Echo and Narcissus iv) Pyramus and Thisbe
III	General idea of Vedic, Epic and Puranic Mythology
IV	Symbolism: Role of Symbols in myths, Symbols related to Sacrifice and other Iconography, Understanding totems and taboos in tribal myths
V	Indian Mythology by (Devdutt Pattanaik)- in-depth psychological devotion to the perspectives of Indian Mythology in Literature,

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Understand the origin and sources of myths in literature	PO1
CO2	Develop an in-depth knowledge of the theoretical approaches of myth, ritual, philosophy, methods and contemporary issues in religious studies from ancient times to modern times.	PO1, PO2
CO3	Gain insight to the basic idea of Vedic Epic and Puranic Mythology and also the connection among Fire, Rain, Stars, Holy Drink, Supernatural birth, Mountains & Rivers, Holy places & Festivals	PO4, PO6
CO4	Understand symbolism with its different types and dimensions.	PO4, PO5, PO6
CO5	Develop in-depth psychological devotion to the perspectives of Indian Mythology in Literature, Art, and Music	PO3, PO8

Text Books (Latest Editions)

1.	Bauman, Richard. <i>A Genre@ in Folklore, Cultural Performance, and Popular Entertainments: A Communications-Centered Handbook</i> . Oxford: Oxford University Press, 1991.
2.	Boas, Franz. <i>A Introduction to James Teit, @ Traditions of the Thompson River Indians of British Columbia</i> . <i>Memoirs of the American Folklore Society</i> , VI, 1898.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Eller, Cynthia. <i>The Myth of the Matriarchal Prehistory: Why an Invented Past Won't Give Women a Future</i> . Boston: Beacon Press, 2000.
2.	Grimm, Jakob and Wilhelm Grimm. <i>A Prefaces to the First and Second Editions@ of the Nursery and Household Tales, in Maria Tatar, The Hard Facts of the Grimms= Fairy Tales</i> . Princeton: Princeton University Press, 1987 (originally published 1812-1819): 203-222.
Web Resources	
1.	<i>Bascom, William. A The Forms of Folklore: Prose Narratives@ in Journal of American Folklore 78, 1965: 3-20.</i>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

GREEN LITERATURE

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours
23111SEC16	GREEN LITERATURE	2	-	-	-	2	2
Learning Objectives							
LO1	To broaden the idea of literature and the concept of texts.						
LO2	To learn the difference between genre fiction and literary fiction.						
LO3	To make students gain an understanding of the folk roots of literature.						
LO4	To make students find a perspective into the debate between high and low cultures.						
LO5	To analyze the fantasy work that gains popularity.						
UNIT	Details						
I	William words worth – My haert leaps up A.K Ramanujan- “Flowering Tree”						
II	Humboldt, Alexander von, Views of Nature Rachel Carson -“A Fable for Tomorrow’						
III	Henry David Thoreau- LIFE IN WOODS D.H. Lawrence -“Snake”						
IV	Jack London -To Build a Fire William Faulkner-A Rose for Emily John Green -Paper Towns						
V	Annie dillard – Teaching A Stone Talk Amitav Ghosh -The Hungry Tide						
<p>The course outcome is based on the Learning Objectives. Each course objective will have a course outcome. This will elucidate what the student will acquaint once he completes that particular unit. There will be equal number of Learning Objectives and Course outcomes.</p> <p>The blooms taxonomy verbs will be given as a separate annexure for your reference.Each course outcome should be mapped with the POs.</p> <p>The mapping of each CO can be done with any number of POs.</p>							
Course Outcomes							
Course Outcomes	On completion of this course, students will;						
CO1	acquire awareness about one of the oldest forms of ecocriticism-respect world views and the discrimination in society as failure to comply with egalitarian values of Nature.					PO1	
CO2	become familiar with the opposing viewpoints in Man’srelationship with the physical environment from literary texts.					PO1, PO2	

CO3	understand and identify Ecological concepts-Symbiosis, Mutation, , Parasitism Biodiversity from the literary texts prescribed.	PO4, PO6
CO4	become familiar with ecological, deep ecological and oikopoetic principles	PO4, PO5, PO6
CO5	apply these critical tools to analyse and understand environmental messages from literary texts and other mediums	PO3, PO8
Text Books (Latest Editions)		
1	Chute, Hillary. -Comics as Literature .Reading Graphic Narrativell.PMLA – Publications of The Modern Language Association of America. 123. 452-465. 2008.	
2	Herge.Tintin in Tibet.Baker and Taylor, 2009.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Chauhan, Anuja. The Zoya Factor Harper Collins, 2008.	
2.	Gill, Rosalind & Herdieckerhoff, Elena. -Rewriting the romance: new femininities in chick lit?!.Feminist Media Studies 6(4). 2006.	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

Course Code	Course Title	L	T	P	C
231AECINC	Indian Constitution	-	-	-	2

Aim

- To understand the salient features of the Indian Constitution

Course Objectives:

- To make the students understand about the democratic rule and parliamentary administration
- To appreciate the salient features of the Indian constitution
- To know the fundamental rights and constitutional remedies
- To make familiar with powers and positions of the union executive ,union parliament and the supreme court
- To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Course outcome:

1. Democratic values and citizenship training are gained
2. Awareness on fundamental rights are established
3. The function of union government and state government are learnt
4. The power and functions of the judiciary are learnt thoroughly
5. Appreciation of democratic parliamentary rule is learnt

Unit I:The making of Indian constitution

The constitution assembly organization –character -work salient features of the constitution- written and detailed constitution -socialism –secularism-democracy and republic.

Unit II: Fundamental rights and fundamental duties of the citizens

Right of equality -right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies -fundamental duties .

Unit III: Directive principles of state policy

Socialistic principles-Gandhi an principles-liberal and general principles -differences between fundamental rights and directive principles

Unit IV: The union executive, union parliament and Supreme Court

Powers and positions of the president -qualification _method of election of president and vice president -prime minister -Rajya Sabah -Lok Sabah .the supreme court -high court - functions and position of supreme court and high court

Unit V: State council -election system and parliamentary democracy in India

State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.

References:

- 1) Palekar.s.a. Indian constitution government and politics, ABD publications, India
- 2) Aiyer, alladi krishnaswami, Constitution and fundamental rights 1955.
- 3) Markandan. k.c.directive Principles in the Indian constitution 1966.
- 4) Kashyap. Subash c, Our parliament ,National book trust , New Delhi 1989

Course Code	Course Title	L	T	P	C
231LSCUV	Universal Human Values	-	-	-	2

Aim:

This course aims at making learners conscious about universal human values in an integral manner, without ignoring other aspects that are needed for learner's personality development.

Course Objectives :

The present course deals with meaning, purpose and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realise one's potentials.

Course Outcomes :

By the end of the course the learners will be able to:

1. Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.
2. Learn from case studies of lives of great and successful people who followed and practised human values and achieved self-actualisation.
3. Become conscious practitioners of human values.
4. Realise their potential as human beings and conduct themselves properly in the ways of the world.

Unit I

- Introduction: What is love? Forms of love—forself, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living
- Love and compassion and inter-relatedness
- Love, compassion, empathy, sympathy and non-violence
- Individuals who are remembered in history for practicing compassion and love.
- Narratives and anecdotes from history, literature including local folklore
- Practicing love and compassion: What will learners learn/gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?
- Sharing learner's individual and/or group experience(s)
- Simulated Situations
- Casestudies

Unit II

- Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others)
- Individuals who are remembered in history for practicing this value
- Narratives and anecdotes from history, literature including local folklore
- Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?
- Learners' individual and/or group experience(s)
- Simulated situations
- Casestudies

Unit III

- Introduction: What is non-violence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non-violence
- Ahimsa as non-violence and non-killing
- Individuals and organisations that are known for their commitment to non-violence
- Narratives and anecdotes about non-violence from history, and literature including local folklore
- Practicing non-violence: What will learners learn/gain if they practice non-violence? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about non-violence
- Simulated situations

- Casestudies

Unit IV

- Introduction: What is righteousness?
- Righteousness and dharma, Righteousness and Propriety
- Individuals who are remembered in history for practicing righteousness
- Narratives and anecdotes from history, literature including local folklore
- Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Casestudies

Unit V

- Introduction: What is peace? Its need, relation with harmony and balance
- Individuals and organisations that are known for their commitment to peace
- Narratives and Anecdotes about peace from history, and literature including local folklore
- Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about peace
- Simulated situations
- Casestudies

Unit VI

- Introduction: What is service? Forms of service for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.
- Individuals who are remembered in history for practicing this value.
- Narratives and anecdotes dealing with instances of service from history, literature including local folklore
- Practicing service: What will learners learn/gain if they practice service? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s) regarding service
- Simulated situations
- Casestudies

Unit VII

- Introduction: What is renunciation? Renunciation and sacrifice. Self-restraint and Ways of overcoming greed. Renunciation with action as true renunciation
- Individuals who are remembered in history for practicing this value.
- Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.
- Practicing renunciation and sacrifice: What will learners learn/gain if they practice Renunciation and sacrifice? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Casestudies

FIRST YEAR : SEMESTER II

Advanced English-II

Course Code	Course Title	L	T	P	C
23111AEC21	Advanced English-II	4	0	0	2

Aim:

- To improve communication skills in English

Objective:

- To understand the format of e-mail, fax and memos
- To write itinerary, checklist, invitation, circular, instruction, recommendations
- To understand the impact of the biographies of famous people

Outcome:

- Developing technological skill
- Able to write in a variety of formats
- Read biographies and develop personality

Unit I

Introduction test of vocabulary range; test of verbal speed; test of verbal responsiveness; affixation-prefix, suffix; synonyms.

Unit II

Homonyms and homographs Words of foreign origin; antonyms; redundant words; phrases; acronyms; words commonly confused; slang and new words.

Unit III

Technical terms Personality types; relationships; medicines; science; business, education, law, technology, and the humanities.

Unit IV

Vocabulary for professional exams TOEFL; IELTS; SAT; GRE; CAT; MAT; TANCET; BEC; GMAT

Unit V

Vocabulary games synonyms; antonyms; compound word; homophone; idioms; literature; oxymoron; parts of speech; prefix; suffix; root word; spelling; word play.

Text Book

Author	Title of the book	Edition / Year	Publisher
Meenakshi Raman & Sangeetha Sharma	Technical Communication	2011	Oxford University Press
Rajendra Pal & J.S.Korlahalli	Business Communication	2015	Sultan

FIRST YEAR : SEMESTER II

PAPER II –ENGLISH-II

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC22	ENGLISH-II	4	2	-	-	3	6	25	75	100
Learning Objectives										
LO1	To introduce learners to the essential skills of communication in English									
LO2	To enable them use these skills effectively in academic and non-academic contexts									
LO3	To help them identify and eliminate common mistakes in writing and speaking									
LO4	To enable them use various business communication strategies and to use advanced vocabulary									
LO5	To familiarize them in writing descriptive essays and respond to arguments orally and in writing									
Unit No.	Unit Title & Text							No. of Periods for the Unit		
I	Poetry 1.1 Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3 On Killing a Tree - Gieve Patel							20		
II	Prose 2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please - Shashi Tharoor 2.3 The Spoon-fed Age- W.R. Inge							20		
III	Fiction Alchemist - Paulo Coelho							20		
IV	Language Competency 4.1 Homonyms, Homophones, Homographs Portmanteau words 4.2 English in the Workplace- Speaking							15		
V	5.1 Reading for General and Specific information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes							15		

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Learn to introduce themselves and talk about everyday activities confidently	PO1
CO2	Be able to write short paragraphs on people, places and events	PO1, PO2
CO3	Identify the purpose of using various tenses and effectively employ them in speaking and writing	PO4, PO6
CO4	Gain knowledge to write subjective and objective descriptions	PO4, PO5, PO6
CO5	Identify and use their skills effectively in formal contexts.	PO3, PO8

TextBooks(LatestEditions)

1	<i>The Alchemist - Paulo Coelho</i> Harper - 2005
ReferencesBooks (Latest editions, and the style as given below must be strictly adhered to)	
1	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2	Descriptive English. <u>SP Bakshi, Richa Sharma</u> · 2019, Arihant Publications (India) Ltd.
3	The Reading Book: A Complete Guide to Teaching Reading. <u>Sheena Cameron, Louise Dempsey</u> , S & L. Publishing, 2019.
4	Skimming and Scanning Techniques, <u>Barbara Sherman</u> , Liberty University Press, 2014
5	Brilliant Speed Reading: Whatever you need to read, however ... <u>Phil Chambers</u> , Pearson, 2013.
6	The Archer, Paulo Coelho. Penguin Viking, 2020.
WebResources	
1	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40_%202020103001102714.pdf
2	Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise

BRITISH LITERATURE-I

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours
23111AEC23	BRITISH LITERATURE-I	4	1	-	-	4	5
Learning Objectives							
LO1	To introduce British Identity, Periods and other related forms.						
LO2	To increase the ability for students to intellectually assess the world and their place in it.						
LO3	To enable learners to understand that British literature is at the foundation of English-speaking peoples' culture.						
LO4	To closely examine the various themes and methodologies present in British literature						
LO5	To create an aptitude of critically probing through the text						
UNIT	Details						
I	Francis Bacon - Of Truth, Of Adversity Joseph Addison and Sir Richard Steele - The Spectator Club, On Gratitude, On Giving Advice.						
II	Robert Jamieson - Robinhood & The Monk Robert Edgar Burns - The Potter William Blake - The Chimney Sweeper John						
III	P.B. Shelly - Arethusa, Hymn to Intellectual Beauty. William Wordsworth - Ode: To Intimation & Immortality Lord Byron - She Walks In Beauty John Milton - Paradise Lost Bk 4.						
IV	Christopher Marlowe - Dr. Faustus Oliver Goldsmith - She Stoops to Conquer						
V	Mary Shelly - Captain Walton's Conclusion-Frankenstein Jonathan Swift - Voyage to Lilliput/Houyhnhnms-Gulliver's Travels Charles						
Course Outcomes							
Course Outcomes	On completion of this course, students will;						
CO1	Demonstrate knowledge of the major social, political, philosophical, and scientific events forming the backdrop for the development of early British Literature.					PO1	
CO2	Synthesize, integrate, and connect information by writing essays using techniques of criticism and evaluation.					PO1, PO2	
CO3	Read and discuss the themes, approaches, styles, and contributions to the development of British literature from the Medieval Period to the end of the eighteenth-century					PO4, PO6	
CO4	Distinguish between the characteristics of British literary movements in discussing and writing about British literature.					PO4, PO5, PO6	

CO5	Write about literature using standard literary terminology and other literary conventions.	PO3, PO8
Text Books (Latest Editions)		
1.	Rexroth, Kenneth. The New British Poets: An Anthology. Granger Books, 1976.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Bacon, Francis, and Michel Leiris. Francis Bacon. Ediciones Poligrafa, 2008.	
2.	MARLOWE, Christopher. Dr. Faustus. BOOK ON DEMAND LTD, 2021.	
3.	Shelley, Mary Wollstonecraft. Frankenstein. CreateSpace, 2015.	
4.	Swift, Jonathan, et al. Gulliver's Travels. Oxford University Press, 2019.	
Web Resources		
1.	Ranger, Paul. "Technical Features." She Stoops to Conquer by Oliver Goldsmith, 1985, pp. 51–68., https://doi.org/10.1007/978-1-349-07664-2_5 .	
2.	Dickens, Charles. "Fifty-Two." A Tale of Two Cities, 2008, https://doi.org/10.1093/owc/9780199536238.003.0047 .	

FIRST YEAR - SEMESTER II

AMERICAN LITERATURE-I

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours
23111AEC24	AMERICAN LITERATURE-I	4	1	-	-	4	5
Learning Objectives							
LO1	To Understand the growth and development of American literature.						
LO2	To critically examine how various genres developed and progressed.						
LO3	Learn about prominent writers and famous works in American literature.						
LO4	To closely examine the various themes and methodologies present in British literature						
LO5	To create an aptitude of critically probing through the text						
UNIT	Details						
I	E.M.Foster - The Prologue-Passage to India (Lines 1-68).Walt Whitman - O Captain, My Captain!						
II	Edgar Allan Poe - The Raven Emily Dickinson - Because I Could Not Stop for Death.						
III	Edgar Allan Poe - The Philosophy of Composition Martin Luther King Jr- I have a Dream						
IV	Tennessee Williams- The Glass Menagerie Eugene O' Neill - Emperor Jones						
V	Harriet Beecher Stowe - Uncle Tom's Cabin Herman Melville- Billy Budd Washington Irving- The Legend of the Sleepy Hollow						
Course Outcomes							
Course Outcomes	On completion of this course, students will;						
CO1	Analyze and discuss works of American literature from arange of genres (e.g. poetry, nonfiction, slave narrative, captivity narrative, literary fiction, genre fiction, sermon,public proclamations, letters, etc.).	PO1					
CO2	Identify relationships between moments in American history, colonialism, and culture and their representationin works of American literature.	PO1, PO2					
CO3	Articulate ways that American literature reflects complex historical and cultural experiences.	PO4, PO6					
CO4	Produce a mix of critical, creative, and/or reflective works about American literature to 1865.	PO4, PO5, PO6					
CO5	Analyze and describe about American literature using standard literary terminology and other literary conventions.	PO3, PO8					
Text Books (Latest Editions)							

1.	Levine, Robert S., et al. The Norton Anthology of American Literature. W.W. Norton & Company, 2022.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Dickinson, Emily, and Johanna Brownell. Emily Dickinson: Poems. ChartwellBooks, 2015.
2.	Gould, Jean. American Women Poets: Pioneers of Modern Poetry. DODD, MEAD, 1980.
3.	Poe, Edgar Allan, et al. Poetry for Young People: Edgar Allen Poe. Sterling Pub.Co., 1995.
4.	Kallen, Stuart A., and Terry Boles. The Gettysburg Address. Abdo & Daughters,1994.
Web Resources	
1.	“Harriet Beecher Stowe's Uncle Tom's Cabin.” 2003, https://doi.org/10.4324/9781315812113 .
2.	Mason, Ronald. “Herman Melville and ‘Billy Budd.’” Tempo, no. 21, 1951, pp. 6–8., https://doi.org/10.1017/s0040298200054863

HISTORY OF ENGLISH LITERATURE

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours
23111GEC25	HISTORY OF ENGLISH LITERATURE(ALLIED)	3	1	-	-	4	4
Learning Objectives							
LO1	To help students with a survey of the history of English literature from OldEnglish times to the Modern period.						
LO2	Help them gain particular reference to the major literary movements and authors						
LO3	To help them with an overview of the major linguistic influences on the English language						
LO4	To provide them with a look at certain linguistic processes that have contributed to the development of the English language						
LO5	To create the ability of critically examining a text						
UNIT	Details						
I	History of British Literature must include British Poetry, Prose, Drama and Fiction, covering representative writers down the ages like given below...						
II	The Renaissance Period (1350 – 1660): An Introduction to Bible Translation -Tyndale, Coverdale, The University Wits, Elizabethan and Jacobean drama, Comedy of Humours						
III	The Late Seventeenth and the Eighteenth Centuries (1660 - 1800): Comedy of Manners, Neo-Classicism, Sentimental and Anti-sentimental comedies, Pre- Romantics						
IV	Well made play (Drama of Ideas - Shaw and Ibsen), Existential Drama, Comedy of menace, Kitchen-sink drama, Problem Play, Didactic Drama (Propaganda play), One-act play						
V	The Victorian Age (1832 - 1901): Pre-Raphaelite movement - D.G. Rossetti, Christina Rossetti Victorian Poets -Tennyson, Browning Victorian Novelists - Charles Dickens, Thackeray Victorian Writers -Carlyle, Ruskin Impressionistic Writers- Proust, Joyce Symbolist Movement – Yeats						
Course Outcomes							
Course Outcomes	On completion of this course, students will;						
CO1	Gain extensive insight into the history of English literature, while laying special emphasis on various literary movements, genres and writers that are held to be the representatives of their times.					PO1	
CO2	Evaluate the way socio-cultural and historical phenomena influence the literary production of a particular period					PO1, PO2	
CO3	Familiarize themselves with the socio-cultural ambience and the discursive frameworks of various ages					PO4, PO6	
CO4	Develop a nuanced appreciation of the literary stalwarts of those times.					PO4, PO5, PO6	

CO5	Gain in-depth understanding on the growth of the English language under the influence of various other languages including Latin and French, besides being mentored in the structural nitty-gritties of the language.	PO3, PO8
Text Books (Latest Editions)		
1.	Hamilton, I. (ed.). The Oxford Companion to Twentieth-Century Poetry in English(Oxford: Oxford University Press, 1994). A well-edited and balanced reference book.	
2.	Parker, P. (ed.). The Reader’s Companion to Twentieth-Century Writing(London: Helicon, 1995). Stringer, J. (ed.). The Oxford Companion to Twentieth-Century Literature in English (Oxford: Oxford University Press, 1996). Another well-edited and balanced reference book	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1. 2.	Bergonzi, B. Heroes’ Twilight: A Study of the Literature of the Great War,2nd edn (London: Constable, 1980). Fussell, P. The Great War and Modern Memory (Oxford: Oxford University Press, 1975)	
Web Resources		
1. ALEX00.PDF (manavata.org)		

FILM AND LITERATURE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111GEC26	FILM AND LITERATURE	2	-	-	-	3	2	25	75	100

Learning Objectives

LO1	To help students look closely into the relation between film and literature.
LO2	Introduce learners to the various ways in which literature and the moving imagediverge.
LO3	Help the learners understand how each form makes their own claims to thenarrative.
LO4	Help learners to interpret elementary concepts of cinema, cinema history andpractice and the basics of adaptation theory.
LO5	Help learners gain perspective on literature's relationship with cinema

UNIT

Details

I	Theories, practices, forms, adaptations, migrations- William Shakespeare's King Lear [1606] Akira Kurasawa, Ran (1985)Gregory Kozintsev, King Lear (1971)
II	Arthur C Clark, The Sentinel (1948)/ Encounter in the Dawn(1953) StanleyKubrick, 2001: A Space Odyssey(1968)
III	Cinema from novella and dramatic literature-
IV	Boris Pasternak, DrZhivago (1957)David Lean, DrZhivago(1965)
V	Joseph Conrad, Heart of Darkness (1902) Francis Ford Coppola, Apocalypse Now(1979)

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Gain insight to the various ways in which literature and the moving image diverge as well as correspond through the theory of narrative while being a source of long conflict through much of the history of film studies.	PO1
CO2	Familiarize withthe inter-dependence of the two artforms that collectively and individually re-present,effectively ensuring that the fruition of the collaboration is often far from simple.	PO1, PO2
CO3	Understand the politics and process of adaptation ofliterary forms into cinematic forms, how the process of signification in them vary and collide.	PO4, PO6
CO4	Gain insight on how each form makes their own claims to the narrative and the major debates thathave been provoked in world cinema around the problems of adaptation.	PO4, PO5, PO6
CO5	Get an understanding of elementary concepts of cinema, cinema history and practice and the basics ofadaptation theory.	PO3, PO8

Text Books (Latest Editions)

1.	Mast, Gerald &Marshall Cohen, Film Theory and Criticism: IntroductoryReadings. New York: Oxford University Press, 1994.
2.	NicholsBill (ed), Movies and Methods: Vol. I: An Anthology. Calcutta: SeagullBooks, 1985.
3.	Bill Nichols (ed), Movies and Methods: Vol. II: An Anthology. Calcutta:Seagull Books, 1985.

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	RobergeGaston, The Subject of Cinema. Calcutta: Seagull Books. 1990. Print.
2.	Horton Andrew, 'Film and Literature', Encyclopedia of World Literature in the 20th Century Vol 2, Leonard S Klein (ed), New York: Frederik Ungar, 1982, 93-99. Print
Web Resources	
1.	(PDF) Film and Literature (researchgate.net)

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours
23111SEC27	PHILOSOPHY FOR LITEERATURE	Y	Y	-	-	2	2

Learning Objectives

LO1	Engage with the philoophy of literary representations.
LO2	Give the students a historical overview of the major figures in philosophy
LO3	Introduce to them some of the significant schools of thought that hasinfluenced human perception.
LO4	Inform students how an understanding of philosophy is vital to thereading of literature
LO5	Analyze the philosophical thought

UNIT Details

I	The World of Greeks-Heraclitus—Nature of Poet—Plato—Concept of Forms—Ideal vs Physical—Aristotle—Concept of Soul—Beauty—Art—Nature
II	Robert Frost. -West- Running Brook- S T Coleridge. -Kubla Khan -P B Shelley.-Ozymandias,
III	Enlightenment and After-Rene Descartes—Rationalism—Dualism—Spinoza—idea of Nature and God— Pantheism—concept of substance and modes— Cartesiandualism vs Spinoza’s monism—John Locke— Liberalism— Empiricism—Immanuel Kant— Transcendental Idealism
IV	Emily Dickinson. -The Brain—is wider than the Sky (Debate the Cartesian mind body or material immaterial dualism), Walt Whitman. -On the Beach at Night Alone. (Spinoza’s pantheism), William D. H. Lawrence.-How Beastly the Bourgeois Is? (Marx’s idea of social44class)
V	W H Auden. -Who’s Who? (Heidegger’s idea of Dasein and Geworfenheit, -Being- thrown- in-the-world), Ted Hughes. -Hawk Roosting, (ego that mediates the instinctual id and the critical super-ego), Maya Angelou.-When I think of myself, (de Beauvoir’s concept of becoming),

The course outcome is based on the Learning Objectives. Each course objective will have a course outcome. This will elucidate what the student will acquaint once he completes that particular unit. There will be equal number of Learning Objectives and Course outcomes.

The blooms taxonomy verbs will be given as a separate annexure for your reference.Each course outcome should be mapped with the POs.

The mapping of each CO can be done with any number of POs.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Have a diachronic understanding of the evolution of philosophy from the time of Greek masters to 20th century.	PO1
CO2	Have an awareness of the major schools of thought in western philosophy.	PO1, PO2
CO3	Have a healthy epistemological foundation at undergraduate level that ensures scholarship at advanced levels of learning	PO4, PO6

CO4	Talk about some of the key figures in Philosophy.	PO4, PO5, PO6
CO5	Analyze and appreciate texts critically, from different philosophical perspectives.	PO3, PO8
Text Books (Latest Editions)		
1	Durrant, Will. The Story of Philosophy, Simon & Schuster, 1991.	
2	Gaarder, Jostein. Sophie's World: 20th Anniversary Edition. Orion, 2015.	
References Books		
(Latest editions, and the style as given below must be strictly adhered to)		
1.	Russell, Bertrand. History of Western Philosophy. Routledge, 2016.	
2.	Gibson, John. The Philosophy of Poetry. Oxford UP, 2015.	
Web Resources		
1.	https://www.philosophybasics.com/general_what_is.html	
2.	https://archive.org/details/SophiesWorld_989/page/n5/mode/2up	

Mapping with Programme Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Mapping with Programme Specific Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

SPOKEN AND PRESENTATION SKILLS (SB-II)

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111SEC28	SPOKEN AND PRESENTATION SKILLS	2	0	-	-	2	2	25	75	100

Learning Objectives

LO1	To help students Identify the differences between a small group, a team, and aspeaking group.
LO2	To help them evaluate their individual presentation skills
LO3	Familiarize them with the four coordination elements of group presentations
LO4	To help them apply chapter concepts for coordinating group communication
LO5	To help them think and speak imaginatively and critically
UNIT	Details
I	Communication: Basic Communication Styles- Passive, Aggressive, Assertive-Significance of communication.
II	Types of communication- Verbal-Non-Verbal.
III	Effective communication skills
IV	Skills to be acquired in communication-Speaking/reading/writing/listening
V	Application of learning

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Learn to list the common types pertaining to spokenskills and group presentations	PO1
CO2	Learn to apply chapter concepts for coordinatingroup communication	PO1, PO2
CO3	Get familiarized with techniques for coordinating a group assignment and their presentation skills	PO4, PO6
CO4	Learn about planning speech organization for the intended audience	PO4, PO5, PO6
CO5	Practice effective group delivery and speech informal context.	PO3, PO8

Text Books (Latest Editions)

1.	<i>Joyce Pereira, Essentials of Spoken and Presentation Skills Level I and Level II, Willow Publications, 2011.</i>
2.	Bradbury, A., (2010) Successful presentation skills (4th ed.), Kogan Page.
3.	Cottrell, S.. (2008) The study skills handbook (3rd ed.), Palgrave Macmillan.

References Books

(Latest editions, and the style as given below must be strictly adhered to)

1.	Van Emden, J., Becker, L., (2010) Presentation skills for students (2nd ed),Palgrave Macmillan.
Web Resources	
1.	<i>chapter 5.pdf (univer.kharkov.ua)</i>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Code	Course Title	L	T	P	C
221ACLSOS	Communication Skills	-	-	-	2

Aim:

Course Objectives :

This course has been developed with the following objectives:

1. Identify common communication problems that may be holding learners back
2. Identify what their non-verbal messages are communicating to others
3. Understand role of communication in teaching-learning process
4. Learning to communicate through the digital media
5. Understand the importance of empathetic listening
6. Explore communication beyond language.

Course Outcome :

By the end of this program participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.

Unit I

- Techniques of effective listening
- Listening and comprehension
- Probing questions
- Barriers to listening

Unit II

- Pronunciation
- Enunciation
- Vocabulary
- Fluency
- Common Errors

Unit III

- Techniques of effective reading
- Gathering ideas and information from a given text
 - i. Identify the main claim of the text
 - ii. Identify the purpose of the text
 - iii. Identify the context of the text
 - iv. Identify the concepts mentioned
 - Evaluating these ideas and information
 - i. Identify the arguments employed in the text
 - ii. Identify the theories employed or assumed in the text
 - Interpret the text
 - i. To understand what a text says
 - ii. To understand what a text does
 - iii. To understand what a text means

Unit IV

- Clearly state the claims
- Avoid ambiguity, vagueness, unwanted generalisations and over simplification of issues
 - Provide background information
 - Effectively argue the claim
 - Provide evidence for the claims

- Use examples to explain concepts
- Follow convention
- Be properly sequenced
- Use proper signposting techniques
- Be well structured
- i. Well-knit logical sequence
- ii. Narrative sequence
- iii. Category groupings
- Different modes of Writing -
- i. E-mails
- ii. Proposal writing for Higher Studies
- iii. Recording the proceedings of meetings
- iv. Any other mode of writing relevant for learners

Unit V

- Role of Digital literacy in professional life
- Trends and opportunities in using digital technology in workplace
- Internet Basics
- Introduction to MS Office tools
- i. Paint
- ii. Office
- iii. Excel
- iv. Powerpoint

Unit VI

- Introduction to social media websites
- Advantages of social media
- Ethics and etiquettes of social media
- How to use Google search better
- Effective ways of using Social Media
- Introduction to Digital Marketing

Unit VII

- Meaning of non-verbal communication
- Introduction to modes of non-verbal communication
- Breaking the misbeliefs
- Open and Closed Body language
- Eye Contact and Facial Expression
- Hand Gestures
- Do's and Don'ts
- Learning from experts
- Activities-Based Learning

Reference:

1. Sen Madhuchanda (2010), *An Introduction to Critical Thinking*, Pearson, Delhi
2. Silvia P. J. (2007), *How to Read a Lot*, American Psychological Association, Washington DC

SECOND YEAR : SEMESTER III

Course Code	Course Title	L	T	P	C
23111AEC31	Advanced English-III	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To familiarize with the organs of speech and the description and classification of speech sounds
- To understand consonant cluster, syllable, word accent and intonation.
- To know how to interpret graphics
- To write slogans and advertisements

Outcome:

- Understand phonetics
- Develop writing skill
- Able to develop creative writing

UNIT-I

The Origins of Language

The natural sound source

The social interaction source

The physical adaptation source: teeth and lips, mouth and tongue, larynx and pharynx

UNIT-II

The Sounds of Language -

Phonetics

Voiced and voiceless sounds

Place of articulation

Manner of articulation

Consonants, Vowels, Diphthongs

UNIT-III

The Sound Patterns of Language

Phonology

Phonemes: Natural classes

Syllables: Consonant clusters

Coarticulation effects: Assimilation, Nasalization, Elision, Normal

UNIT-IV

Word formation -

Coinage, Acronyms, Derivation, Prefixes and suffixes,

Infixes, Multiple

UNIT-V

Syntax

Reference books:

Author	Title of the book	Edition / Year	Publisher
T.B. Balasubramanian	A text book of Phonetics for Indian Students	Reprint 2208	Macmillian
Meenakshi Sharma & Sangeetha Sharma	Technical Communication	2011	Oxford University Press

SECOND YEAR : SEMESTER III

PAPER II –ENGLISH-III

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC32	English-III	4	2	-	-	3	6	25	75	100

Learning Objectives

LO1	To enhance the level of literary and aesthetic experience of students and to help them respond creatively.
LO2	To sensitize them to the major issues in the society and the world.
LO3	To provide them with an ability to build and enrich their communication skills
LO4	To equip them to utilize the digital knowledge resources effectively for their chosen fields of study
LO5	To help them think and write imaginatively and critically.

Unit No.	Unit Title & Text	No. of Periods for the Unit
I	Poetry: 1.1 The Voice of the Mountains - Mamang Dai 1.2 A Song of Hope - Oodgeroo Noonuccal 1.3 In an Artist's Studio - Christina Rossetti	20
II	Scenes From Shakespeare: 2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene	20
III	Speeches of Famous personalities 3.1 Yes, We Can-Barack Obama 3.2 You've Got to Find What You Love-Steve Jobs	20
IV	Language Competency 4.1 Writing letters and emails 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram.facebook] 4.3 Learning netiquette, email etiquette	15
V	English for Workplace 5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used 5.4 Conducting and participating in a meeting	15

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	PO1
CO2	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society	PO1,PO2
CO3	Produce grammatically and idiomatically correct language.	PO4,PO6
CO4	Gain knowledge in writing techniques to meet academic and professional needs.	PO4,PO5,PO6
CO5	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	PO3,PO8

Text Books (Latest Editions)

1	Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011)
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References Books

(Latest Editions, and the style as given below must be strictly adhered to)

1	The Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
3	Famous Speeches by Mahatma Gandhi, Createspace Independent Publishing Platform, 2016
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish , Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse , Michigan Teacher Training, 2016.
6	Role Play-Theory and Practice. Kryisia M Yardley-Matwiejczuk , SAGE publications ltd, 1997

Web Resources

1	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3	In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio

SECOND YEAR - SEMESTER III

BRITISH LITERATURE-II

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC33	British literature-II	3	2	-	-	4	5	25	75	100
Learning Objectives										
LO1	To help learners analyze British Literature written from the late 18th Century to the present.									
LO2	To guide them in interpreting literature as it relates to its historical, cultural, and/or political context.									
LO3	To provide them with understanding of relationships between various movements (such as Romanticism, Victorianism, Modernism, and/or Postmodernism) and the literature of the period.									
LO4	To closely examine literary works using critical perspectives.									
LO5	To help them with applying appropriate formal conventions when writing about literature.									
UNIT	Details									
I	Christina Rossetti- The Goblin Market T.S.Eliot - The Wasteland W.H.Auden - The Unknown Citizen									
II	G. K. Chesterton - Piece of Chalk Charles Lamb- Dream Children William Hazlitt- Indian Jugglers									
III	Joseph Addison - Sir Roger in London G.B.Shaw - Arms and The Man									
IV	John Osborne - Look Back in Anger Jane Austen - Persuasion,									
V	Wilkie Collins - The Moonstone David Green - Winged Words									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Exhibit an understanding of and appreciation for key works in British literature, as evidenced in daily work and course discussions.							PO1		
CO2	Demonstrate an understanding of periodization, theme, genre, motif, and so on, in British literature.							PO1, PO2		
CO3	Establish an understanding that historical, cultural, spiritual, and ethical issues, among others, shape human experiences and impact motivations.							PO4, PO6		
CO4	Respond to literature with facility, both orally and on paper, on important thematic considerations having to do with literary and historical milieu, culture, human responsibility, morality, ethics, and the manner and							PO4, PO5, PO6		

	causes by which humans interact with one another.	
CO5	Analyze and express about British literature using standard literary lexicon and other literary conventions.	PO3, PO8
Text Books (Latest Editions)		
1.	Renard, Virginie. <i>The Great War and Postmodern Memory: The First World War in Late 20 Th -Century British Fiction (1985-2000)</i> . Peter Lang AG, Internationaler Verlag Der Wissenschaften, 2013.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Brontë Charlotte, et al. <i>Jane Eyre</i> . Oxford University Press, 2019.	
2.	Lamb, Charles. <i>Dream Children: A Reverie</i> . Reed Pale Press, 1928.	
3.	Look Back in Anger, by John Osborne: Theatre Program, 1974, La Mama Theatre. 1974.	
Web Resources		
1.	Makinen, Merja. "Representing Women of Violence Agatha Christie and Her Contemporary Culture." <i>Agatha Christie</i> , 2006, pp. 135–157., https://doi.org/10.1057/9780230598270_6 .	

BIOGRAPHIES, AUTO-BIOGRAPHIES & MEMOIRS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC34	Biographies, auto-biographies & memoirs	4	1	-	-	4	5	25	75	100

Learning Objectives

LO1	To provide learners with an appreciation of writing and literature from global and personal perspectives
LO3	To help learners cultivate a more complex understanding of their own culture(s), linguistic/communication practices, and perspectives in relation to others.
LO2	To help them engage in imagination, critical inquiry and self-reflection
LO4	To help them explore significant texts from diverse cultures and people in history
LO5	To help learners understand how an author's own ideology shapes reality in an autobiography or biography.
UNIT	Details
I	James Boswell - Chapter IX-The Dictionary- Life of Johnson. Florence Nightingale-Eminent Victorians
II	Anne Frank- excerpts from The Diary of a Young Girl Malala Yousafzai - I am Malala
III	R.K. Narayan - My Days . Salim Ali - The Fall Of A Sparrow
IV	Tom Alter - The man who made the elephant dance. R.K.Laxman - The tunnel of time
V	Jeff Kinney - Memoirs of a Wimpy kid Jesmyn Ward - Men We Reaped Elizabeth Gilbert - Eat, Pray, Love

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Distinguish the structures of biography and autobiography from one another in order to recognize them as distinct forms of literature.	PO1
CO2	Compare and contrast the ways in which a perceiving, living individual (the "subject") is treated in biography, autobiography, and other literary genres such as poetry, fiction, and journalism.	PO1, PO2
CO3	Analyze how an author's own ideology shapes reality in an autobiography or biography, including how it raises questions about truth, factuality, objectivity, and subjectivity.	PO4, PO6
CO4	Connect biographical and autobiographical texts to their historical and cultural contexts.	PO4, PO5, PO6
CO5	Examine the roles that argument, rhetoric, fiction, photography, aesthetics, and evidence play in the composing process of biography and autobiography.	PO3, PO8

Text Books (Latest Editions)

1.	<i>Knots in My Yo-yo String: The Autobiography of a Kid</i> by Jerry Spinelli. Alfred A. Knopf, 1998.
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2.	<i>It Came From Ohio! My Life as a Writer</i> by R.L. Stine. Scholastic Paperbacks,1998.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	<i>Henry Ford (Rookie Biographies)</i> by Wil Mara. Children’s Press, 2004.
2.	<i>Amelia Earhart (Graphic Biography)</i> by Saddleback Educational Publishing,2008.
3.	<i>A Picture Book of Harriet Tubman</i> by David A. Adler. Holiday House Inc., 1993.
Web Resources	
1.	a. http://gardenofpraise.com/leaders.htm b. http://www.pitara.com/magazine/people.asp

Mapping with Programme Outcomes:

	PO 1	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	2	3	2
CO2	2	3	3	2	3	3	2	2	2
CO3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	2	2	2
CO5	3	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SECOND YEAR - SEMESTER III

LITERARY GENRES AND TERMS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111GEC35	Literary genres and terms	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	To help students apply literary terminology to fiction, drama, and poetry.									
LO2	Help them recognize the main elements of different literary genres and assesstheir significance									
LO3	To help them analyze different genres of literature, particularly short stories,novels, drama, and poetry									
LO4	To enable them to Identify a literary text’s main themes and make reasonableassertions about their meaning									
LO5	To guide them to re-narrate the plot of a short story, both orally and inwriting.									
UNIT	Details									
I	Literary Theory and terms: The Basics									
II	Types of prose text-Semiotics: The Basics									
III	Terms for Interpreting Authorial Voice- Terms for Interpreting Characters									
IV	Terms for Interpreting Word Choice, Dialogue, and Speech- Terms for Interpreting Plot									
v	Terms for Interpreting Layers of Meaning -Cultural Theory: The Key Concepts									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Understand new definitions of contemporary criticalissues such as ‘Cybercriticism’ and ‘Globalization’.							PO 1		
CO2	Gain insight to an exhaustive range of entries, covering numerous aspects to such topics as genre, form, cultural theory and literary technique.							PO1, PO2		
CO3	Get a complete coverage of traditional and radicalapproaches to the study and production of literature.							PO4, PO6		
CO4	Recognize and interpret literary images and symbols to infer their relationship to the main themes of the text.							PO4, PO5, PO6		
CO5	Gain thorough accounts of critical terminology andanalyzes of key academic debates.							PO3, PO8		
Text Books (Latest Editions)										
1.	Baldick, Chris. Oxford Dictionary of Literary Terms. Oxford: Oxford University Press, 2001.									
2.	Mikics, David. A New Handbook of Literary Terms. New Haven: Yale University Press, 2007. Print.									

References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Taafe, James G. A Student's Guide to Literary Terms. Cleveland: The WorldPublishing Company, 1967. Print.
Web Resources	
1.	<i>1821-literary-terms.pdf (cgc.edu)</i>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

ELT & COMPUTER ASSISTED LANGUAGE LEARNING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111GEC36	Elt & computer assisted language learning	2	0	-	-	3	2	25	75	100
Learning Objectives										
LO1	To help students communicate ethically, responsibly, and effectively as local, national, international, global citizens and leaders.									
LO2	To help them gain a background knowledge of ELT and CALL									
LO3	To make learners communicate competently in groups and organizations									
LO4	To help possess skills to effectively deliver formal and informal oral presentations to a variety of audiences in multiple contexts.									
LO5	To assist them in applying knowledge in different situations and the processing skills acquired through the application and synthesis of knowledge									
UNIT	Details									
I	Knowing the learner									
II	Structures of English language									
III	Method of teaching English language and literature									
IV	Materials for language teaching									
V	Assessing language skills-using technology in language teaching.									
Course Outcomes										
Course Outcomes		On completion of this course, students will;								
CO1	Be able to understand the structures of English language.	PO1								
CO2	Understand the critical nuances of teaching language and literature.	PO1, PO2								
CO3	Identify the variety of materials available for language learning and teaching	PO4, PO6								
CO4	Understand the appropriate ways of assessing language skills	PO4, PO5, PO6								
CO5	Learn to use technology in language teaching	PO3, PO8								
Text Books (Latest Editions)										
1. 2.	Aslam Mohammed, Teaching of English, Chand Publishers, 2017R									
References Books										
(Latest editions, and the style as given below must be strictly adhered to)										
1.	R. K. Bansal and J. B. Harrison, Spoken English, A manual of speech and phonetics, Agarwal Publishing, New Delhi, 2020.									
2.	Adrian Doff, Teach English: A training course for teachers (workbook)									
Web Resources										
1.	Computer-Assisted Language Learning (CALL) in the EFL Classroom and its Impact on Effective Teaching-learning Process in Saudi Arabia Azam Hashmi International Journal of Applied Linguistics and English Literature (aiac.org.au)									

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

FUNCTIONAL ENGLISH

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111SEC37	Functional English	2	0	-	-	2	2	25	75	100
Learning Objectives										
LO1	To enable learners use appropriate phrases for performing language functions									
LO2	To help them to edit, select and present information in a format/ perspective									
LO3	To enable them to listen and reduce information to a point form									
LO4	To help them read and to expand from points to paragraph									
LO5	To enable them to predict, comprehend, infer and synthesize information									
Details										
UNIT										
I	Definition of Functional English-Significance of Functional English									
II	Four essentials of functional English: LSRW									
III	Grammar									
IV	Strategies to use functional English									
V	Provide a dramatic play to perform which gives the students to apply functional language									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Learn to form words properly using prefixes/ suffixes and make correct use of Concord or Subject-Verb Agreement								PO1	
CO2	Familiarize themselves in writing leave application, apology and request letters and points/ideas to write paragraphs								PO1, PO2	
CO3	Learn to introduce themselves and describe person, place or situation and also gain knowledge of using prepositions of place, time and direction correctly.								PO4, PO6	
CO4	Get practiced to skim and scan through a passage and read to get an overall idea, and comprehend the Passage								PO4, PO5, PO6	
CO5	Cultivate the habit of newspaper reading								PO3, PO8	
Text Books (Latest Editions)										
1.	Susan Thurman, The Only Grammar Book You'll Ever Need: A One-Stop Source for Every Writing Assignment. 2011									
2.	Grant Barrett, Perfect English Grammar: The Indispensable Guide to Excellent Writing and Speaking, 2013									
References Books (Latest editions, and the style as given below must be strictly adhered to)										
1.	Jane Straus, Lester Kaufman, and Tom Stern, The Blue Book of Grammar and Punctuation: An Easy-to-Use Guide with Clear Rules, Real-World Examples, and Reproducible Quizzes, 2015									
Web Resources										

1.	BBC World Service. (2011) Learning English: Ø http://www.bbc.co.uk/worldservice/learningenglish/language/askaboutenglish/2009/03/090210_aae_punc_apostrophe.shtm
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Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

PUBLIC SPEAKING SKILLS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111SEC37	Public speaking skills	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	To help students understand the goals and benefits of public speaking									
LO2	To help them recognize communication apprehension and guide them on how to reduce it									
LO3	To familiarize them on how public speaking can be used to advocate or create change									
LO4	To enable learners recognize the social and historical contexts of speech, oratory, and rhetoric									
LO5	To help them think and speak imaginatively and critically									
UNIT	Details									
I	What is Public Speaking?									
II	Need for Public Speaking.									
III	Significance and essentials of public speaking skills									
IV	Techniques in acquiring the skill									
V	Speaking any common topic in front of the class									
Course Outcomes										
Course Outcomes		On completion of this course, students will;								
CO1	Demonstrate an understanding of the principles of public speaking	PO1								
CO2	Recognize barriers to public speaking and identify how to avoid them	PO1, PO2								
CO3	Understand how to give effective verbal and nonverbal feedback	PO4, PO6								
CO4	Learn about planning speech organization for the intended audience	PO4, PO5, PO6								
CO5	Practice effective group delivery and speech in informal context.	PO3, PO8								
Text Books (Latest Editions)										
1.	Beebe, S. A., & Beebe, S. J. (2006). Public Speaking: An audience-centred approach (6 th ed.). New York: Pearson									
2.	Fraleigh, D.M., & Tuman, J.S. (2009). Speak up! An illustrated guide to public speaking. New York: Bedford/St. Martins.									
References Books										
(Latest editions, and the style as given below must be strictly adhered to)										
1.	Apple, W., Streeter, L.A. & Krauss, R. M (1979). Effects of pitch and speech rate on personal attributions. Journal of Personality and Social Psychology, 37, 715-727.									
Web Resources										
1.	Learning Outcomes Public Speaking (lumenlearning.com) lu03_public_speaking.pdf (indianhills.edu)									

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

Course Code	Course Title	L	T	P	C
22111AECC3	Research Methodology	2	0	0	2

Aim:

- To create a basic appreciation towards research process and awareness of various research publication

Objectives:

- To understand the steps in research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-bases

Outcome:

- Understand the steps to do research
- Able to carry out independent literature survey
- Assess basic literary research tools.

UNIT I

Research – Definition, Objectives, Motivation and purpose, Distinction between Literary Research vs Social Science Research, Types of literary research, Criteria of Good Research

UNIT II

Problems encountered by researchers

Assignments, term papers, dissertation, thesis

Conventions of writing

Planning the thesis-selecting a topic, reviewing the literature, designing the study, the chapter outline

UNIT III

Data collection-Primary data- works of the author/s, autobiography, Interviews, articles in newspapers, magazine, letters, data collected through surveys, tools for questionnaire, interviews.

Secondary data-Articles in journals, books, critical books on the author, magazines, e-articles, websites.

UNIT IV

Writing the thesis- the general format, the page and chapter format

Mechanics of writing-Spelling, Punctuation, Italics, Names, Numbers, Titles, Capitalization, paragraphs, quotation, work cited, bibliography

Revising the thesis-editing, evaluating, proof reading

UNIT V

Practical exercise to prepare a paper for a journal-poem, short story, novel, drama

Uses of computer in research

Text book:

Author	Title of the book	Edition / Year	Publisher
Joseph Gibaldi	M L A Hand Book	VIII Ed,2009	First East West Press
Anderson et al		Thesis and Assignment writing	
Kothari	Research Methodology Methods & Techniques	II, 2005	New Age International

Course Code	Course Title	L	T	P	C
231ACLSOAN	Office Automation	-	-	-	2

Aim:

Course Objectives :

To provide an in-depth training in use of office automation, internet and internet tools. The course also helps the candidates to get acquainted with IT.

Course Outcomes:

After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with internet.

UNIT I

Knowing the basics of Computers

UNIT II

Word Processing (MS word)

UNIT III

Spread Sheet (MS XL)

UNIT IV

Presentation (MS Power Point)

UNIT V

Communicating with Internet

Reference:

1. Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
2. Microsoft Office 2007 Bible - John Walkenbach,Herb Tyson,Faithe Wempen,cary N.Prague,Michael R.groh,Peter G.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
3. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
4. Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
5. <https://en.wikipedia.org>
6. <https://wiki.openoffice.org/wiki/Documentation>
7. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

SECOND YEAR :SEMESTER IV

Course Code	Course Title	L	T	P	C
23111AEC41	Advanced English-IV	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To familiarize with the objectives and types of interview
- To know the types of questions and answering techniques
- To prepare reviews and proposals
- To learn the grammatical forms
- To understand the meaning of a poem and write the content
- To write for and against a topic
- To draw a flowchart
- To write definitions

Outcome:

- Develop writing skill
- Comprehend and describe poems
- Learn interviewing skills

UNIT I

Parts of speech –Noun –Pronoun-Adjective-Verb-Adverb-Conjunction-PrepositionInterjection-Definition-Types-Examples

UNIT II

Types Of Sentences-Statement-Interrogative-Exclamatory-Imperative

UNIT III

Sentence Pattern-Types-SV-SVO-SVC-SVA-SVOO-SVOC-SVOA

UNIT IV

Tenses- Subject -Verb-Concord

UNIT V

Phrases And Clauses-Definition And Types

Reference books:

Author	Title of the book	Edition / Year	Publisher
Rajendra Pal & J.S Korlahalli	Essentials of Business Communication	2015	Sultan Chand & Sons
Meenakshi Raman & Sangeetha Sharma	Technical Communication	2011	Oxford University Press
Wren & Martin	English Grammar & Composition	2009	S.Chand

SEMESTER IV
PAPER II –ENGLISH-IV

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC42	English-IV	4	2	-	-	3	6	25	75	100
Learning Objectives										
LO1	To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.									
LO2	To enable them use receptive skills through reading and listening to acquire good exposure to language and literature.									
LO3	To help them develop style in speech and writing and manipulate the tools of language for effective communication.									
LO4	To provide exposure to plays, autobiographies and expose them to value based ideas.									
LO5	To enhance their language skills especially in the areas of grammar and pronunciation.									
Unit No.	Unit Title & Text							No. of Periods for the Unit		
I	Life Writing 1.1 I am Malala-Malala Yousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2							20		
II	One Act Plays 2.1 The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov							20		
III	Interviews 3.1 Nelson Mandela's Interview with Larry King. 3.2 Rakesh Sharma's Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)							20		
IV	Language Competency 4.1 Refuting, Arguing & Debating 4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help 4.3 Interviews (face to face, telephone and video conferencing)							15		
V	English for Workplace 5.1 Job Applications: Covering letters, CV and Resume 5.2 Creating a digital profile - LinkedIn 5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card 5.4 Body Language -Practical Skills for Interviews							15		

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Learn to communicate effectively and appropriately in real life situation.	PO1
CO2	Use English effectively for study purpose across the curriculum	PO1,PO2

TextBooks(LatestEditions)

1	I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by <u>Malala Yousafzai</u> , <u>Christina Lamb</u> , Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition

ReferencesBooks

(Latest editions,and the style as given below must be strictly adhered to)

1	<u>Writing Your Life: A Guide to Writing Autobiographies</u> , <u>Mary Borg</u> , Taylor & Francis, 2021
2	One-act Plays for Acting Students: An Anthology of Short <u>Norman A. Bert</u> · 1987 ·
3	<u>The One-Act Play Companion: A Guide to plays, playwrights ...</u> <u>Colin Dolley</u> , <u>Rex Walford</u> · 2015
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Role Play-Theory and Practice.Krysia M Yardley-Matwiejczuk, SAGE publications ltd, 1997

CO3	Develop interest in and appreciation of Literature	PO4,PO6
CO4	Develop and integrate the use of the four language skills	PO4,PO5,PO6
CO5	Enhance their language skills especially in the areas of grammar and pronunciation.	PO3,PO8

SECOND YEAR - SEMESTER IV
AMERICAN LITERATURE-II

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC43	American Literature-II	3	2	-	-	4	5	25	75	100
Learning Objectives										
LO1	To help learners examine the roots of American literature by focusing multiple genres—poetry, drama, stories and novel.									
LO2	To guide to explore literature that reveals and emerges from multiple perspectives such as race, gender, ethnicity, socioeconomic class and historical period.									
LO3	To create an awareness of the social, historical, literary and cultural elements of the changes in American literature.									
LO4	To help them explore distinct literary characteristics of American literature and analyze literary works of eminent American writers.									
LO5	To inculcate a rhetorical approach to the literary study of American texts and also the conceptions, generalizations, myths and beliefs about American cultural history.									
UNIT	Details									
I	Theodore Roethke - The Meadow Mouse . Emily Dickinson - The Bird Came Down the Walk Maya Angelou - Phenomenal Women									
II	Neil Simon - Barefoot in the Park Henry David Thoreau - Winter Animals									
III	Ralph Waldo Emerson - The American Scholar Edgar Allan Poe - Philosophy of Composition									
IV	Nathaniel Hawthorne - Young Goodman Brown. Toni Morrison – Beloved									
V	Mark Twain - The Adventures of Tom Sawyer. Angeline Boulley - Firekeeper’s Daughter									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Understand the depth and diversity of American literature, keeping in mind the history and culture of the United States of America from the colonial period to the present.							PO1		
CO2	Understand the social-cultural-ecological-political, historical, religious and philosophical contexts of the American spirit in literature.							PO1, PO2		
CO3	Evaluate the thoughts, beliefs, customs, struggles, and visions of African American writers							PO4, PO6		
CO4	Understand the American style of writing and ideologies like Transcendentalism, corruption, pride, power and obsession along with spiritualism and Christian values.							PO4, PO5, PO6		

CO5	Critically analyze American literary texts in the light of several movements in literature and understand the changing faces of texts with developments in culture. Students can compare/contrast literary works through an analysis of genre, theme, character, and other literary devices.	PO3, PO8
Text Books (Latest Editions)		
1.	Angelou, Maya. The Complete Poetry. Random House, 2015.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Dickinson, Emily. A Bird Came Down the Walk - Selected Bird Poems of Emily Dickinson. Read Books Ltd, 2021.	
2.	Gray, Richard. A Brief History of American Literature. John Wiley & Sons, 2010. Hansberry, Lorraine. A Raisin in the Sun. Modern Library, 1995.	
3.	Morrison, Toni. Beloved. Everyman's Library, 2006.	
4.	Twain, Mark. The Adventures of Tom Sawyer. The Floating Press, 2009.	
Web Resources		
1.	Cramer, Jeffrey S., editor. "Thoreau Describes His Contemporaries." The Quotable Thoreau, Princeton University Press, 2011, pp. 430–38, http://dx.doi.org/10.1515/9781400838004.430 .	
2.	Hawthorne, Nathaniel. "The Revelation of the Scarlet Letter." The Scarlet Letter, Oxford University Press, 2008, http://dx.doi.org/10.1093/owc/9780199537808.003.0025 .	

SECOND YEAR - SEMESTER IV

WORLD LITERATURE IN TRANSLATION

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC44	World Literature In Translation	3	2	-	-	4	5	25	75	100

Learning Objectives

LO1	To help learners achieve accessibility to regional and international literary forms.
LO2	To enable them to contextualize the texts and be familiar with translation theory.
LO3	To enable them to develop a comparative perspective to study the texts
LO4	To exhibit appreciation of literature and writers from various nations and cultures.
LO5	To learn to see critically the rising trends of globalization, capitalism and multiculturalism.

UNIT	Details
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I	Dante - Ulysses's Last Voyage Johann Wolfgang von Goethe - The Violet, Khalil Gibran - Your Children are not your children.
II	Pablo Neruda - If you forget me. Gabriel Okara - The Mystic Drum Jean Arasayanagam - Two Dead Soldiers
III	Walter Benjamin - Unpacking My Library Montaigne - Of Friendship.
IV	Marie Clements - The Unnatural & Accidental Women. Samuel Beckett - Waiting for Godot.
V	Gabriel García Márquez - A Very Oldman With Enormous Wings. Ivan S. Turgenev - The District Doctor. Antoine de Saint-Exupéry - The Little Prince.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Gain an exposure to some Classics in World Literature, both in theme and form.	PO1
CO2	Be able to identify elements of universal literary merits as well as critically compare some of the great works of the East and the West.	PO1, PO2
CO3	Gain an understanding of the works in their cultural/historical contexts and of the enduring human values which unite the different literary traditions.	PO4, PO6
CO4	Pay special attention to critical thinking and writing within a framework of cultural diversity as well as comparative and interdisciplinary analysis.	PO4, PO5, PO6
CO5	Have an understanding of the study and consideration of the literary, cultural, and human significance of selected great works of the Western and non-Western literary traditions.	PO3, PO8

Text Books (Latest Editions)

1.	Márquez, Gabriel García. A Very Old Man with Enormous Wings. 2014.
2.	Neruda, Pablo. The Poetry of Pablo Neruda. Farrar, Straus and Giroux, 2015.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Angelou, Maya. The Complete Poetry. Random House, 2015.
2.	Benjamin, Walter, and Martin Jay. Unpacking My Library. 2010.
3.	Bercovici, Konrad. The Story of the Gypsies. Pickle Partners Publishing, 2017.
4.	Bolton, David. The Pot of Gold by Plautus. Lulu.com, 2019.
5.	Clements, Marie Humber. The Unnatural and Accidental Women. TalonbooksLimited, 2005.
Web Resources	
1.	The Introduction of Victor Hugo to the English (1823–1830).” The Fortunes of Victor Hugo in England, Columbia University Press, 1938, pp. 1–26, http://dx.doi.org/10.7312/hook93490-002 .

FILM STUDIES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111GEC45	Film Studies	2	1	-	-	3	3	25	75	100
Learning Objectives										
LO1	Aims to train students to decode the visual messages imparted by movies.									
LO2	To amplify their impacts.									
LO3	To train the students to read the films they watch, both as an aesthetic work and as politically motivated.									
LO4	To enabling the learnersto use a various methods.									
LO5	To learn ouchstone method in evaluating contemporary Indian main streamcinema with World Cinema as well as Indian Classics.									
UNIT	Details									
I	Introduction, Filmic Visual: Mise-en-Sceneism.									
II	Screen writing, One-line, plot, characterization, one-linescene order & treatment.									
III	Film history and film genres									
IV	Critical understanding of films Auteurist, Formalist, Marxist, Feminist and Post-colonialPerspectives									
V	Writing film reviews and critic									
<p>The course outcome is based on the Learning Objectives. Each course objective will have a course outcome. This will elucidate what the student will acquaint once he completes that particular unit. There will be equal number of Learning Objectives and Course outcomes.</p> <p>The blooms taxonomy verbs will be given as a separate annexure for your reference. Each course outcome should be mapped with the POs.</p> <p>The mapping of each CO can be done with any number of POs.</p>										
	Course Outcomes									
Course Outcomes	On completion of this course, students will;									
CO1	Students discuss the aspects of Cinema.								PO1	
CO2	Students analyze the aesthetics as well as the politics in films.								PO1, PO2	
CO3	Students read and review films,								PO4, PO6	
CO4	Students develop an understanding of contemporary aesthetic trends in political, social,cultural and philosophical context								PO4, PO5, PO6	
CO5	Write film scripts and reviews.								PO3, PO8	

Text Books (Latest Editions)	
1	Monaco, James How to Read a Film 5th ed. OUP, 2005.
2	Bordwell, David and Thompson, Kristin, Film Art: an Introduction, 7th ed. McGraw-HillCo., 2004.
3	Cook, David A., A History of Narrative Film, 4th ed. W.W.Norton, 2004.
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Kawin, Bruce, How Movies Work. University of California Press, 1992.
2.	Nelken, Jill, Introduction to Film Studies, 5th ed. Routledge, 2011.
3.	Feild, Syd, Screenplay: The Foundations of Screenwriting. RHUS, 2005.

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

TRANSLATION: BASIC CONCEPTS AND PRACTICE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks			
								CIA	External	Total	
23111GEC46	Translation: basic concepts and practice	2	1	-	-	3	3	25	75	100	
Learning Objectives											
LO1	To enable learners get an overview of translation concepts										
LO2	To gain insight into the evolution of Translation in global perspective and its development in the domain of language and literature.										
LO3	Gain exposure to some basic concepts related to Translation.										
LO4	Familiarize with some Important Institutions of Translation and their contributions										
LO5	Help learners get a knowledge on Translation Studies										
UNIT	Details										
I	Origin and Development of Translation in Global perspective										
II	Origin and Development of Translation and its Present Scenario.										
III	Important Institutions of Translation (some important Translators and their works)										
IV	Basics of Translation and Translation Studies – An Introduction										
V	Objectives and Importance of Translation										
Course Outcomes											
Course Outcomes	On completion of this course, students will;										
CO1	Be able to explain the growth and development of Translation and some basic concepts related to it.							PO1			
CO2	Be ready to discuss and define Translation Studies.							PO1, PO2			
CO3	Familiarize and learn about the different types of books and the need for their translation.							PO4, PO6			
CO4	Gain exposure to the field of translation studies and explore the dynamics of the field.							PO4, PO5, PO6			
CO5	Learn about the use of translation and the methods of assessing the written concepts of translation.							PO3, PO8			
Text Books (Latest Editions)											
1.	Mona Baker, Kirsten Malmkjær, Routledge Encyclopedia of Translation Studies, (1998), Routledge Taylor and Francis Group, London and New York										
2.	Yves Gambier, Luc van Doorslaer, Handbook of Translation Studies, (2011), John Benjamins Publishing, Amsterdam and Philadelphia										
3.	Susan Bassnett, Translation Studies, (2013), Routledge Taylor and Francis Group, London and New York.										
References Books											
(Latest editions, and the style as given below must be strictly adhered to)											
1.	Carmen Millán, Francesca Bartrina, The Routledge Handbook of Translation Studies, (2013), Routledge Taylor and Francis Group, London and New York										
Web Resources											
1.	https://mu.ac.in/wp-content/uploads/2022/06/PDF-of-Translation-Studies.pdf										

ENGLISH FOR BUSINESS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111SEC47	English For Business	2	0	-	-	2	2	25	75	100
Learning Objectives										
LO1	To help students learn strategies and practical language to deal with reallife situations.									
LO2	To help them improve on how to speak and write in order to keep communication going and always appear professional and competent									
LO3	To enable them to use the language flexibly and express in the suitable language for the context : for example in social, professional or academic contexts									
LO4	To help them strengthen their understanding of native speakers in real life situations by learning strategies and through practice, practice, practice!									
LO5	To help them to consistently develop a comprehensive vocabulary through real, authentic resources									
UNIT	Details									
I	Business English Definition and Difference									
II	Highlights/ Significance/Essentials of Business English									
III	Needs of Business English									
IV	The role of Business English in English language Learning-Education as an instrumental factor in learning Business English.									
V	Economic Development through Business English									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Strengthen their language skills : writing, reading, listening & speaking								PO1	
CO2	Understand real speech patterns and learn pronunciation techniques in fluent speech								PO1, PO2	
CO3	Improve their confidence and learn how to connect with people in English								PO4, PO6	
CO4	Develop a comprehensive vocabulary in order to improve the way of doing business in English and ultimately, to move you towards English proficiency.								PO4, PO5, PO6	
CO5	Learn how to run meetings, deliver presentations, deal with clients and interact with colleagues								PO3, PO8	
Text Books (Latest Editions)										
1.	Nabila, H. (2015). English for Specific Business Purposes. University of Oran Faculty of Letters, Languages, and Arts Department of Anglo-Saxon Languages Section of English.									
2.	Hutchinson, T. & Waters, A. (1987). English for specific purposes. Cambridge: Cambridge University Press.									
References Books										
(Latest editions, and the style as given below must be strictly adhered to)										
1.	Strapasson, G. (2015). Needs Analysis And English For Business Purposes. Language Arts English/Portuguese College Final course assignment - Federal University of Technology - Paraná. Curitiba. 2015.									
Web Resources										
1.	English language skills for the future Cambridge English									

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111SEC48	English For Careers	2	-	-	-	2	2	25	75	100

Learning Objectives

LO1	To help students gain knowledge about the job search, application, and interview process
LO2	Help them to explore their global career path, while building vocabulary and improving language skills to achieve professional goals.
LO3	Help them with strategies for identifying the jobs that match their interests and skills
LO4	Help them to understand the job-seekers language for meeting new people, making small talk, and describing
LO5	To enable learners to describe themselves and their experiences in a résumé
UNIT	Details
I	Definition of English Language-Characteristic Features
II	Purposes of English Language
III	Major Roles played by English Language in Education and various career choices
IV	English language as a identity to popular culture
V	The major developments happening in the contemporary world by using English language.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Attain communicative competence so that they can use language accurately and appropriately	PO1
CO2	Understand the basic features of communication and aim at improving language skills	PO1, PO2
CO3	Gain useful letter/report writing tools, tips and techniques to effectively apply the skills to their everyday workplace correspondence.	PO4, PO6
CO4	Demonstrate the particulars of writing effective emails, whilst improving punctuation and grammar.	PO4, PO5, PO6
CO5	Make sure that the style, content and message is concise, correct and appropriate.	PO3, PO8

Text Books (Latest Editions)

1.	The Waterfall. The English Writings of Rabindranath Tagore. Ed. Sisir Kumar Das. Vol. II. New Delhi: Sahitya Academy, 1966. 163-208. Print
2.	Geddes, Patrick. The Life and Work of J. C. Bose. London: Longman's Green and Co., 1920. Print

References Books

(Latest editions, and the style as given below must be strictly adhered to)

1.	Bose, D.M. "J.C. Bose." Dr. D. M. Bose Centenary Celebration Commemoration Volume 1885- 1985. Kolkata: Bose Institute, 1995. Print
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Mapping with Programme Outcome:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

Course Code	Course Title	L	T	P	C
231LSCLS	Leadership and Management Skills	-	-	-	2

Aim:

The aim of the course cultivating and nurturing the innate leadership skills of the youth so that they may transform these challenges into opportunities and become torch bearers of the future by developing creative solutions.

Course Objective:

The Module is designed to:

- Help students to develop essential skills to influence and motivate others
- Inculcate emotional and social intelligence and integrative thinking for effective leadership
- Create and maintain an effective and motivated team to work for the society
- Nurture a creative and entrepreneurial mindset
- Make students understand the personal values and apply ethical principles in professional and social contexts.

Course Outcomes :

Upon completion of the course students will be able to:

1. Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision
2. Learn and demonstrate a set of practical skills such as time management, self management, handling conflicts, team leadership, etc.
3. Understand the basics of entrepreneurship and develop business plans
4. Apply the design thinking approach for leadership
5. Appreciate the importance of ethics and moral values for making of a balanced personality.

UNIT I- Leadership Skills

a. Understanding Leadership and its Importance

- What is leadership?
- Why Leadership required?
- Whom do you consider as an ideal leader?

Traits and Models of Leadership

- Are leaders born or made?
- Key characteristics of an effective leader
- Leadership styles
- Perspectives of different leaders

Basic Leadership Skills

- Motivation
- Team work
- Negotiation
- Networking

UNIT II - Managerial Skills

a. Basic Managerial Skills

- Planning for effective management
- How to organize teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate
- Conflict management

Self Management Skills

- Understanding self concept
- Developing self-awareness
- Self-examination
- Self-regulation

UNIT III - Entrepreneurial Skills

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurship
- Traits and competencies of entrepreneur

Creating Business Plan

- Problem identification and idea generation
- Idea validation
- Pitch making

UNIT IV - Innovative Leadership and Design Thinking

a. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

Design Thinking

- What is design thinking?
- Key elements of design thinking:
 - Discovery
 - Interpretation
 - Ideation
 - Experimentation
 - Evolution.
- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

UNIT V- Ethics and Integrity

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

Ethics and Conduct

- Importance of ethics
- Ethical decision making
- Personal and professional moral codes of conduct
- Creating a harmonious life

Bibliography and Suggested Readings : Books

- Ashokan, M. S. (2015). Karmayogi: A Biography of E. Sreedharan. Penguin, UK.
- Brown, T. (2012). Change by Design. Harper Business
- Elkington, J., & Hartigan, P. (2008). The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World. Harvard Business Press.
- Goleman D. (1995). Emotional Intelligence. Bloomsbury Publishing India Private Limited
- Kalam A. A. (2003). Ignited Minds: Unleashing the Power within India. Penguin Books India
- Kelly T., Kelly D. (2014). Creative Confidence: Unleashing the Creative Potential Within Us All. William Collins
- Kurien V., & Salve G. (2012). I Too Had a Dream. Roli Books Private Limited

- Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success*. New York: American Management Association
- McCormack M. H. (1986). *What They Don't Teach You at Harvard Business School: Notes From A Street-Smart Executive*. RHUS
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E-Resources

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- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - . "A Leader Should Know How to Manage Failure" <https://www.youtube.com/watch?v=laGZaS4sdeU>
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, 85(6): 60.
- NPTEL Course on Leadership - <https://nptel.ac.in/courses/122105021/9>

SEMESTER IV- 2023

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Definition, scope, and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – the concept of an ecosystem – structure, and function of an ecosystem – producers, consumers, and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes

UNIT II ENVIRONMENTAL POLLUTION

Definition - causes, effects, and control measures of (a) Air pollution (Atmospheric chemistry - Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen, and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission,

UNIT III NATURAL RESOURCES

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and groundwater, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development – urban problems related to energy – water conservation, rainwater harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – the role of non-governmental organization environmental ethics:

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – population explosion – family welfare program – environment and human health – human rights – value education – HIV / AIDS – women and child welfare.

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition,

Pearson Education (2004).

2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2006).

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)

Semester-II

ENVIRONMENTAL SCIENCE

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Introduction, types, characteristic features, structure, and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – the value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, and birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION

Control of SO₂, NO_x, CO, and HC) (b) Water pollution: Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical, and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–the role of an individual in prevention of pollution – pollution case studies – A field study of the local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES

The effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man-induced landslides, soil erosion, and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Introduction to Environmental Biochemistry: Proteins –Biochemical degradation of pollutants, Bioconversion of pollutants. Field study of the local area to document environmental assets – river/forest/grassland/hill/mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

Environmental Issues and possible solutions – 12 Principles of green chemistry - nuclear accidents and the holocaust, case studies – wasteland reclamation – consumerism and waste products – environment production act – Air Act – Water Act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Ecomark). enforcement machinery involved in environmental legislation- central and state pollution control boards- disaster management: floods, earthquakes, cyclones, and landslides. Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

Environmental impact analysis (EIA)- -GIS-remote sensing-role of information technology in environment and human health – Case studies. [Environmental Education and Environmental Education at different levels of Education](#) [Environmental awareness and attitude change.](#) [Environmental Stressors and Disaster Management Education](#)

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2006).

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)

Course Code	Course Title	L	T	P	C
231ACSIKWS	INDIANKNOWLEDGE SYSTEM	4	0	0	3

Course Objectives:

The course design seeks to address the following issues:

- To introduce to the students the overall organization of IKS
- To develop an appreciation among the students the role and importance of Veda, Vedāngas, Upa Vedas and Purāṇas
- To show case the multi-dimensional nature of IKS and their importance in the contemporary society
- To motivate the students to take up a detailed study of some of these topics and explore their application potential

Course Outcomes:

CO1: Explain the historicity of Indian Knowledge System and the broad classification of Indian philosophical systems

CO2: Explain the potential of Sanskrit in natural language processing

CO3: Explain the features of Indian numeral system and its role in science & technology advancement

CO4: Illustrate the basic elements of the Indian calendar and the components of Indian Panchanga

CO5: Outline the science, engineering & technology heritage of ancient and medieval India

Syllabus

Unit I: Introduction to Indian Knowledge System (IKS), Definition, Concept and Scope of IKS (4)

Definition, Concept and Scope of IKS

IKS based approaches on Knowledge Paradigms

IKS in ancient India and in modern India

Unit II: IKS and Indian Scholars, Indian Literature (8)

1. Philosophy and Literature (Maharishi Vyas, Manu, Kanad, Pingala, Parasara, Banabhatta, Nagarjuna and Panini)
2. Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhashkaracharya, Varahamihira and Brahmgupta)
3. Medicine and Yoga (Charak, Susruta, Maharishi Patanjali and Dhanwantri)
4. Sahitya (Vedas, Upvedas, Upavedas (Ayurveda, Dhanurveda, Gandharvaveda))
5. Puran and Upnishad and shaddarshan (Vedanta, Nyaya, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma and Meditation)
6. Shastra (Nyaya, vyakarana, Krishi, Shilp, Vastu, Natya and Sangeet)

Unit III: Indian Traditional/tribal/ethnic communities, their livelihood and local wisdom (6)

1. Geophysical aspects, Resources and Vulnerability
2. Resource availability, utilization pattern and limitations
3. Socio-Cultural linkages with Traditional Knowledge System
4. Tangible and intangible cultural heritage.

Unit IV: Unique Traditional Practices and Applied Traditional Knowledge (8)

1. Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives
2. Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices
3. Indigenous Bio-resource Conservation, Utilization Practices and Food Preservation Methods,

- Handicrafts, Wood Processing and Carving, -Fiber Extraction and Costumes
4. Vaidya(traditional healthcaresystem), Tantra-Mantra, AmchiMedicineSystem
 5. Knowledgeofdyeing, chemistryofdyes, pigmentsandchemicals

UnitV:Protection,preservation,conservationandManagementofIndianKnowledge System(4)

1. DocumentationandPreservationofIKS
2. ApproachesforconservationandManagementof natureandbio-resources
3. Approachesand strategies toprotectionand conservationofIKS

THIRD YEAR - SEMESTER V
ASPECTS OF LANGUAGE & LINGUISTICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC51	Aspects Of Language & Linguistics	3	2	-	-	4	5	25	75	100
Learning Objectives										
LO1	To help learners gain knowledge of linguistic research methods and of different theories of language									
LO2	To enable them gain specialized knowledge related to other areas of linguistic research and applications									
LO3	To help them gain detailed knowledge of the history, traditions and distinctive character of the academic field of English linguistics.									
LO4	To familiarize them with the ability to use this knowledge to analyze problems in both other academic settings and work contexts.									
LO5	To enhance competence in humanities that includes the ability to think historically and analytically about language, literature, culture and society.									
UNIT	Details									
I	Introduction to study of language									
II	Theory of Communication-General Semiotics- Linguistics, Sign, Language & Culture- Language & Writing.									
III	Introduction to Saussurian Structuralism-Introduction to Phonology & Morphology- Syntax & Semantics									
IV	Computing in Linguistics & Phonetics- Introductory Reading.									
V	Linguistic Changes-English Language Varieties- Idiolect, Dialect, Pidgin & Creole- Bilingualism/Multilingualism- Psychology of Language-Natural Learning Process- Linguistics: An Introduction of Language & Communication-Structural Aspects of Language Change-Course in General Linguistics-The Study of New Linguistic Varieties.									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Be able to analyze a wide range of problems relating to linguistic scholarship and research ethics.							PO1		
CO2	Apply the acquired skills in both academic and work contexts to plan and complete extensive research projects involving the gathering and systematizing of a substantial amount of information							PO1, PO2		
CO3	Communicate the results of independent research and gain mastery of advanced linguistic terminology							PO4, PO6		
CO4	Communicate about academic issues related to languages and linguistics, both with specialists and the general public.							PO4, PO5, PO6		

CO5	Contribute to new thinking and innovation processes within the area of linguistic specialization.	PO3, PO8
Text Books (Latest Editions)		
1.	Eco, Umberto. A Theory of Semiotics. Indiana University Press, 1979.	
2.	Harley, Trevor A. The Psychology of Language. Psychology Press, 2013.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	McLuhan, Eric, and Marshall McLuhan. Theories of Communication. Peter Lang Pub Incorporated, 2011.	
2.	Sakoda, Kent, and Jeff Siegel. Pidgin Grammar. Bess Press, 2003.	
3.	Bloomfield, Leonard. Language. University of Chicago Press, 1984.	
4.	Saussure, Ferdinand. Course in General Linguistics. Open Court Publishing, 1986. Yule, George. The Study of Language. Cambridge University Press, 2010.	

AUTHORS IN FOCUS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC52	Authors In Focus	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To help learners gain knowledge of authors of various backgrounds.									
LO2	To enable them gain specialized knowledge related to works of authors of national and international acclaim.									
LO3	To familiarize them with the style, diction and coherence of authors and their works.									
LO4	To equip them with the ability to use this knowledge to analyze problems in both other academic settings and work contexts.									
LO5	To enhance their ability to think historically and analytically about people, language, literature, culture and society.									
Details										
UNIT										
I	Aristotle-Life and works.									
II	Charles Dickens-Life & Works									
III	Rabindranath Tagore-Life & Works									
IV	Jane Austen-Life & Works									
V	Sandra Gilbert & Susan Gubar "Mad Woman in the Attic"									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Demonstrate a broad and coherent body of knowledge with depth in the underlying principles and concepts								PO1	
CO2	Integrate knowledge of the diversity of cultures and peoples								PO1, PO2	
CO3	Apply critical thinking, independent judgment, intercultural sensitivity and regional, national and global perspectives to identify and solve problems in English Language and Literature								PO4, PO6	
CO4	Demonstrate capacity for reflection, planning, ethical decision-making and inter-disciplinary team work in diverse contexts of community engagement.								PO4, PO5, PO6	
CO5	Develop creativity, understanding, teaching and critical appreciation of English Literature.								PO3, PO8	
Text Books (Latest Editions)										
1.	Barnes, Jonathan, and Professor of Ancient Philosophy Jonathan Barnes. Aristotle: A Very Short Introduction. Oxford Paperbacks, 2000.									
2.	Fabiny, Sarah. Who Was Jane Austen? Penguin, 2017.									
References Books (Latest editions, and the style as given below must be strictly adhered to)										
1.	Gilbert, Sandra M., and Susan Gubar. The Madwoman in the Attic. Yale University Press, 2020.									
2.	Tagore, Rabindranath. Rabindranath Tagore: An Anthology. Macmillan, 1999.									
3.	Tomalin, Claire. Charles Dickens. Penguin UK, 2012.									

4.	Wilson, Cheryl A., and Maria H. Frawley. The Routledge Companion to JaneAusten. Routledge, 2021.
Web Resources	
1.	“About the Authors.” Beyond Performance, John Wiley & Sons, Inc., 2015, pp.269–70, http://dx.doi.org/10.1002/9781119202455.about .

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 – Low

Mapping with Programme Specific Outcome:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

THIRD YEAR - SEMESTER V
WOMEN'S WRITING IN ENGLISH AND IN TRANSLATION

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC53	Women's Writing In English And In Translation	4	1	-	-	4	5	25	75	100

Learning Objectives

LO1	To familiarize learners with how unique experiences of women influence their writings
LO2	To help them analyze representations of women in literature.
LO3	To enable learners to be familiar with various contexts that influence the representation of women in literature.
LO4	To enable them apply appropriate formal conventions when writing about literature
LO5	To help them in understanding how and on what grounds women's writing can be considered as a separate genre.

UNIT Details

I	Toru Dutt - Our Casuarina Tree. Elizabeth Browning - How do I love thee? Judith Wright – Eve to the Daughter
II	Gwendolyn Brooks - Boy Breaking Glass. Avvaiyar - Worth Four Crores (Give, Eat & Live) On Reading Haiku
III	Virginia Woolf - A Room Of One's Own. Clarissa Pinkola Estés - Women Who Run With Wolves
IV	Kate Chopin –Awakening Carol Churchill – Top Girls
V	Margaret Atwood - Surfacing- Ambai - In a forest, A deer. N. Kalyan Vaasanthi - Breaking Free.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Examine and appreciate the role played by sociocultural-economic contexts in defining women.	PO1
CO2	Be enlightened about the issues and concerns of the women writers of the developed and developing countries.	PO1, PO2
CO3	Understand and appreciate the representation of female experience in literature	PO4, PO6
CO4	Gain awareness of class, race and gender as social constructs and how they influence women's lives.	PO4, PO5, PO6

CO5	Be equipped with analytical, critical and creative skills to interrogate the biases in the construction of gender and patriarchal norms.	PO3, PO8
Text Books (Latest Editions)		
1.	Gilbert, Sandra M., and Susan Gubar. The Norton Anthology of Literature by Women. W. W. Norton, 2007.	
2.	Olson, S. Douglas. The “Homeric Hymn to Aphrodite” and Related Texts. Walter de Gruyter, 2012.	
References Books		
(Latest editions, and the style as given below must be strictly adhered to)		
1.	Estés, Clarissa Pinkola. Women Who Run with the Wolves. 1995.	
2.	Holmström, Lakshmi. In A Forest, A Deer. OUP India, 2012.	
3.	Jain, Jasbir, and Avadhesh K. Singh. Indian Feminisms. 2001.	
4.	Woolf, Virginia. A Room of One’s Own. Renard Press Ltd, 2020.	
Web Resources		
1.	“Ambai (C. S. Lakshmi) b. 1944.” Name Me a Word, Yale University Press, 2019, pp. 259–67, http://dx.doi.org/10.12987/9780300235654-032 .	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

THIRD YEAR - SEMESTER V
INDIAN WRITING INTRANSLATION

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC54	Indian Writing InTranslation	3	2	-	-	4	5	25	75	100
Learning Objectives										
LO1	To introduce the students to the polyphony of modern Indian writing intranlation.									
LO2	To make them understand the multifaceted nature of cultural identities in thevarious Indian literatures through indigenous literary traditions.									
LO3	To compare literary texts produced across Indian regional landscapes to seeksimilarities and differences in thematic and cultural perspectives.									
LO4	To explore images in literary productions that express the writers sense of theirsociety.									
LO5	To encourage the students to explore texts outside of the suggested reading liststo realize the immense treasure trove of translated Indian literary works.									
UNIT	Details									
I	Ilango Adigal - The book of Vanci. – Silappathikaaram Kurunthogai (Five verses for oneTina)									
II	Rabindranath Tagore - Where the mind is without fear Sarojini Naidu - The Soul's Prayer. Nissim Ezeikel - The Railway Clerk. Arun Kolatkar - An Old Woman									
III	Theory of Value A collection of Readings-(33-40) Chapter 6-Bharata Natya Shastra (100-118)-Hindu Viewof Life-Vanishing Landmarks									
IV	Anon E. Mouse - How the Raja's son won the Princess Labam. Sunil Gangopadhyay - Arjun									
V	Badal Sircar - Evam IndrajitGirish Karnad – Tughlaq									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Understand the multifaceted nature of cultural identities in the various Indian literatures throughindigenous literary traditions.								PO1	
CO2	Compare literary texts produced across Indian regional landscapes to seek similarities and differences in thematic and cultural perspectives.								PO1, PO2	
CO3	Learn to explore images in literary productions thatexpress the writers' sense of their society.								PO4, PO6	
CO4	Explore texts outside of the suggested reading lists torealize the immense treasure trove of translated Indian literary works.								PO4, PO5, PO6	
CO5	Be familiar with concepts such as modernism, regionalism, the contemporary, and representations of history, class, and gender in modern Indian writingin translation.								PO3, PO8	
Text Books (Latest Editions)										
1.	Modern Indian Writing in Translation, Edited by Dhananjay Kapse, 2016									

2.	Short Fiction from South India, Edited by Subashree Krishnaswamy and K.Srilata, 2007
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	A Clutch of Indian Masterpieces, Edited by David Davidar, 2016.
2.	Changing the Terms: Translating in the Postcolonial Era, Edited by Sherry Simonand Paul St. Pierre, 2000
3.	100 Great Indian Poems by Abhay K. Bloomsbury, 2019
Web Resources	
1.	Modern Indian Writing in Translation - Course (nptel.ac.in).

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

NON- MANDATORY ELECTIVE PAPER – VIII - WRITING FOR MEDIA

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111DSC55	Writing For Media	3	2	-	-	3	5	25	75	100

Learning Objectives	
LO1	To learn the basics of journalistic reporting, writing, and editing.
LO2	To acquire basic skills in other forms of written communication.
LO3	To learn how to use technology
LO4	To reach, communicate with and increase your audience.
LO5	To explore various branches of journalism.

UNIT	Details
I	Introduction to types of media, print electronic , digital writing, significance of media and social benefits.
II	Writing for the media-the basic principles-Style of media writing.
III	Types of media writing-1 News Reports-Interviews-Commentaries.
IV	Types of media writing-2 Reviews of Art, Literature, Film-Reporting Cultural Events.
V	Journalism in education, tabloid, investigative, developmental and photography.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Recall the basics of reporting and writing for print media.	PO1
CO2	Report news keeping values and qualities of a good reporter.	PO1, PO2
CO3	Apply theoretical knowledge in writing reports, commentaries, reviews.	PO4, PO6
CO4	Distinguish between the different styles of Journalism and compose specific articles.	PO4, PO5, PO6
CO5	Apply various knowledge in regard to various branches of journalism.	PO3, PO8

Text Books (Latest Editions)	
1.	Pickering, Ian. Writing for News Media: The Story Teller's Craft. Routledge, 2018.
2.	Flak, Vincent F. Dynamics of Media Writing: Adapt and Connect. Sage, 2018.
3.	Batty, Craig and Cain, Sandra. Media Writing: A Practical Introduction. RedGlobe Press, 2016.

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

ART AND LITERARY AESTHETICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC56A	Art And Literary Aesthetics	4	2	-	-	4	6	25	75	100

Learning Objectives

LO1	To introduce the multidisciplinary of Art and Literary Studies.
LO2	To gain an understanding of various movements in art history.
LO3	To help students find relevant and associative ideas.
LO4	To engage with works of art that directly refer to literary works and also draw inspiration from from it.
LO5	To recognize how all forms of art is part of a continuum.

UNIT	Details
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I	Literature and visual arts - essays.
II	Romanticism through coleridge and delacroix
III	Pre-Raphaelite movement - D.G. Rosetti's Prosperine (painting and Poem)
IV	Post-Impressionism - Amritya shergill's Ancient story Teller painting and virginia woolf's The Waves (novel)
V	Expressionism - Munch- Scream (painting) and Kafka- Metaphorphosis (Novella)

The course outcome is based on the Learning Objectives. Each course objective will have a course outcome. This will elucidate what the student will acquaint once he completes that particular unit. There will be equal number of Learning Objectives and Course outcomes. The blooms taxonomy verbs will be given as a separate annexure for your reference. Each course outcome should be mapped with the POs. The mapping of each CO can be done with any number of POs.

	Course Outcomes	
Course Outcomes	On completion of this course, students will;	
CO1	The student will be able to engage with literature in abroad, educated perspective.	PO1
CO2	The student will be able to think with greater originality and independence about the complex interrelationship between different art forms.	PO1, PO2
CO3	The student will be trained to engage sensitively and intelligently in new readings of literature.	PO4, PO6
CO4	The course develops an understanding of the co- relation between literature, film, music and painting and encourages ways of reading and seeing which deliver insights into literary texts.	PO4, PO5, PO6
CO5	Initiate students to implement the multidisciplinary scope of art and literary studies.	PO3, PO8

References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Herbert Read – extract from The Meaning of Art (pg 17-48) Pelican Books,1959.
Web Resources	
1.	Astor, Dave. Music in Literature.2 Apr. 2013, www.huffpost.com/entry/music-in-literature_b_2590404 .
2.	Benjamin, Elizabeth and Sophie Corser. -INTRODUCTION Literature and Art: Conversations and Collaborations MHRA Working Papers in the Humanities, 9 (2015) http://www.mhra.org.uk/pdf/wph-9-1.pdf
3.	Berger, John. Ways of Seeing. Penguin 1972. http://waysofseeingwaysofseeing.com/ways-of-seeing-john-berger-5.7.pdf

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

INTRODUCTION TO COMPARITIVE LITERATURE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111DSC56B	INTRODUCTION TO COMPARITIVE LITERATURE	3	0	0	0	3	5	25	75	100

Learning Objectives

LO1	To attain a broad knowledge of various literary traditions bothin their specificity and interrelation.
LO2	To interpret a literary text or other cultural artifact in a non-native target language and to develop advanced skills in order to compare texts from variety of different traditions, genres, periods and areas.
LO3	To cultivate a complex, transdisciplinary understanding and appreciation of literary texts from a variety of different traditions, genres, periods, and areas.
LO4	To develop the skills to move among and between diverse cultures, including on-site research and travel abroad as meansof participation in cultural.
LO5	To enable the students to produce sophisticated oral andwritten argumentations on literary and cultural topics in comparative contexts.

UNIT

Details

I	Definition and Scope, National Literature, Comparative Literature, General Literature, World Literature, The Frenchand American Schools of Comparative Literature.
II	Influence and Imitation- Periodization Movement, GenreStudies, Thematology
III	Literature and other disciplines, Literature and other Arts
IV	Comparative Study of Shelley and Bharathi, Selectedpoems of Shelley- <i>Ode toLibert ,Queen Mab, Love's Philosophy</i> . Selected poems of SubramaniyaBharathi- <i>Bharath Country, Worship of Sun, KannanMyServant</i> .
V	Comparative study of Vairamuthu's <i>KallikattuIthikasam</i> and ErnestHemingway's' <i>The Old Man and the Sea</i> '

The course outcome is based on the Learning Objectives. Each course objective will have a course outcome. This will elucidate what the student will acquaint once he completes that particular unit. There will be equal number of Learning Objectives and Course outcomes.

The blooms taxonomy verbs will be given as a separate annexure for your reference. Each course outcome should be mapped with the POs.

The mapping of each CO can be done with any number of POs.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Read critically literary and cultural textsin a range of genres and media (novels, poetry, drama, film, monuments, political discourse, popular culture, audio, etc.)	PO1

CO2	Demonstrate knowledge of historical, linguistic, and cultural contexts of texts as they are produced and received across national boundaries and in response to the dynamics of global movements and crises creating dynamic intersections of power, peoples, and aesthetic practices.	O1, PO2
CO3	Use critical terminology and interpretive methods drawn from specific 20 th –and 21 st century comparative and critical theories from multiple disciplines.	PO4, PO6
CO4	Recognize the different aims, formal constraints, rhetorical strategies, and ideological underpinnings at stake in different literary genres through texts in two or more foreign languages.	PO4, PO5, PO6
CO5	Master a variety of theoretical and methodological approaches to texts and adopt them for comparative textual studies able to go beyond simply mechanical applications.	PO3, PO8

Text Books (Latest Editions)

References Books

(Latest editions, and the style as given below must be strictly adhered to)

1.	Ulrich Weisstein: Comparative Literature and other
2.	Arts Wellek & Warren: Theory of Literature
3.	Part II S.S.Prawar : Comparative Literatures

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Code	Course Title	L	T	P	C
231AECCVED	Value Education	2	0	0	2

OBJECTIVES:

- To understand the philosophy of life and values through Thirukural
- To analyse the components of value education to attain the sense of citizenship
- To understand different types of values towards National Integration and international understanding
- To learn yoga as value education to promote mental and emotional health
- To understand human rights, women rights and other rights to promote peace and harmony

UNIT I: PHILOSOPHY OF LIFE AND SOCIAL VALUES:

Human Life on Earth (Kural 629) - Purpose of Life (Kural 46) - Meaning and Philosophy of Life (Kural 131, 226) - Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities/duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).

UNIT-II – HUMAN VALUES AND CITIZENSHIP

Aim of education and value education: Evolution of value oriented education, Concept of Human values: types of Values - Character Formation – Components of Value education - APJ Kalam's ten points for enlightened citizenship - The role of media in value building

UNIT-III VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT:

Constitutional or national values: Democracy, socialism, secularism, equality, Justice, liberty, freedom and fraternity - Social Values: Pity and probity, self-control, universal brotherhood - Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith - Religious Values: Tolerance, wisdom, character - Aesthetic Values- Love and appreciation of literature and fine arts and respect for the same - National Integration and International Understanding.

UNIT IV: YOGA AND HEALTH:

Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga – Yoga practices: Asanas, Pranayama and Meditation.

UNIT V: HUMAN RIGHTS:

Concept of Human Rights: Indian and international perspectives - Evolution of Human Rights - definitions under Indian and International documents - Broad classification of Human Rights and Relevant Constitutional Provisions: Right to Life, liberty and Dignity - Right to equality - Right against exploitation - Cultural and Educational Right - Economic Rights - Political Rights - Social Rights - Human Rights of Women and Children - Peace and harmony.

UNIT-VI:CURRENT CONTOURS:(forcontinuousinternalassessmentonly):

BOOKS FOR REFERENCES:

1. Thirukkural with English Translation of Rev. Dr. G. U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613004.
2. Leah Levin, Human Rights, NBT, 1998
3. V.R. Krishna Iyer, Dialectics and Dynamics of Human Rights in India, Tagore Law Lectures.
4. Yogic Therapy - Swami Kuvalayananda and Dr. S.L. Vinekar, Government of India, Ministry of Health, New Delhi.
5. SOUND HEALTH THROUGH YOGA - Dr. K. Chandrasekaran, Prem Kalyan Publications, Sedapatti, 1999.
6. Grose. D.N - "A text book of Value Education" New Delhi (2005)
7. Gawande. EN - "Value Oriented Education" - Vision for better living. New Delhi (2002) Sarupsons
8. Brain Trust Aliyar - "Value Education for Health, Happiness and Harmony" Erode (2004) Vethathiri Publications

COURSE OUTCOMES: After completion of the course, the student will be able to:

- Apply the values in Thirukkural to be peaceful, dutiful and responsible in family and society
- Develop character formation and sense of citizenship
- Be secular, self-control, sincere, respectful and moral.
- Master yoga, asana and meditation to promote mental health
- Be attitude in alto follow the constitutional rights

Course Code	Course Title	L	T	P	C
221ACLSPSL	Professional Skills	0	0	0	1

Course Objectives :

The Objectives of the course are to help students/candidates:

1. Acquire career skills and fully pursue to partake in a successful career path
2. Prepare good resume, prepare for interviews and group discussions
3. Explore desired career opportunities in the employment market in consideration of an individual SWOT.

Course Outcomes :

At the end of this course the students will be able to:

1. Prepare their resume in an appropriate template without grammatical and other errors and using proper syntax
2. Participate in a simulated interview
3. Actively participate in group discussions towards gainful employment
4. Capture a self - interview simulation video regarding the job role concerned
5. Enlist the common errors generally made by candidates in an interview
6. Perform appropriately and effectively in group discussions
7. Explore sources (online/offline) of career opportunities
8. Identify career opportunities in consideration of their own potential and aspirations
9. Use the necessary components required to prepare for a career in an identified occupation (as a case study).

Unit I: Resume Skills

Resume Skills : Preparation and Presentation

- Introduction of resume and its importance
- Difference between a CV, Resume and Bio data
- Essential components of a good resume

Resume skills : common errors

- Common errors people generally make in preparing their resume
- Prepare a good resume of her/his considering all essential components

Unit II: Interview Skills

i. Interview Skills : Preparation and Presentation

- Meaning and types of interview (F2F, telephonic, video, etc.)
- Dress Code, Background Research, Do's and Don'ts
- Situation, Task, Approach and Response (STAR Approach) for facing an interview
- Interview procedure (opening, listening skills, closure, etc.)
- Important questions generally asked in a job interview (open and closed ended questions)

Interview Skills : Simulation

- Observation of exemplary interviews
- Comment critically on simulated interviews

Interview Skills : Common Errors

- Discuss the common errors generally candidates make in interview
- Demonstrate an ideal interview

Unit III: Group Discussion Skills

Meaning and methods of Group Discussion

- Procedure of Group Discussion
- Group Discussion- Simulation

- Group Discussion - Common Errors

Unit IV: Exploring Career Opportunities

Knowing yourself – personal characteristics

- Knowledge about the world of work, requirements of jobs including selfemployment.
- Sources of career information
- Preparing for a career based on their potentials and availability of opportunity

Course Code	Course Title	L	T	P	C
231—DSC54-	Disaster Management	4	0	0	3

AIM: Disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery.

Course Objectives:

1. To provide students an understanding the need for studying the disaster management
2. Develop an understanding about the various types of disasters.
3. To expose students to the risk and vulnerability analysis
4. To create awareness about disaster prevention and risk reduction
5. To establish relationship between disasters and developments.
6. To understand Rehabilitation, Reconstruction and Recovery in the event of Disaster
7. To gain knowledge on Climate Change Adaptation and IPCC Scenario and Scenarios in the context of India.

Course Outcomes:

CO1: Understand the need and significance of studying disaster management

CO2: Understand the different types of disasters and causes for disasters.

CO3: Gain knowledge on the impacts Disasters on environment and society

CO4: Study and assess vulnerability of a geographical area.

CO5: Students will be equipped with various methods of risk reduction measures and risk mitigation.

CO6: Understand the role of Information Technology in Disaster Management

CO7: Understand Geographical Information System applications in Disaster Management

Content of Course
Unit I: Introduction to Disasters
Chapter No. 1 Disaster: Concept, Meaning, and Definition Chapter No. 2 History of Major Disaster Events in India Chapter No. 3 Types of Disasters – Natural Disasters: Famine, Drought, Flood, Cyclone, Tsunami, Earthquake
Unit II: Disaster Mitigation and Disaster Management

Chapter No. 4 Man-made Disasters: Riots, Blasts, Industrial, Militancy

Chapter No. 5 Profile, Forms and Reduction of Vulnerability **Chapter**

No. 6 Disaster Mitigation: Concept and Principles

Unit III: Impact of Disaster

Chapter No. 7 Disaster Management: Concept and Principles

Chapter No. 8 Pre-disaster-Prevention and Preparedness

Chapter No. 9 Physical, Economic, Social, Psycho-socio Aspects, Environmental Impacts

Unit IV: Disaster Process and Intervention

Chapter No. 10 During Disaster-Rescue and Relief

Chapter No. 11 Post-disaster-Rehabilitation and Reconstruction

Chapter No. 12 Victims of Disaster-Children, Elderly, and Women

Chapter No. 13 Displacement-Causes, Effects and Impact

Unit V: Disaster Intervention

Chapter No. 14 Major Issues and Dynamics in the Administration of Rescue, Relief, Reconstruction and Rehabilitation

Chapter No. 15 Components of Rescue, Relief, Reconstruction; Rehabilitation

Chapter No. 16 Disaster Policy in India; Disaster Management Authority-NDMA, SDMA, DDMA; Disaster Management Act, 2005

Key Words: Disaster, Disaster Mitigation, Disaster Management and Disaster Process

References:

- Anil Sinha (2001), Disaster Management - Lessons Drawn and Strategies for Future. New Delhi, Jain Publications.
- Backer, C. W. and Chapman, W. (ed.). (1969), Man and Society in Disasters, New Delhi,
- Clarke, J. I., Peter Curson, et. al. (ed.) (1991), Population and Disaster, Oxford, Basil Blackwell Ltd.
- Cuny, Frederick (1984), Disasters and Development, Oxford, Oxford University Press.
- Disaster Management Act 2005
- Garb, S. and Eng, E. (1969), Disasters Hand Book, New York, Springer.
- Gupta, M. C, L. C. Gupta, B. K. Tamini and Vinod K. Sharma (2000), Manual on Natural Disaster Management in India, New Delhi, National Institute of Disaster Management.
- Hoff, A. (1978), People in Crisis - Understanding and Helping, California, Addison Wesley.
- Maskrey, Andrew (1989), Disaster Mitigation: A Community Based Approach, Oxford, Oxford.
- Narayan, Sachindra (ed.) (2000), Anthropology of Disaster Management, New Delhi, Gyan Publishing House.
- Nidhi GDhawan (2014), Disaster Management and Preparedness, New Delhi, Jain Publications.
- Parasuraman, S. and Unnikrishnan, P. V. (2000), India Disasters Report: Towards Policy Initiative, New Delhi, Oxford University Press.
- Satendra, K. J. Anandha Kumar and V. K. Naik (2013), India's Disaster Report, New Delhi, National Institute of Disaster Management.
- Singh, R. B. (ed.) (2000), Disaster Management, New Delhi, Rawat Publications.
- Sinha, P. C. (ed.) (1998), Encyclopedia of Disaster Management (Vol. 1 - 10), New Delhi, Anmol Publications.
- Tata Institute of Social Sciences (2002). Special Volume on Disaster Management, Indian Journal of Social Work, Vol. 63, Issue 2, April.

THIRD YEAR: SEMESTER VI

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC61	Shakespeare Studies	4	2	-	-	4	6	25	75	100
Learning Objectives										
LO1	To facilitate learners with a deeper understanding of Shakespeare's drama by reading a range of his plays from a variety of different critical perspectives									
LO2	To provide learners with an overview of Shakespeare's historical and political contexts									
LO3	To help learners gain an appreciation of Shakespeare's dramatic practice through close readings of the plays themselves									
LO4	To help them view the plays in performance either by visiting current theatre productions or by watching film versions									
LO5	To equip learners with a good working knowledge of both Shakespeare's drama and Shakespeare criticism									
UNIT	Details									
I	Shakespeare & his relevance - popular quotes - Shakespeare. Canon, theatre, audience, stage etc...									
II	The Four Phases of Shakespeare's, Dramatic career- tragedy lecture I & II- Comedy- Characters of Shakespeare									
III	30-Second Shakespeare-Tales from Shakespeare									
IV	Detailed- Merchant of Venice-Detailed- Julius Caesar-									
V	Wilson Knight - The wheel of fire. Akram Hossain - An approach to Shakespeare scholarship and criticism									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Demonstrate an understanding of the historical, cultural and political contexts of the plays discussed							PO1		
CO2	Show evidence of wider reading and a knowledge of Shakespeare scholarship.							PO1, PO2		
CO3	Articulate ideas that identify, analyze and communicate principles and concepts of the plays discussed, while considering competing points of view							PO4, PO6		
CO4	Undertake research to demonstrate detailed knowledge of theories and concepts in Shakespeare studies as applied to the plays discussed.							PO4, PO5, PO6		
CO5	Engage critically with both primary and secondary texts to develop informed opinions and make incisive interpretations							PO3, PO8		
Text Books (Latest Editions)										
1.	Donaldson, Peter S. "Two of Both Kinds: Marriage and Modernism in Peter Hall's A Midsummer Night's Dream." in Reel Shakespeare. Edited by Courtney Lehmann and Lisa Starks. Cranbury, NJ: Associated University Presses, 2002.									
2.	Frye, Northrop. "The Argument of Comedy." In English Institute Essays. New York, NY: Columbia University Press, 1949, pp. 58-73; repr. in Shakespeare: Modern Essays in Criticism. Edited by Edward Dean. New York: Oxford University Press, 1969 [1957]									

References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Habicht, Werner. "Shakespeare and the German Imagination." In Shakespeare: World Views. Edited by Heather Kerr, Robin Eaden, and Madge Mitton. Cranbury, NJ : Associated University Presses, 1996
2.	Harris, Diana. "The Diva and the Donkey: Hoffman's Use of Opera in A Midsummer Night's Dream" MS.
3.	Jackson, Russell. "A Shooting Script for the Reinhardt-Dieterle Dream: the War with the Amazons, Bottom's Wife, and other Missing 'Scenes.'" Shakespeare Bulletin 16/4 (Fall, 1998)
Web Resources	
1.	Reinhardt, Max and William Dieterle. (1935): VHS, laserdisc

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

THIRD YEAR - SEMESTER VI

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC62	Literary criticism	4	2	-	-	4	6	25	75	100
Learning Objectives										
LO1	To Introduce learners to the basics of Literary Criticism									
LO2	To enable learners to widen their knowledge of literary texts and focus on their importance									
LO3	To empower learners to write a critical appreciation									
LO4	To ingrain the minds towards creative writing, appreciation, critical thinking and critical analysis									
LO5	To help them accentuate expression of thoughts and views for critical appreciation and judgmental reviews									
UNIT	Details									
I	Poetics-Mimesis, Catharsis, Hamartia, Parts of Tragedy, Plot, Tragic Hero.									
II	Preface to Lyrical Ballads-The romantic creed, Definition of Poetry, Diction & Language. Fancy and Imagination, Poetic Genius.									
III	The Concept of Poetry-Defence of Poetry -Classicism, Touchstone Theory, Grand Style, High Seriousness etc									
IV	Indian Aesthetics, Movements and Concepts, Tinai, Rasa, Dhvani, Alankara, All ISMS, Object Correlative, Negative Capability, Seven Types of Ambiguity									
V	William Blake - Tyger . G K. Chesterton - Running After one's Hat Katherine Mansfield - A Cup of Tea									
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Articulate and discuss the latest developments in the specific field of practice; Communicate effectively in oral and in written English; and recognize the need for, and prepare to engage in lifelong learning.								PO1	
CO2	Apply knowledge of contemporary issues and principles of ethics relevant to professional practice;								PO1, PO2	
CO3	Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings;								PO4, PO6	
CO4	Recognize the need for, and prepare to engage in lifelong learning.								PO4, PO5, PO6	
CO5	Demonstrate a service orientation in one's profession;								PO3, PO8	
Text Books (Latest Editions)										
1.	Dobie, Ann B. (2009). Theory into Practice: An Intro to Literary Criticism. Australia: Wadsworth Cengage Learning.									
References Books										
(Latest editions, and the style as given below must be strictly adhered to)										
1.	Fry, Paul H. (2013). Theory of Literature. New Haven: Yale University Press.									
2.	Habib, M. R. (2011). A History of Literary Criticism: From Plato to Present. UK: Wiley-Blackwell Publishing.									

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

FUNDAMENTALS OF ACADEMIC WRITING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111DSC64B	FUNDAMENTALS OF ACADEMIC WRITING	3	0	-	-	3	5	25	75	100

Learning Objectives

LO1	To attain broad knowledge.
LO2	To understand various styles of sentence pattern.
LO3	To cultivate a coherent and associative thinking ability to exhibit writing skills.
LO4	To develop the ability to structure Essays.
LO5	To enable the students to learn copy- editing.

UNIT

Details

I	Writing as a Process -Pre-writing strategies, while- writing strategies, post- writing strategies ;developing writing through extended practices; developing reflective abilities & meta-awareness about writing.
II	Sentence Skills -Sentence structure; S-V agreement; modifiers; sentence fragments; commas coordination; subordination; parallelism; making complete, logical comparisons; avoiding wordy phrasing; V-T sequence.
III	Structuring Paragraphs -Topic sentence; supporting details; unity & coherence; Methods of development (Examples, comparison & contrast, process, definition, cause & effect, division & classification)
IV	Structuring Essays - Introduction; development of body; conclusion; description, narration, exposition; argumentation.
V	Content editing and substantive editing: Proofreading, copy-editing (involves an intensive check of word choice, style & sentence structure, comprehension and terminologies) & substantive editing (to resolve content ambiguity, to eliminate language errors, to improve structure, and to enhance the overall comprehension of the paper); features of written English

The course outcome is based on the Learning Objectives. Each course objective will have a course outcome. This will elucidate what the student will acquire once he completes that particular unit. There will be equal number of Learning Objectives and Course outcomes.

The blooms taxonomy verbs will be given as a separate annexure for your reference. Each course outcome should be mapped with the POs.

The mapping of each CO can be done with any number of POs.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	To design the process writing	PO1
CO2	To express sentence skills.	PO1, PO2
CO3	To structure and develop paragraphs through techniques	PO4, PO6
CO4	To compose academic essays	PO4, PO5, PO6
CO5	To distinguish between content editing and substantive editing.	PO3, PO8

Text Books (Latest Editions)

1.	Zemach, Dorothy E. & Rumisek, Lisa A. <i>Academic Writing from Paragraph to Essay</i> . London: Macmillan
2.	Langan, John. 2001. <i>Sentence Skills with Readings</i> . Boston: McGrawHill.

References Books

(Latest editions, and the style as given below must be strictly adhered to)

1.	Hartley, James. 2008. <i>Academic Writing and Publishing: A Practical Handbook</i> . London:Routledge.
2.	Bailey, Stephen. 2003. <i>Academic Writing: A Practical Guide for Students</i> . London:RoutledgeFalmer.

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	14	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

MASS COMMUNICATION AND JOURNALISM

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
2311DSC56	Mass Communication And Journalism	3	2	-	-	3	5	25	75	100

Learning Objectives

LO1	To impart the basic knowledge of Mass communication & Journalism and related areas of studies.
LO2	To develop the learner into competent and efficient Media & Entertainment Industry ready professionals.
LO3	To empower learners by communication, professional and life skills.
LO4	To develop the ability to structure Essays.
LO5	To enable the students to learn copy- editing.

UNIT	Details
I	Mass Communication in India, Print Medium, Audio-Visual Media, Other Media, Ethics, press laws
II	News Agencies, News and its Dissemination, Feature and Column Writing, Editorials, reporting
III	Advertising, Illustrations.
IV	House and Trade Journals, Starting of Newspapers and Periodicals.
V	Preparation for a Career, Research in Journalism, Planning and Publicity Campaigns.

The course outcome is based on the Learning Objectives. Each course objective will have a course outcome. This will elucidate what the student will acquire once he completes that particular unit. There will be equal number of Learning Objectives and Course outcomes.

The blooms taxonomy verbs will be given as a separate annexure for your reference. Each course outcome should be mapped with the POs.

The mapping of each CO can be done with any number of POs.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Students would be able to enhance understanding of the origin and of the print, electronic and web media. Electronic and web media.	PO1
CO2	Students would be able to inculcate the knowledge of growth of print, electronic and web	PO1, PO2
CO3	Students would be able to understand the significance of speech communication.	PO4, PO6
CO4	Students explore journals.	PO4, PO5, PO6
CO5	Students would find research gaps.	PO3, PO8

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

ENGLISH FOR COMPETITIVE EXAMINATIONS

Subject Code	Course Title	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111SEC65	English For Competitive Examinations	4	2	-	-	3	6	25	75	100
Learning Objectives										
LO1	To develop the students intellectual, personal and professional abilities.									
LO2	To acquire basic language skills listening, speaking, reading and writing for effective communication.									
LO3	To develop confidence in getting job opportunities.									
LO4	To provide awareness to the students about the various types of jobs offered in both in the Central and State Government.									
LO5	To develop competitive skills through various types of objective tests.									
UNIT	Details									
I	Parts of Speech, Direct and Indirect Speech, Reading Comprehension, Letter Writing.									
II	Tenses, Active and Passive Voice, Expansion of Proverbs, Essay Writing.									
III	Gerund, Infinitives, Idioms and Phrases, Degrees of Comparison, Hints Development, Email Writing, Report Writing.									
IV	Homonyms, Question Tags, Simple, Complex, Compound, Jumbled Sentences, Dialogue Writing.									
V	Determiners, Kinds of Sentences (Assertive, Imperative, Interrogative and Exclamatory), Capitalization, Punctuation, Spotting Errors, CV Writing and Cover letter.									
<p>The course outcome is based on the Learning Objectives. Each course objective will have a course outcome. This will elucidate what the student will acquire once he completes that particular unit. There will be equal number of Learning Objectives and Course outcomes. The blooms taxonomy verbs will be given as a separate annexure for your reference. Each course outcome should be mapped with the POs. The mapping of each CO can be done with any number of POs.</p>										
Course Outcomes										
Course Outcomes	On completion of this course, students will;									
CO1	Gain knowledge of English language to face the challenges in Competitive Examinations.							PO1		
CO2	Acquire skills in vocabulary usage and grammar.							PO1, PO2		
CO3	Acquire skills in logical reasoning, question error analysis and correct usage of words.							PO4, PO6		
CO4	Build confidence in getting job opportunities.							PO4, PO5, PO6		

CO5	Aware of the various types of jobs offered in both in the Central and State Government.	PO3, PO8
Text Books (Latest Editions)		
1.	English for Competitive examinations-.P.Bhatnagar & Rajal Bhargava	
2.	Remedial Grammar-F.T.Wood	



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY

U/s 3 of UGC Act, 1956

Vallam, Thanjavur-613403

**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF MATHEMATICS
B.Sc- CURRICULUM- 2023-REGULATION**

**COURSE STRUCTURE
Credit Distribution for UG Programme in Mathematics**

M.Sc., MATHEMATICS

Syllabus

**FROM THE ACADEMIC YEAR
2023-2024**



**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF MATHEMATICS
M.Sc- CURRICULUM- 2023-REGULATION**

**COURSE STRUCTURE
Credit Distribution for PG Programme in Mathematics**

	Course Code	Course Title	L	T	P	C
		SEMESTER I				
Part-A	23212AEC11	Algebraic Structures	4	1	0	4
	23212AEC12	Real Analysis I	4	1	0	4
	23212AEC13	Ordinary Differential Equations	4	1	0	4
	23212SEC14_	Elective-I (Generic/Discipline Specific) (One from Group A) Programming in C++	4	1	0	3
	23212GSC15_	Elective-II (Generic / Discipline Specific) (One from Group B) Discrete Mathematics	4	1	0	3
Part-B	23212 AECC1	Ability Enhancement Compulsory Course(AECC 1) Soft Skill-1	2	-	-	2
	23212SEC1	Skill Enhancement Course-SEC1 Research Methodology	3			2
		Total	25	5	0	22
		SEMESTER II				
Part-A	23212AEC21	Advanced Algebra	4	1	0	4
	23212AEC22	Real Analysis II	4	1	0	4
	23212AEC23	Partial Differential Equations	4	1	0	4
	23212GSC24_	Elective-III (Generic / Discipline Specific) (One from Group C) Mathematical Statistics	4	1	0	3

	23212MSE25-	Elective-IV (Computer / IT related) (One from Group D) Modelling and Simulation with Excel	3	2	0	3
Part-B	23212 SEC2-	Skill Enhancement Course-SEC2 Numerical analysis using SCILAB	3	-	-	2
	23212AECC2-	Ability Enhancement Compulsory Course(AECC 2) Soft Skill-2	2	-	-	2
		Total	24	06		22
		SEMESTER III				
Part-A	23212AEC31	Topology	4	1	0	4
	23212AEC32	Probability Theory	4	1	0	4
	23212AEC33	Complex Analysis	4	1	0	4
	23212AEC34	Core Industry Module	4	1	0	3
	23212GSC35_	Elective-V (Generic / Discipline Specific) (One from Group E) Python	4	1	0	3
Part-B	2321IIVEV36	Internship / Industrial Activity (Carried out in Summer Vacation at the end of I year – 30 hours)	-	-	-	2
	23212SEC3	Skill Enhancement Course-SEC- 3Professional Communication Skill - Term paper & Seminar presentation	3	-	-	2
	23212AECC3-	Ability Enhancement Compulsory Course(AECC 3) Soft Skill-3	2	-	-	2
		Total	25	05		24
		SEMESTER IV				
Part-A	23212AEC41	Functional Analysis	4	1	0	4
	23212AEC42	Differential Geometry	4	1	0	4
	23212AEC43	Mechanics	4	1	0	4
	23212PRW44	Core Project with viva voce	4	-	0	3
	23212GSC45_	Elective-VI (Generic / Discipline Specific) (One from Group F) Resource Management Techniques	4	1	0	3

Part-B	23212TCE-	Professional Competency Skill Enhancement Course Training for Competitive Examinations A. Mathematics for NET / UGC - CSIR/ SET / TRB Competitive Examinations (2 hours) B. General Studies for UPSC / TNPSC / Other Competitive Examinations (2 hours) OR C. Mathematics for Advanced Research Studies (4 hours)	4	-	-	2
	23212AECC4-	Ability Enhancement Compulsory Course(AECC 4) Soft Skill-4	2	0	0	2
Part-C	23212EA	Extension Activity	-	-	-	1
		Total	26	04	0	23
		Total Credits for the Programme				91

Consolidated Table for Credits Distribution

	Category of Courses	Credits for each Course	Number of Courses	Number of Credits in each Category of Courses	Total Credits	Total Credits for the Programme
PART A	Core	4	12	48	72	80 (CGPA)
	Project with viva voce	3	1	3		
	Industry aligned Programmes-	3	1	3		
	Elective (Generic and Discipline Centric)	3	6	18		
PART B (i)	Skill Enhancement (Term paper and Seminar & Generic / Discipline - Centric Skill Courses) (Internal Assessment Only)	2	4	8	8	

PART B	(ii) Ability Enhancement (Soft skill)	2	4	8	10	11 (Non CGPA)
	(iii) Summer Internship	1	2	2		
PART C	Extension Activity	1	1	1	1	
						91

Template for Semester

Code	Category	Title of the Paper	Marks (Max 100)		Duration for UE	Credits
			CIA	UE		
Semester -I						
Part A	Core I		25	75	3 Hrs	4
	Core II		25	75	3 Hrs	4
	Core III		25	75	3 Hrs	4
	Elective I	Elective-I (Choose one from Group-A)	25	75	3 Hrs	3
	Elective II	Elective-I I (Choose one from Group-B)	25	75	3 Hrs	3
Part B	Skill Enhancement Course -SEC 1	(Choose One from group G)	Internal Assessment			2
	Ability Enhancement Course(AECC1)	Soft Skill I	Performance based assessment			2
Semester-II						
Part A	Core IV		25	75	3 Hrs	4
	Core V		25	75	3 Hrs	4
	Core VI		25	75	3 Hrs	4
	Elective III	Elective-III (Choose one from Group-C)	25	75	3 Hrs	3
	Elective IV	Elective-IV (Choose one from Group-D)	25	75	3 Hrs	3
Part B	Skill Enhancement Course -SEC 2	(Choose one from Group-G)	Internal Assessment			2
	Ability Enhancement Course(AECC 2)	Soft Skill II	Performance based assessment			2

Semester-III						
Part A	Core VII		25	75	3 Hrs	4
	Core VIII		25	75	3 Hrs	4
	Core IX		25	75	3 Hrs	4
	Elective / ED V	Elective-VI /ED-V (Choose one from Group-E)	25	75	3 Hrs	3
	Core Industry Module	ED-IV (Choose from outside the Department)	25	75	3 Hrs	3
Part B						
	Skill based (Term paper and Seminar)	Assignment of problem by the faculty Lecture -I (by the student) 25% Lecture-II (by the student) 25% Lecture-III (by the student) 25% Submission of a write-up (10-15 pages using LaTeX) 25% Marks / Grade Point/ Letter Grade as per the Regulation)				2
	Ability Enhancement Course(AECC 3)	Soft Skill III		Performance based assessment		2
	Internship / Industrial - Vacation Activity					2
Semester-IV						
Part A	Core X		25	75	3 Hrs	4
	Core XI		25	75	3 Hrs	4
	Core XII		25	75	3 Hrs	4
	Project with viva voce XIII		25	75	3 Hrs	3
	Elective VI	Elective-VI (Choose one from Group – F)	25	75	3 Hrs	3
Part B	Skill Enhancement Course -SEC 4	Professional Competency Skill Enhancement Course			Internal Assessment	2
	Ability Enhancement Course(AECC4)	Soft Skill IV			Performance based assessment	2
Part C	Extension Activity	Performance based assessment				1
Total Credits						91

DISCIPLINE SPECIFIC ELECTIVES

Courses are grouped (Group A to Group F) so as to include topics from Pure Mathematics(PM), Applied Mathematics(AM), Industrial Components(IC) and IT Oriented(ITC) courses for flexibility of choice by the stakeholders / institutions.

Semester	Discipline Specific Elective Courses
I	<p>Elective I to be chosen from Group A and Elective II to be chosen from Group B</p> <p>Group A: (PM/AP/IC/ITC)</p> <ul style="list-style-type: none"> A. Number Theory and Cryptography B. Graph Theory and Applications C. Formal Languages and Automata Theory D. Programming in C++ and Numerical Methods <p>Group B:(PM/AP/IC/ITC)</p> <ul style="list-style-type: none"> A. Lie Groups and Lie Algebras B. Mathematical Programming C. Fuzzy Sets and Their Applications D. Discrete Mathematics
II	<p>Elective III to be chosen from Group C and Elective IV to be chosen from Group D</p> <p>Group C:(PM/AP/IC/ITC)</p> <ul style="list-style-type: none"> A. Algebraic Topology B. Mathematical Statistics C. Statistical Data Analysis using R Programming D. Tensor Analysis and Relativity <p>Group D:(PM/AP/IC/ITC)</p> <ul style="list-style-type: none"> A. Wavelets B. Modelling and Simulation with Excel C. Machine Learning and Artificial Intelligence D. Neural Networks
III	<p>Elective V to be chosen from Group E.</p> <p>Group E: (PM/AP/IC/ITC)</p> <ul style="list-style-type: none"> A. Algebraic Number Theory B. Fluid Dynamics C. Stochastic Processes D. Mathematical Python
IV	<p>Elective VI to be chosen from Group F.</p> <p>Group F:(PM/AP/IC/ITC)</p> <ul style="list-style-type: none"> A. Algebraic Geometry B. Financial Mathematics C. Resource Management Techniques D. Mathematical Python

SKILL ENHANCEMENT COURSES

Skill Enhancement Courses are chosen so as to keep in pace with the latest developments in the academic / industrial front and provides flexibility of choice by the stakeholders / institutions.

Group G (Skill Enhancement Courses) SEC:

- A. Computational Mathematics using SageMath
- B. Mathematical documentation using LATEX / other packages
- C. Office Automation and ICT Tools

- D. Numerical analysis using SCILAB
- E. Differential equations using SCILAB
- F. Industrial Mathematics /Statistics using latest programming packages
- G. Research Tools and Techniques

Ability Enhancement Courses

- Soft Skill courses

Extra Disciplinary Courses for other Departments (not for Mathematics students)

Students from other Departments may also choose any one of the following as Extra Disciplinary Course.

- ED-I: Mathematics for Life Sciences
- ED-II: Mathematics for Social Sciences
- ED-III: Statistics for Life and Social Sciences
- ED-IV: Game Theory and Strategy
- ED-V: History of Mathematics

Instructions for Course Transaction

Courses	Lecture hrs	Tutorial hrs	Lab Practice	Total hrs
Core	75	15	--	90
Electives	75	15	--	90
ED	75	15	--	90
Lab Practice Courses	45	15	30	90
Project	20	--	70	90

Testing Pattern (25+75)
INTERNAL ASSESSMENT

Theory Course:

For theory courses there shall be three tests conducted by the faculty concerned and the average of the best two can be taken as the Continuous Internal Assessment (CIA) for a maximum of 25 marks. The duration of each test shall be one / one and a half hour.

Computer Laboratory Courses:

For Computer Laboratory oriented Courses, there shall be two tests in Theory part and two tests in Laboratory part. Choose one best from Theory part and other best from the two Laboratory part. The average of the best two can be treated as the CIA for a maximum of 25 marks. The duration of each test shall be one / one and a half hour.

There is no improvement for CIA of both theory and laboratory, and, also for University End Semester Examination.

Written Examination : Theory Paper (Bloom’s Taxonomy based)

Question paper Model

Intended Learning Skills	Maximum 75 Marks Passing Minimum: 50% Duration : Three Hours
	Part –A (10x 2 = 20 Marks) Answer ALL questions Each Question carries 2mark
Memory Recall / Example/ Counter Example / Knowledge about the Concepts/ Understanding	Two questions from each UNIT

	Question 1 to Question 10
	Part – B (5 x 5 = 25 Marks) Answer ALL questions Each questions carries 5 Marks
Descriptions/ Application (problems)	Either-or Type Both parts of each question from the same UNIT
	Question 11(a) or 11(b) To Question 15(a) or 15(b)
	Part-C (3x 10 = 30 Marks) Answer any THREE questions Each question carries 10 Marks
Analysis /Synthesis / Evaluation	There shall be FIVE questions covering all the five units
	Question 16 to Question 20

Each question should carry the course outcome and cognitive level

For instance,

1. [CO1 : K2] Question xxxx
2. [CO3 : K1] Question xxxx

Different Types of Courses

(i) Core Courses (Illustrative)

1. Algebra
2. Real Analysis
3. Ordinary Differential Equations
4. Partial Differential Equations
5. Topology
6. Complex Analysis
7. Mechanics
8. Functional Analysis
9. Differential Geometry and more

(ii) Elective Courses (ED within the Department Experts) (Illustrative)

1. Discrete Mathematics
2. Number Theory and Cryptography
3. Formal Languages and Automata Theory
4. Programming in C++ and Numerical Methods
5. Fuzzy Sets and Their Applications
6. Mathematical Programming
7. Algebraic Number Theory
8. Java Programming
9. Analytical Number Theory
10. Tensor Analysis and Relativity
11. Stochastic Processes
12. Algebraic Geometry
13. Fluid Dynamics
14. Financial Mathematics
15. Wavelets
16. Mathematical Statistics and more

(iii) Elective Courses (ED from other Department Experts)

(iv) Skill Development Courses

(v) Institution-Industry-Interaction (Industry aligned Courses)

Programmes /course work/ field study/ Modelling the Industry Problem/ Statistical Analysis /
Commerce-Industry related problems / MoU with Industry and the like activities.

FIRST YEAR -SEMESTER I

Part-I

Core Paper

ALGEBRAIC STRUCTURES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212AEC11	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To introduce the concepts and to develop working knowledge on class equation, solvability of groups, finite abelian groups, linear transformations, real quadratic forms									
LO2	Algebra is necessary to help you understand what is important in a sequence of events.									
LO3	This course aims to provide a first approach to the subject of algebra, which is one of the basic pillars of modern mathematics.									
LO4	The focus of the course will be the study certain structures called groups and some related structures and Application of matrices									
LO5	Algebra gives to student a good mathematical maturity and enables to build mathematical thinking and skill.									
UNIT	DETAILS									
I	UNIT-I : Counting Principle - Class equation for finite groups and its applications - Sylow's theorems (For theorem 2.12.1, First proof only). Chapter 2: Sections 2.11 and 2.12 (Omit Lemma 2.12.5)									
II	UNIT-II : Solvable groups - Direct products - Finite abelian groups- Modules Chapter 5 : Section 5.7 (Lemma 5.7.1, Lemma 5.7.2, Theorem 5.7.1) Chapter 2: Section 2.13 and 2.14 (Theorem 2.14.1 only) Chapter 4: Section 4.5									
III	UNIT-III : Linear Transformations: Canonical forms –Triangular form - Nilpotent transformations. Chapter 6: Sections 6.4, 6.5									
IV	UNIT-IV : Jordan form - rational canonical form. Chapter 6 : Sections 6.6 and 6.7									
V	UNIT-V: Trace and transpose - Hermitian, unitary, normal transformations, real quadratic form. Chapter 6 : Sections 6.8, 6.10 and 6.11 (Omit 6.9)									

Course Outcomes		
CO1	Recall basic counting principle, define class equations to solve problems, explain Sylow's theorems and apply the theorem to find number of Sylow subgroups	PO1
CO2	Define Solvable groups, define direct products, examine the properties of finite abelian groups, define modules	PO1,PO2
CO3	Define similar Transformations, define invariant subspace, explore the properties of triangular matrix, to find the index of nilpotence to decompose a space into invariant subspaces, to find invariants of linear transformation, to explore the properties of nilpotent transformation relating nilpotence with invariants	PO4,PO6
CO4	Define Jordan,canonical form, Jordan blocks, define rational canonical form, define companion matrix of polynomial, find the elementary devices of transformation, apply the concepts to find characteristic polynomial of linear transformation	PO4,PO5, PO6
CO5	Define trace, define transpose of a matrix, explain the properties of trace and transpose, to find trace, to find transpose of matrix, to prove Jacobson lemma using the triangular form, define symmetric matrix, skew symmetric matrix, adjoint, to define Hermitian, unitary, normal transformations and to verify whether the transformation in Hermitian, unitary and normal	PO3,PO8

Text Books (Latest Editions)	
1	I. N. Herstein , Topics in Algebra, Wiley Eastern Ltd. New Delhi, 1975
2	D.T. Finkbeiner, Introduction to Matrices and Linear transformations, CBS Publishers, New Delhi, 1986.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	M.Artin, <i>Algebra</i> , Prentice Hall of India, 1991
2	P.B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, <i>Basic Abstract Algebra</i> (II Edition) Cambridge University Press, 1997. (Indian Edition)
3	I.S.Luther and I.B.S.Passi, <i>Algebra</i> , Vol. I –Groups(1996); Vol. II Rings, Narosa Publishing House , New Delhi, 1999
4	D.S.Malik, J.N. Mordeson and M.K.Sen, <i>Fundamental of Abstract Algebra</i> , McGraw Hill (International Edition), New York. 1997
5	N.Jacobson, <i>Basic Algebra</i> , Vol. I & II W.H.Freeman (1980); also published by Hindustan Publishing Company, New Delhi
Web Resources	
	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics
	http://www.opensource.org , www.algebra.com

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I
Part-I
Core Paper
REAL ANALYSIS - I

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC12	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To work comfortably with functions of bounded variation, Riemann-Stieltjes Integration, convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations									
LO2	Have the knowledge of basic properties of the field of real numbers.									
LO3	Have the knowledge of the series of real numbers and convergence									
LO4	Studying the differentiability of real functions and related theorems									
LO5	Studying the notion of continuous functions and their properties									
UNIT	DETAILS									
I	<p>UNIT-I : Functions of bounded variation - Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on $[a, x]$ as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation.</p> <p>Chapter – 6 : Sections 6.1 to 6.8</p> <p>Infinite Series : Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series.</p> <p>Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18</p>									
II	<p>UNIT-II : The Riemann - Stieltjes Integral - Introduction - Notation - The definition of the Riemann - Stieltjes integral - Linear Properties - Integration by parts- Change of variable in a Riemann - Stieltjes integral - Reduction to a Riemann Integral – Euler's summation formula - Monotonically increasing integrators, Upper and lower integrals - Additive and linearity properties of upper, lower integrals - Riemann's condition - Comparison theorems.</p> <p>Chapter - 7 : Sections 7.1 to 7.14</p>									
III	<p>UNIT-III : The Riemann-Stieltjes Integral - Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes integrals-Necessary conditions for the existence of RS integrals- Mean value theorems -integrals as a function of the interval – Second fundamental theorem of integral calculus-Change of variable -Second Mean Value Theorem for Riemann integral- Riemann-Stieltjes integrals depending on a parameter- Differentiation under integral sign-Lebesguecriteriaon for existence of Riemann integrals. Chapter - 7 : 7.15 to 7.26</p>									
IV	<p>UNIT-IV :Infinite Series and infinite Products - Double sequences - Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series – Cesarosummability - Infinite products.</p> <p>Chapter - 8 Sec, 8.20, 8.21 to 8.26</p> <p>Power series - Multiplication of power series - The Taylor's series generated by a function - Bernstein's theorem - Abel's limit theorem - Tauber's theorem</p>									

	Chapter 9 : Sections 9.14 9.15, 9.19, 9.20, 9.22, 9.23	
V	UNIT-V: Sequences of Functions – Pointwise convergence of sequences of functions - Examples of sequences of real - valued functions - Uniform convergence and continuity - Cauchy condition for uniform convergence - Uniform convergence of infinite series of functions - Riemann - Stieltjes integration – Non-uniform Convergence and Term-by-term Integration - Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series - Mean convergence. Chapter -9 Sec 9.1 to 9.6, 9.8,9.9,9.10,9.11, 9.13	
Course Outcomes		
CO1	Analyze and evaluate functions of bounded variation and Rectifiable Curves	PO1
CO2	Describe the concept of Riemann-Stieltjes integral and its properties.	PO1,PO2
CO3	Demonstrate the concept of step function, upper function, Lebesgue function and their integrals.	PO4,PO6
CO4	Construct various mathematical proofs using the properties of Lebesgue integrals and establish the Levi monotone convergence theorem	PO4,PO5, PO6
CO5	Formulate the concept and properties of inner products, norms and measurable functions	PO3,PO8
Text Books (Latest Editions)		
1	Rudin,W. <i>Principles of Mathematical Analysis</i> , 3 rd Edition. McGraw Hill Company, New York, 1976	
2	Tom M.Apostol : <i>Mathematical Analysis</i> , 2 nd Edition, Addison-Wesley Publishing Company Inc. New York, 1974.	
3	R. G. Bartle, “Introduction to Real Analysis”, 3rd Ed, 2000, John Wiley & Sons, Inc., New York, NY.	
References Books		
(Latest editions, and the style as given below must be strictly adhered to)		
1	Bartle, R.G. <i>Real Analysis</i> , John Wiley and Sons Inc., 1976.	
2	R.Bartle and D.Sherbert : Introduction to Real Analysis ,John –Wiely and sons , New York	
3	Malik,S.C. and Savita Arora. <i>Mathematical Anslysis</i> , Wiley Eastern Limited.New Delhi, 1991	
4	Sanjay Arora and BansiLal, <i>Introduction to Real Analysis</i> , SatyaPrakashan, New Delhi, 1991	
5	Gelbaum, B.R. and J. Olmsted, <i>Counter Examples in Analysis</i> , Holden day, San Francisco, 1964	
6	A.L.Gupta and N.R.Gupta, <i>Principles of Real Analysis</i> , Pearson Education, (Indian print) 2003.	
Web Resources		
1	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics ,	
2	http://www.opensource.org , www.mathpages.com	
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Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	3	1
CO2	2	1	3	1	3	3	3	2	3	1
CO3	3	2	3	1	3	3	3	2	3	1
CO4	1	2	3	2	3	3	3	2	3	1
CO5	3	1	2	3	3	3	3	2	2	1

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I
Part-I
Core Paper
ORDINARY DIFFERENTIAL EQUATIONS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC 13	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points, to study existence and uniqueness of the solutions of first order differential equations									
LO2	To model mechanical systems using differential equations.									
LO3	To analyse and solve ordinary differential equations.									
LO4	To understand numerical methods for solving ordinary differential equations.									
LO5	Solve the ordinary differential equations using variation of parameters, undetermined coefficients and by numerical technique.									
UNIT	DETAILS									
I	UNIT-I : Linear equations with constant coefficients Second order homogeneous equations-Initial value problems-Linear dependence and independence-Wronskian and a formula for Wronskian-Non-homogeneous equation of order two. Chapter 2: Sections 1 to 6									
II	UNIT-II : Linear equations with constant coefficients Homogeneous and non-homogeneous equation of order n –Initial value problems- Annihilator method to solve non-homogeneous equation- Algebra of constant coefficient operators. Chapter 2 : Sections 7 to 12.									
III	UNIT-III :Linear equation with variable coefficients Initial value problems -Existence and uniqueness theorems – Solutions to solve a non-homogeneous equation – Wronskian and linear dependence – reduction of the order of a homogeneous equation – homogeneous equation with analytic coefficients-The Legendre equation. Chapter : 3 Sections 1 to 8 (Omit section 9)									
IV	UNIT-IV :Linear equation with regular singular points Euler equation – Second order equations with regular singular points – Exceptional cases – Bessel Function. Chapter 4 : Sections 1 to 4 and 6 to 8 (Omit sections 5 and 9)									

V	UNIT-V : Existence and uniqueness of solutions to first order equations: Equation with variable separated – Exact equation – method of successive approximations – the Lipschitz condition – convergence of the successive approximations and the existence theorem. Chapter 5 : Sections 1 to 6 (Omit Sections 7 to 9)	
Course Outcomes		
CO1	Establish the qualitative behavior of solutions of systems of differential equations	PO1
CO2	Recognize the physical phenomena modeled by differential equations and dynamical systems.	PO1,PO2
CO3	Analyze solutions using appropriate methods and give examples	PO4,PO6
CO4	Formulate Green’s function for boundary value problems	PO4,PO5, PO6
CO5	Understand and use various theoretical ideas and results that underlie the mathematics in this course.	PO3,PO8
Text Books (Latest Editions)		
1	Advanced Engineering Mathematics, E Kreyszig, John Wiley and Sons, Tenth Edition, 2018.	
2	E.A.Coddington, <i>A introduction to ordinary differential equations</i> (3 rd Printing) Prentice-Hall of India Ltd.,New Delhi, 1987.	
3	George F Simmons, <i>Differential equations with applications and historical notes</i> , Tata McGraw Hill, New Delhi, 1974.	
References Books		
(Latest editions, and the style as given below must be strictly adhered to)		
1	Williams E. Boyce and Richard C. DI Prima, <i>Elementary differential equations and boundary value problems</i> , John Wiley and sons, New York, 1967	
2	N.N. Lebedev, <i>Special functions and their applications</i> , Prentice Hall of India, New Delhi, 1965	
3	W.T. Reid. <i>Ordinary Differential Equations</i> , John Wiley and Sons, New York, 1971	
4	M.D.Raisinghania, <i>Advanced Differential Equations</i> , S.Chand& Company Ltd. New Delhi 2001	
5	B.Rai, D.P.Choudary and H.I. Freedman, <i>A Course in Ordinary Differential Equations</i> , Narosa Publishing House, New Delhi, 2002	
Web Resources		
1	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics	
2.	http://www.opensource.org , www.mathpages.com	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	2
CO2	2	1	3	1	3	3	3	2	1	1
CO3	3	2	3	1	3	3	3	2	1	1
CO4	1	2	3	2	3	3	3	2	1	2
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I

Part-I

Core Paper

PROGRAMMING IN C++

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212SEC14	ELECTIVE-I	4	1	-	-	3	5	25	75	100
Learning Objectives										
LO1	Utilize Object Oriented techniques to design C++ programs									
LO2	Use the standard C++ library.									
LO3	Exploit advanced C++ techniques									
LO4	Constructors and destructors in C++									
LO5	Files management and templates in C++									
UNIT	DETAILS									
I	Beginning with C++ - what is C++ - applications — simple program — structure of C program — creating the source file — compiling and linking — tokens, expressions and control structures — user defined data types — derived data types — declarations of variables — reference — variables									
II	Operations in C++ - Manipulators — types cast operator — expressions and implicit conversions — operator over loading — operator precedence — control structures — Functions in C — the main function — functions prototyping. call by reference — return by reference — function overloading									
III	Class and object — introduction — C structures revisited — C++ program with class — arrays with in class — static member function — arrays of objects — returning objects — returning objects — constant member functions — pointers to members									
IV	Constructors and destructors — introduction — constructors — parameterized constructors — multiple constructors in a class — copy constructor — dynamic constructor — two dimensional Arrays — destructors — operators over loading and type conversions — defining operator loading — manipulation strings using operations — type conversions.									
V	Inheritance: extending classes — introduction — defining derived classes — single in heritage — multiple inheritance — virtual base classes — abstract classes — nesting classes									
Course Outcomes										
CO1	Creating simple programs using classes and objects in C++								PO1	
CO2	Implement Object Oriented Programming Concepts in C++								PO1,PO2	
CO3	Develop applications using stream I/O and file I/O.								PO4,PO6	
CO4	Implement simple graphical user interfaces								PO4,PO5, PO6	
CO5	Implement Object Oriented Programs using templates and exceptional handling concepts.								PO3,PO8	
Text Books (Latest Editions)										
1	Object Oriented Programming with C++ - E.Balagurusamy									

2	C++ Pocket Reference 1st Edition, Kyle Loudon
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	Object Oriented Programming with C++ - E.Balagurusamy
2	C++ All-in-One For Dummies 3rd Edition, Jeffrey M. Cogswel
Web Resources	
1	http://www.lmpt.univ-tours.fr/~volkov/C++.pdf
2	https://faculty.ksu.edu.sa/sites/default/files/ObjectOrientedProgramminginC4thEdition.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	2
CO2	2	1	3	1	3	3	3	2	1	1
CO3	3	2	3	1	3	3	3	2	1	1
CO4	1	2	3	2	3	3	3	2	1	2
CO5	3	1	2	3	3	2	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I
Part-I
Core Paper
DISCRETE MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212GSC15	ELECTIVE-II	4	1	-	-	3	5	25	75	100
Learning Objectives										
LO1	Use mathematically correct terminology and notation.									
LO2	Construct correct direct and indirect proofs									
LO3	Use division into cases in a proof.									
LO4	Use counterexamples									
LO5	Apply logical reasoning to solve a variety of problems.									
UNIT	DETAILS									
I	RELATIONS: Cartesian Product of Two sets – Relations – Representation of Relation-Operations Relations-Equivalence Relation FUNCTIONS: Function and Operators- One-to-One , Onto Functions-Special Types of Functions-Invertible Functions- Compositions of Functions									
II	LOGIC: Introduction-TF –Statements-Connectives-Atomic and Compound Statements-Well Formed (Statements) Formulae-Truth Table of a Formula- Tautology-Tautological Implications and Equivalence of Formulae									
III	LATTICES AND BOOLEAN ALGEBRA Lattices – Some Properties of Lattices – New Lattices – Modular and Distributive Lattices- Boolean Algebra									
IV	RECURRENCE RELATIONS AND GENERATING FUNCTIONS: Recurrence an introduction – Polynomials and their Evaluations-Recurrence Relations-Solution of Finite Order Homogeneous (liner) Relations-Solution of Non- homogeneous-Relations-Generating Functions-Some Common Recurrence Relations-Primitive- Recursive Functions-Recursive and Partial Recursive Functions									
V	AUTOMATA, LANUAGES AND COMPUTATIONS: Introduction-Finite Automata- Definition of Finite Automaton – Representation of Finite Automaton-Acceptability of a string by a Finite Automaton-Languages accepted by a Finite Automaton-Non-deterministic Finite Automata- Acceptability of a String by Non-Deterministic Finite Automata –Equivalence of FA and NFA									

Course Outcomes		
CO1	A knowledge of Relations and functions	PO1
CO2	A knowledge of logical reasoning is used in mathematics to prove theorems, in computer science to verify the correctness of programs and to prove theorems in physical science to draw the conclusions..	PO1,PO2
CO3	An ability to find the solutions of Recurrence relations.	PO4,PO6
CO4	A knowledge of to study on ordering relations.	PO4,PO5, PO6
CO5	Determine properties of relations, identify equivalence and partial order relations, sketch relations.	PO3,PO8
Text Books (Latest Editions)		
1	Dr.M.K. Venkataraman and N. Sridharan.N.Chandrasekaran For UNIT 1 - .Chapter 2:Section 2.1 to 2.21& Chapter 3Section 3.1 to 3.13 For UNIT 2 - Chapter 9:Section 9.1 to 9.30 For UNIT 3 - Chapter 10:Section 10.1 to 10.34 For UNIT 4 - Chapter 5: Section 5.1 to 5.33 For UNIT 5 - Chapter 12: Section 12.1 to 12.18	
References Books		
(Latest editions, and the style as given below must be strictly adhered to)		
1	Discrete Mathematics by Oscar Levin, 3rd Edition, 3rd Edition	
2	A Textbook of Discrete Mathematics, 9th Edition, By Sarkar, Swapan Kumar	
Web Resources		
https://discrete.openmathbooks.org/pdfs/dmoi3-tablet.pdf		

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	1	2
CO2	2	3	3	3	2	3	3	2	1	2
CO3	3	3	3	2	3	3	3	2	1	2
CO4	3	3	3	3	3	3	3	2	1	2
CO5	3	2	3	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I
Part-II
Skill Enhancement Course
RESEARCH TOOLS AND TECHNIQUES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212SEC1	SEC1	3	-	-	-	2	3	25	75	100
Learning Objectives										
LO1	Research methodology is a way of explaining how a researcher intends to carry out their research.									
LO2	It's a logical, systematic plan to resolve a research problem.									
LO3	A methodology details a researcher's approach to the research to ensure reliable, valid results that address their aims and objectives.									
LO4	To inform the students about the basics of how research problems are defined, research methods are adopted and/or developed, research is undertaken, and how research results are communicated to the peers.									
LO5	The lectures will cover research methods, some of which are general in nature and the remaining specific to the field of computer science.									
UNIT	DETAILS									
I	INTRODUCTION TO RESEARCH METHODOLOGY Research Methodology- Definition and significance- Types of research - Exploratory research, Conclusive research, Modeling research, Algorithmic research, Casual research, Theoretical and Empirical research, Cross-Sectional research and Time Series research, Research process-, Research problem- Objectives, Characteristics, Hypothesis and research in evolutionary perspective. Research Design- Definition, Types- Descriptive and Experimental Questionnaire preparation- prerequisites of a good questionnaire, Data Collection methods in research -Primary data and Secondary data.									
II	MEASUREMENT, SCALING AND SAMPLING TECHNIQUES AND RESEARCH REPORT PRESENTATION Validity and Reliability-Definition, importance, types of validity, types of reliability-- Construction and Validation of questionnaire, Cronbach alpha test, Measurement – definition- significance – types Nominal, Ordinal, Interval and Ratio ,Scaling- Importance, Scaling techniques. Sampling methods- Probability sampling methods and Non - Probability sampling methods, Report writing – importance , guideline to write an academic report, Basics of report presentation- Content of an Academic Research report, Content on a Research Article, Steps to publish an article, Research Metrics: Significance of Journal Impact Factor, SNIP, SJR, IPP, Cite Score, Metrics: h-index, g index, i10 index,									
III	APPLICATION OF MATHEMATICAL TOOLS FOR ANALYSIS AND RESEARCHREPORT WRITING Non parametric tests- One sample tests- one sample sign test. Kolmogorov-Smirnov test , Run test for randomness, two sample tests- tow sample sign test, Mann-Whitney U test, K sample test- Kruskal Wallis test (H- test). Hypothesis testing – Testing of hypothesis concerning means (one mean and difference between two means – one tailed and two tailed tests), Concerning									

	Variance – One tailed Chi square test, Analysis of Variance(anova) , Introduction to Discriminant , Factor analysis, cluster analysis, multi-dimensional scaling , conjoint analysis, multiple regression and correlation, application for statistical software for data analysis	
IV	PHILOSOPHY,ETHICS AND SCIENTIFIC CONDUCT Introduction to philosophy: definition, nature and scope, concept, branches, Ethics: definition, moral philosophy, nature of moral judgments and reactions’, Ethics with respect to science and research, Intellectual honest and research integrity, Scientific misconduct: falsification, fabrication, and plagiarism, Redundant publications: duplicate and overlapping publications, salami slicing, Selective reporting and misrepresentation of data.	
V	PUBLICATION ETHICS Publication ethics: definition, introduction and importance, Best practices/standards setting initiatives and guidelines: COPE, WAME, etc. Conflicts of interest, Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types, Violation of publication ethics, authorship and contributor ship, Identification of publication misconduct, complaints and appeals, Predatory publishers and journals	
Course Outcomes		
CO1	Demonstrate the ability to choose methods appropriate to research aims and objectives.	PO1
CO2	Understand the limitations of particular research methods.	PO1,PO2
CO3	Develop skills in qualitative and quantitative data analysis and presentation.	PO4,PO6
CO4	Develop advanced critical thinking skills.	PO4,PO5, PO6
CO5	It helps the researcher achieve goals and save time	PO3,PO8
Text Books (Latest Editions)		
1	Ana smith Iltis,” Research Ethics”, Publisher: Routledge, ISBN: 0415701589 ,2016 by HAN LUO - 2012	
2	Dr.Tripathi, P.C, Research Methodology, 1st Edition, Prentice Hall Inc., 2009	
References Books		
(Latest editions, and the style as given below must be strictly adhered to)		
1	Introducing Research Methodology: A Beginner's Guide to Doing a Research Project by FLICK, UWE. HAN LUO. Northwestern University	
2	Kothari, K.C. and Gaurav Garg Research Methodology: Methods And Techniques (Multi Colour Edition,	
3	Mr.Suber Peter, Open Access (MIT Press Essential Knowledge series), New age international publishers, 2019	
Web Resources		
1	https://euacademic.org/BookUpload/9.pdf	
2	https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II

Part-I

Core Paper

ADVANCED ALGEBRA

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC 21	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To study field extension, roots of polynomials, Galois Theory, finite fields, division rings, solvability by radicals and to develop computational skill in abstract algebra									
LO2	Make sense of problems and persevere in solving them									
LO3	Reason abstractly and quantitatively									
LO4	Construct viable arguments and critique the reasoning of others									
LO5	Look for and make use of structure.									
UNIT	DETAILS									
I	UNIT-I :Extension fields – Transcendence of e. Chapter 5: Section 5.1 and 5.2									
II	UNIT-II : Roots or Polynomials.- More about roots Chapter 5: Sections 5.3 and 5.5									
III	UNIT-III : Elements of Galois theory. Chapter 5 : Section 5.6									
IV	UNIT-IV : Finite fields - Wedderburn's theorem on finite division rings. Chapter 7: Sections 7.1 and 7.2 (Theorem 7.2.1 only)									
V	UNIT-V :Solvability by radicals - A theorem of Frobenius - Integral Quaternions and the Four - Square theorem. Chapter 5: Section 5.7 (omit Lemma 5.7.1, Lemma 5.7.2 and Theorem 5.7.1) Chapter 7 : Sections 7.3 and 7.4									
Course Outcomes										
CO1	Prove theorems applying algebraic ways of thinking.								PO1	
CO2	Connect groups with graphs and understanding about Hamiltonian graphs								PO1,PO2	
CO3	Compose clear and accurate proofs using the concepts of Galois Theory								PO4,PO6	
CO4	Bring out insight into Abstract Algebra with focus on axiomatic theories								PO4,PO5, PO6	
CO5	Demonstrate knowledge and understanding of fundamental concepts including extension fields, Algebraic extensions, Finite fields, Class equations and Sylow's theorem								PO3,PO8	
Text Books (Latest Editions)										
1	D.S.Malik, J.N. Mordeson and M.K.Sen, <i>Fundamental of Abstract Algebra</i> , McGraw Hill (International Edition), New York. 1997									
2	I.N. Herstein. <i>Topics in Algebra</i> (II Edition) Wiley Eastern Limited, New Delhi, 1975.									
3	N.Jacobson, <i>Basic Algebra</i> , Vol. I & II Hindustan Publishing Company, New Delhi									

References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	M.Artin, <i>Algebra</i> , Prentice Hall of India, 1991
2	P.B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, <i>Basic Abstract Algebra</i> (II Edition) Cambridge University Press, 1997. (Indian Edition)
3	I.S.Luther and I.B.S.Passi, <i>Algebra</i> , Vol. I –Groups(1996); Vol. II <i>Rings</i> , Narosa Publishing House , New Delhi, 1999
4	D.S.Malik, J.N. Mordeson and M.K.Sen, <i>Fundamental of Abstract Algebra</i> , McGraw Hill (International Edition), New York. 1997
Web Resources	
1	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics
2	http://www.opensource.org , www.algebra.com

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	3
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	3
CO5	3	1	2	3	3	3	3	2	1	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II

Part-I

Core Paper

REAL ANALYSIS- II

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC 22	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To introduce measure on the real line, Lebesgue measurability and integrability, Fourier Series and Integrals, in-depth study in multivariable calculus									
LO2	This course aims to provide students with the specialist knowledge necessary for basic concepts in Real Analysis									
LO3	It strives to enable students to learn basic concepts about functions of bounded variation, grasp basic concepts about the total variation									
LO4	To learn about Riemann-Stieltjes integrals ,									
LO5	To learn about sequences and series of functions									
UNIT	DETAILS									
I	UNIT-I :Measure on the Real line - Lebesgue Outer Measure - Measurable sets - Regularity - Measurable Functions - Borel and Lebesgue Measurability Chapter - 2 Sec 2.1 to 2.5 (de Barra)									
II	UNIT-II : Integration of Functions of a Real variable - Integration of Non-negative functions - The General Integral - Riemann and Lebesgue Integrals Chapter - 3 Sec 3.1,3.2 and 3.4 (de Barra)									
III	UNIT-III : Fourier Series and Fourier Integrals - Introduction - Orthogonal system of functions - The theorem on best approximation - The Fourier series of a function relative to an orthonormal system - Properties of Fourier Coefficients - The Riesz-Fischer Theorem - The convergence and representation problems in for trigonometric series - The Riemann - Lebesgue Lemma - The Dirichlet Integrals - An integral representation for the partial sums of Fourier series - Riemann's localization theorem - Sufficient conditions for convergence of a Fourier series at a particular point –Cesarosummability of Fourier series- Consequences of Fejes's theorem - The Weierstrass approximation theorem Chapter 11 : Sections 11.1 to 11.15 (Apostol)									
IV	UNIT-IV : Multivariable Differential Calculus - Introduction - The Directional derivative - Directional derivative and continuity - The total derivative - The total derivative expressed in terms of partial derivatives - The matrix of linear function - The Jacobian matrix - The chain rule - Matrix form of chain rule - The mean - value theorem for differentiable functions - A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives - Taylor's theorem for functions of R^n to R^1 Chapter 12 : Section 12.1 to 12.14 (Apostol)									
V	UNIT-V : Implicit Functions and Extremum Problems : Functions with non-zero Jacobian determinants – The inverse function theorem-The Implicit function theorem-Extrema of real valued functions of severable variables- Extremum problems with side conditions. Chapter 13 : Sections 13.1 to 13.7 (Apostol)									
Course Outcomes										

CO1	Understand and describe the basic concepts of Fourier series and Fourier integrals with respect to orthogonal system	PO1
CO2	Analyze the representation and convergence problems of Fourier series.	PO1,PO2
CO3	Analyze and evaluate the difference between transforms of various functions	PO4,PO6
CO4	Formulate and evaluate complex contour integrals directly and by the fundamental theorem.	PO4,PO5, PO6
CO5	Apply the Cauchy integral theorem in its various versions to compute contour integration.	PO3,PO8
Text Books (Latest Editions)		
1	Textbook - H.L. Royden , Real Analysis, J Prentice Hall, New Jersey, 1963.	
References Books		
(Latest editions, and the style as given below must be strictly adhered to)		
1	Burkill,J.C. <i>The Lebesgue Integral</i> , Cambridge University Press, 1951	
2	Munroe,M.E. <i>Measure and Integration</i> . Addison-Wesley, Mass.1971	
3	Roydon,H.L. <i>Real Analysis</i> , Macmillan Pub. Company, New York, 1988.	
4	Rudin, W. <i>Principles of Mathematical Analysis</i> , McGraw Hill Company, New York,1979	
5	Malik,S.C. and Savita Arora. <i>Mathematical Analysis</i> , Wiley Eastern Limited. New Delhi, 1991	
6	Sanjay Arora and Bansilal, <i>Introduction to Real Analysis</i> , SatyaPrakashan, New Delhi, 1991	
Web Resources		
1	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics	
2	http://www.opensource.org	
.		

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	3
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	3
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II

Part-I

Core Paper

PARTIAL DIFFERENTIAL EQUATIONS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC 23	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To classify the second order partial differential equations and to study Cauchy problem, method of separation of variables, boundary value problems									
LO2	A partial differential equation (PDE) is a differential equation that contains an unknown function and its partial derivatives.									
LO3	PDEs are used to describe a wide range of natural processes.									
LO4	PDEs also play an important role in other areas of mathematics such as analysis and differential geometry.									
LO5	To give an introduction to the basic properties of PDEs and to the basic analytical techniques to solve them.									
UNIT	DETAILS									
I	UNIT-I :Mathematical Models and Classification of second order equation :Classical equations-Vibrating string – Vibrating membrane – waves in elastic medium – Conduction of heat in solids – Gravitational potential – Second order equations in two independent variables – canonical forms – equations with constant coefficients – general solution Chapter 2 : Sections 2.1 to 2.6 Chapter 3 : Sections 3.1 to 3.4 (Omit 3.5)									
II	UNIT-II :Cauchy Problem : The Cauchy problem – Cauchy-Kowalewsky theorem – Homogeneous wave equation – Initial Boundary value problem-Non-homogeneous boundary conditions – Finite string with fixed ends – Non-homogeneous wave equation – Riemann method – Goursat problem – spherical wave equation – cylindrical wave equation. Chapter 4 : Sections 4.1 to 4.11									
III	UNIT-III :Method of separation of variables: Separation of variable-Vibrating string problem – Existence and uniqueness of solution of vibrating string problem- Heat conduction problem – Existence and uniqueness of solution of heat conduction problem – Laplace and beam equations Chapter 6 : Sections 6.1 to 6.6 (Omit section 6.7)									
IV	UNIT-IV : Boundary Value Problems : Boundary value problems – Maximum and minimum principles – Uniqueness and continuity theorem – Dirichlet Problem for a circle , a circular annulus, a rectangle – Dirichlet problem involving Poisson equation – Neumann problem for a circle and a rectangle. Chapter 8 : Sections 8.1 to 8.9									
V	UNIT-V : Green’s Function: The Delta function – Green’s function – Method of Green’s function – Dirichlet Problem for the Laplace and Helmholtz operators – Method of images and eigen functions – Higher dimensional problem – Neumann Problem. Chapter 10 : Section 10.1 to 10.9									

Course Outcomes		
CO1	To understand and classify second order equations and find general solutions	PO1
CO2	To analyse and solve wave equations in different polar coordinates	PO1,PO2
CO3	To solve Vibrating string problem, Heat conduction problem, to identify and solve Laplace and beam equations	PO4,PO6
CO4	To apply maximum and minimum principle's and solve Dirichlet, Neumann problems for various boundary conditions	PO4,PO5, PO6
CO5	To apply Green's function and solve Dirichlet, Laplace problems, to apply Helmholtz operation and to solve Higher dimensional problem	PO3,PO8
Text Books (Latest Editions)		
1	An Introduction of Partial Differential Equations by Walter A Strauss	
2	TynMyint-U and LokenathDebnath, <i>Partial Differential Equations for Scientists and Engineers</i> (Third Edition), North Hollan, New York, 1987.	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1	M.M.Smirnov, <i>Second Order partial Differential Equations</i> , Leningrad, 1964	
2	I.N.Sneddon, <i>Elements of Partial Differential Equations</i> , McGraw Hill, New Delhi, 1983	
3	R. Dennemeyer, <i>Introduction to Partial Differential Equations and Boundary Value Problems</i> , McGraw Hill, New York, 1968.	
4	M.D.Raisinghania, <i>Advanced Differential Equations</i> , S.Chand & Company Ltd., New Delhi, 2001	
5	S, Sankar Rao, <i>Partial Differential Equations</i> , 2 nd Edition, Prentice Hall of India, New Delhi. 2004	
Web Resources		
1	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics	
2.	http://www.opensource.org , www.mathpages.com	
3	https://s2pnd-matematika.fkip.unpatti.ac.id/wp-content/uploads/2019/03/Walter-A-Strauss-Partial-differential-equations--an-introduction-Wiley-2009.pdf	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	3
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	3
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3

CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II
Part-I
Elective Paper
MATHEMATICAL STATISTICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212GSC24	ELECTIVE-III	4	1	-	-	3	5	25	75	100
Learning Objectives										
LO1	Statistics provides the methodology for the planning and execution for any scientific enquiry, which has been accepted as a valid tool in this content. In this course Central Limit Theorem, Discrete and Continuous Distributions, Small and Large Sampling would be taught.									
LO2	In this course Central Limit Theorem, Discrete and Continuous Distributions, Small and Large Sampling would be taught.									
LO3	To understand the basic principles underlying statistical inference									
LO4	It will formulate complete, concise, and correct mathematical proofs.									
LO5	It will frame problems using multiple mathematical and statistical representations of relevant structures and relationships and solve using standard techniques.									
UNIT	DETAILS									
I	Chebychev's inequality and weak law of large numbers — Simple form of central limit theorem for i.i.d random variables									
II	Binomial, Poisson, Negative binomial, geometric distribution — Constants, moment generating function, Cumulant generating function.									
III	Continuous distribution — rectangular, exponential, beta, gamma distributions, Normal Distributions.									
IV	Test of Hypothesis—Null and alternative hypothesis(Concept only) One tail and two tail tests, tests of significance based on normal and t distribution for mean, simple correlation and properties.									
V	Test of significance based on chi square and F distributions for variance, test for goodness of fit and independence of attributes Analysis of variance — One way and two — way classifications with simple problems.									

Course Outcomes		
CO1	Understand the concept of Tchebychev's inequality and Applications of Central Limit Theorem.	PO1
CO2	Understand the concept of Bivariate Distribution.	PO1,PO2
CO3	A knowledge of test of significance based on parametric and non-parametric test.	PO4,PO6
CO4	Understood the concept of sampling theory.	PO4,PO5, PO6
CO5	Learned the concept of chi square, F-Test and ANOVA.	PO3,PO 8
Text Books (Latest Editions)		
1	Fundamentals of Mathematical Statistics — S.C.Gupta and V.K.Kapoor, Sultan Chand & Sons, New Delhi	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1	Fundamentals of Applied Statistics -S.C.Gupta and V.K.Kapoor. Sultan Chand & Sons.	
2	Elementary Statistical Methods – S.P.Gupta, Sultan Chand & Sons, New Delhi.	
Web Resources		
	https://www.dcehvpvm.org/E-Content/Stat/FUNDAMENTAL%20OF%20MATHEMATICAL%20STATISTIC%20S-S%20C%20GUPTA%20&%20V%20K%20KAPOOR.pdf	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	1
CO2	2	3	3	3	2	3	3	2	3	1
CO3	3	3	3	2	3	3	3	2	3	1
CO4	3	3	3	3	3	3	3	2	3	1
CO5	3	2	3	3	3	3	3	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II
Part-I
Elective Paper
MODELLING AND SIMULATION WITH EXCEL

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212MSE25	ELECTIVE-IV	3	2	-	-	3	5	25	75	100
Learning Objectives										
LO1	Define the basics of simulation modeling and replicating the practical situations in organizations									
LO2	Generate random numbers and random variates using different techniques.									
LO3	Develop simulation model using heuristic methods.									
LO4	Analysis of Simulation models using input analyzer, and output analyzer									
LO5	Explain Verification and Validation of simulation model.									
UNIT	DETAILS									
I	Introduction to Simulation: Simulation, Advantages, Disadvantages, Areas of application, System environment, components of a system, Model of a system, types of models, steps in a simulation study. Simulation Examples: Simulation of Queuing systems, Simulation of Inventory System, Other simulation examples.									
II	General Principles: Concepts in discrete - event simulation, event scheduling/ Time advance algorithm, simulation using event scheduling. Random Numbers: Properties, Generations methods, Tests for Random number- Frequency test, Runs test, Autocorrelation test.									
III	Random Variate Generation: Inverse Transform Technique- Exponential, Uniform, Weibull, Triangular distributions, Direct transformation for Normal and log normal Distributions, convolution methods- Erlang distribution, Acceptance Rejection Technique Optimisation Via Simulation: Meaning, difficulty, Robust Heuristics, Random Search.									
IV	Analysis of Simulation Data Input Modelling: Data collection, Identification and distribution with data, parameter estimation, Goodness of fit tests, Selection of input models without data, Multivariate and time series analysis. Verification and Validation of Model – Model Building, Verification, Calibration and Validation of Models.									
V	Output Analysis – Types of Simulations with Respect to Output Analysis, Stochastic Nature of output data, Measures of Performance and their estimation, Output analysis of terminating simulation, Output analysis of steady state simulations. Simulation Softwares: Selection of Simulation Software, Simulation packages, Trend in Simulation Software.									

Course Outcomes		
CO1	Describe the role of important elements of discrete event simulation and modeling paradigm.	PO1
CO2	Conceptualize real world situations related to systems development decisions, originating from source requirements and goals.	PO1,PO2
CO3	Develop skills to apply simulation software to construct and execute goal-driven system models.	PO4,PO6
CO4	Interpret the model and apply the results to resolve critical issues in a real world environment.	PO4,PO5, PO6

Text Books (Latest Editions)	
1	Jerry Banks, John S Carson, II, Berry L Nelson, David M Nicol, Discrete Event system Simulation, Pearson Education, Asia, 4th Edition, 2007, ISBN: 81-203-2832-9.
2	Geoffrey Gordon, System Simulation, Prentice Hall publication, 2nd Edition, 1978, ISBN: 81-203-0140-4.

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Averill M Law, W David Kelton, Simulation Modelling & Analysis, McGraw Hill International Editions – Industrial Engineering series, 4th Edition, ISBN: 0-07-100803-9.
2	NarsinghDeo, Systems Simulation with Digital Computer, PHI Publication (EEE), 3rd Edition, 2004, ISBN : 0-87692-028-8.

Web Resources	
	https://industri.fatek.unpatti.ac.id/wp-content/uploads/2019/03/108-Simulation-Modeling-and-Analysis-Averill-M.-Law-Edisi-5-2014.pdf
	https://faculty.ksu.edu.sa/sites/default/files/index.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II
Part-II
Skill Enhancement Course
NUMERICAL ANALYSIS USING SCIAB

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212SEC2	SEC2	3	-	-	-	2	3	25	75	100
Learning Objectives										
LO1	To make the students aware for SCILAB programming environment.									
LO2	Students will understand the basics of SCILAB software and codes development.									
LO3	Students able to Perform basic mathematical operations using Scilab software.									
LO4	Students able to Perform Execute loops and conditional statements using Scilab software.									
LO5	Analyze different types of data using plotting functions in Scilab software.									
UNIT	DETAILS									
I	Introduction of scilab About Scilab and its benefits-Scilab is reliable-Use of Scilab in CNES-Use of Scilab for space mission analysis and flight dynamics- Industrial application of Scilab-Matrix calculation in Scilab-Installing Scilab-Expression: Show Mathematical Expressions with numbers- Variables- Dairy command-Define Symbolic constants-Basic functions-Suppressing output-conditional branching- ‘if ‘and ‘then’ with the example-use of the ‘Else’ keyword-use of the ‘else if’ keyword-example of select-iteration-symbol of ‘for’ statement-Scripts and functions									
II	Vector Operations and Matrix Operations Define vector- Calculate length of a vector- Perform mathematical operations on Vectors such as Addition, Subtraction and Multiplication. Define a matrix-Calculate Size of matrix –perform mathematical operations on matrices-such as addition, subtraction and multiplication-matrix operation-Access the elements of matrix, Determine the determinant, inverse and eigen values of the matrix-Define special matrices- Perform Elementary row operations-Solve the system of linear equations.									
III	Ordinary Differential Equations Solving ODEs using eulers methods-solve ODEs using Euler and Modified Euler Methods Develop Scilab code to solve ODEs-Plot the Solution									
IV	Solving linear Equations Explain Gauss Elimination Method algorithm-Explain code for Gauss Elimination method and solve an Example using this code-Explain Gauss Jordon method algorithm –Explain code for gauss Jordon method algorithm- Explain code of Gauss Jordon method and solve an example using this code- Solve system of linear equations using iterative methods- Use Jacobi and Gauss Seidal Non-linear Methods									
V	Solving Non-Linear Equations Numerical Methods-Solving non-linear Equations-Learn How to Solve Nonlinear equations using numerical methods- Learn Bisection Method- Learn Secant Method- Learn how to develop Scilab code for solving nonlinear equations									

Course Outcomes		
CO1	The Course content will enable the students to learn basics of SCILAB codes for vectors, matrix, ordinary differential equations, Linear and Non-Linear Equations	PO1
CO2	The study of approximation techniques for numerically solving mathematical problems.	PO1,PO2
CO3	Scilab is based on methods of numerical computation: Data analysis. Algorithm development.	PO4,PO6
CO4	Students will able to design various system models using the Xcos simulator.	PO4,PO5, PO6
CO5	Students will able to design applications with Scilab GUI toolbox.	PO3,PO8

Text Books (Latest Editions)	
1	SCILAB –A Beginner’s Approach 1 st Edition, by Anil Kumar Verma
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Scilab Textbook Companion for Numerical Methods For Scientific And Engineering Computation by M. K. Jain, S. R. K. Iyengar And R. K. Jain
2	Scilab Textbook Companion for Numerical Methods: Principles, Analysis, And Algorithms by S. Pal
3	
Web Resources	
	https://cdn-cms.f-static.com/uploads/1707486/normal_5c5eb5e3d9e91.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECONDYEAR -SEMESTER III

**Part-I
Core Paper
TOPOLOGY**

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC31	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To explore the foundations of mathematics (logic and set theory) at a level and depth appropriate for someone aspiring to study higher-level mathematics and/or to become a professional mathematician.									
LO2	To present an introduction to the field of topology, with emphasis on those aspects of the subject that are basic to higher mathematics.									
LO3	To introduce the student to what it means to do mathematics, as opposed to learning about mathematics or to learning to do computational exercises.									
LO4	To help the student learn how to write mathematical text according to the standards of the profession.									
LO5	Demonstrate an understanding of the concepts of metric spaces and topological spaces, and their role in mathematics.									
UNIT	DETAILS									
I	TOPOLOGICAL SPACES: Topological spaces'- Basis for a topology- The order topology -The product topology on $X \times Y$ - The subspace topology - Closed sets and limit points									
II	CONTINUOUS FUNCTIONS: Continuous functions - the product topology -The metric topology									
III	CONNECTEDNESS: Connected spaces- connected subspaces of the Real line - Components and local connectedness.									
IV	COMPACTNESS: Compact spaces -compact subspaces of the Real line - Limit Point Compactness -Local Compactness.									
V	COUNTABILITY AND SEPERATION AXIOMS: The Countability Axioms - The separation Axioms - Normal spaces -The Urysohn Lemma -The Urysohnmetrization Theorem - The Tietz extension theorem.'									
Course Outcomes										
CO1	Understand terms, definitions and theorems related to topology								PO1	
CO2	Demonstrate knowledge and understanding of concepts such as open and closed sets, interior, closure and boundary.								PO1,PO2	
CO3	Create new topological spaces by using subspace, product and quotient topologies								PO4,PO6	
CO4	Use continuous functions and homeomorphisms to understand structure of topological spaces.								PO4,PO5, PO6	
CO5	Demonstrate knowledge and understanding of metric spaces.								PO3,PO8	
Text Books (Latest Editions)										
1	Topology 2nd edition, James Munkres, Pearson publishing, ISBN-13: 9780131816299									
References Books										
(Latest editions, and the style as given below must be strictly adhered to)										
1	Topology by J.Dugundji1975. Prentice Hall of India, New Delhi.									
2	Introduction to Topology and Modern Analysis by George F.Sinmon1963. McGraw Hill Book Co									
3	General Topology byJ.L.Kelly. Van Nostrand, Reinhold Co., New York									

Web Resources	
1	http://mathforum.org , http://ocw.mit.edu/ocwwweb/Mathematics
2.	http://www.opensource.org , http://en.wikipedia.org

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	3	3
CO2	2	1	3	1	3	3	3	2	2	3
CO3	3	2	3	1	3	3	3	2	3	3
CO4	1	2	3	2	3	3	3	2	2	3
CO5	3	1	2	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III

Part-I

Core Paper

PROBABILITY THEORY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC32	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives

LO1	To introduce axiomatic approach to probability theory, to study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability
LO2	The probability estimate is computed using mathematical equations that manipulate the data to determine the likelihood of an independent event occurring
LO3	An independent event is an event whose outcome is not influenced by prior events.
LO4	The probability theory is very much helpful for making prediction
LO5	Estimates and predictions form an important part of research investigation.

UNIT

DETAILS

I	UNIT-I : Random Events and Random Variables: Random events – Probability axioms – Combinatorial formulae – conditional probability – Bayes Theorem – Independent events – Random Variables – Distribution Function – Joint Distribution – Marginal Distribution – Conditional Distribution – Independent random variables – Functions of random variables. Chapter 1: Sections 1.1 to 1.7 Chapter 2 : Sections 2.1 to 2.9
II	UNIT-II : Parameters of the Distribution : Expectation- Moments – The Chebyshev Inequality – Absolute moments – Order parameters – Moments of random vectors – Regression of the first and second types. Chapter 3 : Sections 3.1 to 3.8
III	UNIT-III: Characteristic functions : Properties of characteristic functions – Characteristic functions and moments – semi-invariants – characteristic function of the sum of the independent random variables – Determination of distribution function by the Characteristic function – Characteristic function of multidimensional random vectors – Probability generating functions. Chapter 4 : Sections 4.1 to 4.7
IV	UNIT-IV : Some Probability distributions: One point , two point , Binomial – Polya – Hypergeometric – Poisson (discrete) distributions – Uniform – normal gamma – Beta – Cauchy and Laplace (continuous) distributions. Chapter 5 : Section 5.1 to 5.10 (Omit Section 5.11)
V	UNIT-V: Limit Theorems : Stochastic convergence – Bernaulli law of large numbers – Convergence of sequence of distribution functions – Levy-Cramer Theorems – de Moivre-Laplace Theorem – Poisson, Chebyshev, Khintchine Weak law of large numbers – Lindberg Theorem – Lapunov Theroem – Borel-Cantelli Lemma - Kolmogorov Inequality and Kolmogorov Strong Law of large numbers. Chapter 6 : Sections 6.1 to 6.4, 6.6 to 6.9 , 6.11 and 6.12. (Omit Sections 6.5, 6.10,6.13 to 6.15)

Course Outcomes

CO1	To define Random Events, Random Variables, to describe Probability, to apply Bayes, to define Distribution Function, to find Joint Distribution function, to find Marginal Distribution and Conditional Distribution	PO1
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	function, to solve functions on random variables.	
CO2	To define Expectation, Moments and Chebyshev Inequality, to solve Regression of the first and second types	PO1,PO2
CO3	To define Characteristic functions, to define distribution function, to find probability generating functions, to solve problems applying characteristic functions	PO4,PO6
CO4	To define One point, two-point, Binomial distributions, to solve problems of Hypergeometric and Poisson distributions, to define Uniform, normal, gamma, Beta distributions, to solve problems on Cauchy and Laplace distributions	PO4,PO5, PO6
CO5	To discuss Stochastic convergence, Bernaulli law of large numbers, to elaborate Convergence of sequence of distribution functions, to prove Levy-Cramer Theorems and de Moivre-Laplace Theorems, to explain Poisson, Chebyshev, Khintchine Weak law of large numbers, to explain and solve problems on Kolmogorov Inequality and Kolmogorov Strong Law of large numbers	PO3,PO8

Text Books (Latest Editions)

1	<u>An Introduction to Probability Theory and Its Applications, Volume 1 (Hardcover)</u> by <u>William Feller</u>
2	BASIC PROBABILITY THEORY Robert B. Ash Department of Mathematics University of Illinois DOVER PUBLICATIONS, INC. Mineola, New York

References Books

(Latest editions, and the style as given below must be strictly adhered to)

1	R.B. Ash, <i>Real Analysis and Probability</i> , Academic Press, New York, 1972
2	K.L.Chung, <i>A course in Probability</i> , Academic Press, New York, 1974.
3	R.Durrett, <i>Probability : Theory and Examples</i> , (2 nd Edition) Duxbury Press, New York, 1996.
4	V.K.Rohatgi <i>An Introduction to Probability Theory and Mathematical Statistics</i> , Wiley Eastern Ltd., New Delhi, 1988(3 rd Print).
5	S.I.Resnick, <i>A Probability Path</i> , Birhauser, Berlin,1999
6	B.R.Bhat , <i>Modern Probability Theory</i> (3 rd Edition), New Age International (P)Ltd, New Delhi, 1999

Web Resources

	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics
	http://www.opensource.org , http://www.probability.net
	https://faculty.math.illinois.edu/~r-ash/BPT/BPT.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	2
CO2	2	1	3	1	3	3	3	2	1	1
CO3	3	2	3	1	3	3	3	2	1	1
CO4	1	2	3	2	3	3	3	2	1	2
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

**Mapping with Programme Specific
Outcomes**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECONDYEAR -SEMESTER III

Part-I

Core Paper

COMPLEX ANALYSIS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC 33	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To Study Cauchy integral formula, local properties of analytic functions, general form of Cauchy's theorem and evaluation of definite integral and harmonic functions									
LO2	This course is aimed to provide an introduction to the theories of functions of complex variables;									
LO3	To study the techniques of complex variables and functions together with their derivatives, Contour integration and transformations.									
LO4	To study complex power series, classification of singularities,									
LO5	To study calculus of residues and its applications in the evaluation of integrals, and other concepts and properties.									
UNIT	DETAILS									
I	UNIT-I :Cauchy's Integral Formula: The Index of a point with respect to a closed curve – The Integral formula – Higher derivatives. Local Properties of analytical Functions: Removable Singularities-Taylor's Theorem – Zeros and poles – The local Mapping – The Maximum Principle. Chapter 4 : Section 2 : 2.1 to 2.3 Chapter 4 : Section 3 : 3.1 to 3.4									
II	UNIT-II :The general form of Cauchy's Theorem : Chains and cycles- Simple Continuity - Homology - The General statement of Cauchy's Theorem - Proof of Cauchy's theorem - Locally exact differentials- Multiply connected regions - Residue theorem - The argument principle. Chapter 4 : Section 4 : 4.1 to 4.7 Chapter 4 : Section 5: 5.1 and 5.2									
III	UNIT-III :Evaluation of Definite Integrals and Harmonic Functions Evaluation of definite integrals - Definition of Harmonic function and basic properties - Mean value property - Poisson formula. Chapter 4 : Section 5 : 5.3 Chapter 4 : Sections 6 : 6.1 to 6.3									
IV	UNIT-IV :Harmonic Functions and Power Series Expansions: Schwarz theorem - The reflection principle - Weierstrass theorem – Taylor's Series – Laurent series . Chapter 4 : Sections 6.4 and 6.5 Chapter 5 : Sections 1.1 to 1.3									
V	UNIT-V: Partial Fractions and Entire Functions: Partial fractions - Infinite products – Canonical products – Gamma Function- Jensen's formula – Hadamard's Theorem Chapter 5 : Sections 2.1 to 2.4 Chapter 5 : Sections 3.1 and 3.2									
Course Outcomes										
CO1	Analyze and evaluate local properties of analytical functions and								PO1	

	definite integrals.	
CO2	Describe the concept of definite integral and harmonic functions	PO1,PO2
CO3	Demonstrate the concept of the general form of Cauchy's theorem	PO4,PO6
CO4	Develop Taylor and Laurent series .	PO4,PO5, PO6
CO5	Explain the infinite products, canonical products and jensen's formula	PO3,PO8

Text Books (Latest Editions)	
1	Lars V. Ahlfors, <i>Complex Analysis</i> , (3 rd edition) McGraw Hill Co., New York, 1979
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	H.A. Presfly, <i>Introduction to complex Analysis</i> , Clarendon Press, oxford, 1990
2	J.B. Conway, <i>Functions of one complex variables</i> Springer - Verlag, International student Edition, Naroser Publishing Co.1978
3	E. Hille, <i>Analytic function Thorey</i> (2 vols.), Gonm& Co, 1959.
4	M.Heins, <i>Complex function Theory</i> , Academic Press, New York,1968
Web Resources	
	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics
	http://www.opensource.org , http://en.wikipedia.org

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	3
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	3
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III

Part-I

Core Paper

INDUSTRY MODULES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC 34	CORE	4	1	-	-	3	5	25	75	100
Learning Objectives										
LO1	The course aims at building capabilities in the students for analysing different situations in the industrial/ business scenario involving limited resources and finding the optimal solution within constraints.									
LO2	To enable the student to understand and analyse managerial and engineering problems to equip him to use the resources such as capitals, materials, productions, controlling, directing, staffing, and machines more effectively and Statistics provides the methodology for the planning and execution for any scientific enquiry, which has been accepted as a valid tool in this content.									
LO3	In this course Central Limit Theorem, Discrete and Continuous Distributions, Small and Large Sampling would be taught.									
LO4	The course discusses the basic statistical theory that is frequently used in econometric analysis.									
LO5	Students will frame problems using multiple mathematical and statistical representations of relevant structures and relationships and solve using standard techniques.									
UNIT	DETAILS									
I	Introduction to OR-Meaning and scope of O.R, Definition of O.R, LPP (Linear Programming Problem). Formulation of LPP, graphical solution of LPP- Problems.									
II	Transportation problem- Its definition, feasible solution by North-West corner rule, matrix minima VAM methods. Optimal solution through MODI & stepping stone method for balanced and unbalanced transportation problem..									
III	PERT and CPM network - critical and sub critical jobs -Determining the critical path. Network calculation PERT networks probability aspect of PERT- PERT time -PERT cost (omitting Crashing)									
IV	Test of Hypothesis-Null and alternative hypothesis(Concept only) One tail and two tail tests, tests of significance based on normal and t-distribution for mean, simple correlation and properties.									
V	Test of significance based on chi square and F-distributions for variance, test for goodness of fit and independence of attributes Analysis of variance -One way and two - way classifications with simple problems.									
Course Outcomes										
CO1	Students using OR techniques in business tools for decision making								PO1	
CO2	Students develop PERT and CPM networks and finding the shortest path								PO1,PO2	
CO3	Understand the concept of sequencing problems and game theory								PO4,PO6	
CO4	Students get the knowledge about inventory theory								PO4,PO5, PO6	
CO5	Understand the concept of Bivariate Distribution.								PO3, PO8	
Text Books (Latest Editions)										
1	Operations Research by Kantiswarup, P.K. Gupta and Manmohan.									
2	Fundamentals of Mathematical Statistics — S.C.Gupta and V.K.Kapoor, Sultan Chand &									

	Sons, New Delhi.
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	Fundamentals of Applied Statistics — S.C.Gupta and V.K.Kapoor. Sultan Chand & Sons.
2	Resource Management Techniques (Operations Research) V.Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan.
Web Resources	
1	https://mdu.ac.in/UpFiles/UpPdfFiles/2021/Jun/4_06-11-2021_16-06-34_OPERATIONS%20RESEARCH%20TECHNIQUES(20MAT22C5).pdf
2	https://www.amirajcollege.in/wp-content/uploads/2020/10/3151910-operations-research-theory-and-applications-by-j.-k.-sharma-z-lib.org_.pdf
	https://www.dcpehvpm.org/E-Content/Stat/FUNDAMENTAL%20OF%20MATHEMATICAL%20STATISTICS-S%20C%20GUPTA%20&%20V%20K%20KAPOOR.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	2
CO2	2	1	3	1	3	3	3	2	1	1
CO3	3	2	3	1	3	3	3	2	1	1
CO4	1	2	3	2	3	3	3	2	1	2
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECONDYEAR -SEMESTER III

Part-I

Elective Paper

To make students understand the concepts of Python programming.

PYTHON

Subject Code	Category	L	T	P	S	Credits	Inst. Hour s	Marks		
								CIA	External	Total
23212GSC35	ELECTIVE-V	4	1	-	-	3	5	25	75	100
Learning Objectives										
LO1	To make students understand the concepts of Python programming.									
LO2	To apply the OOPs concept in PYTHON programming.									
LO3	To impart knowledge on demand and supply concepts									
LO4	To make the students learn best practices in PYTHON programming									
LO5	To know the costs and profit maximization									
UNIT	DETAILS									
I	Basics of Python Programming: History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays – Array methods.									
II	Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.									
III	Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.									
IV	Lists: Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.									
V	Python File Handling: Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.									
Course Outcomes										
On completion of this course, students will										
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.								PO1	
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.								PO1,PO2	

CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO4,PO6
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO4,PO5, PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO3,PO8
Text Books (Latest Editions)		
1	ReemaThareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.	
2	Dr. R. NageswaraRao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.	
References Books		
(Latest editions, and the style as given below must be strictly adhered to)		
1	VamsiKurama, "Python Programming: A Modern Approach", Pearson Education.	
2	Mark Lutz, "Learning Python", Orielly.	
3	Adam Stewarts, "Python Programming", Online.	
4	Fabio Nelli, "Python Data Analytics", APress.	
5	Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.	
Web Resources		
1	https://www.programiz.com/python-programming	
2	https://www.guru99.com/python-tutorials.html	
3	https://www.w3schools.com/python/python_intro.asp	
4	https://www.geeksforgeeks.org/python-programming-language/	
5	https://en.wikipedia.org/wiki/Python_(programming_language)	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	3
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	3
CO5	3	1	2	3	3	3	3	2	1	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3
Weighted percentage of Course Contribution to POs	15	14	15	15	13

FIRST YEAR -SEMESTER IV
Part-I
Core Paper
FUNCTIONAL ANALYSIS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212AEC41	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To study about Converges, Hilbert spaces and Bessels's inequality									
LO2	To study about Spectral Theory									
LO3	To study about convergences in $L(X,Y)$ – Uniform boundedness and Banach Algebra									
LO4	To study certain topological-algebraically structures and the methods by which the knowledge of these methods can be applied to analytic problems.									
LO5	The objectives of the course is the study of the main properties of bounded operators between Banach and Hilbert spaces, the basic results associated to different types of convergences in normed spaces and the spectral theorem and some of its applications.									
UNIT	DETAILS									
I	BANACH SPACES : The definition and some examples - Continuous linear transformations-The Hahn - Banach theorem									
II	BANACH SPACE & HILBERT SPACES :The natural imbedding of N in N^{**} - The open mapping theorem- The conjugate of a operator. Hilbert Spaces : The definition and some simple properties									
III	HILBERT SPACES :Orthogonal complements - Orthonormal sets -The conjugate space H^* - The adjoint of an operator									
IV	OPERATORS ON HILBERT SPACES :Self-adjoint operators -Normal and unitary operators - Projections									
V	BANACH ALGEBRAS : Banach Algebra- General Preliminaries on Banach Algebras: The definition and some examples -Regular and simple elements - Topological divisors of zero -The spectrum -The formula for the spectral radius -The radical and semi- simplicity									

Course Outcomes		
CO1	Understand the Banach spaces and Transformations on Banach Spaces	PO1
CO2	Prove Hahn Banach theorem and open mapping theorem	PO1,PO2
CO3	Describe operators and fundamental theorems	PO4,PO6
CO4	Validate orthogonal and orthonormal sets	PO4,PO5, PO6
CO5	Analyze and establish the regular and singular elements	PO3,PO8

Text Books (Latest Editions)	
1	Functional Analysis , by Walter Rudin, Second Edition. McGraw-Hill, Inc.
2	G.F.Simmons,IntroductiontoTopologyandModernAnalysis,McGrawHillEducation(India)Private Limited, New Delhi
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Functional Analysis by Walter Rudin1974. TMH Edition
2	Functional Analysis by B.V.Limaye1985. Wiley Eastern Limited
Web Resources	
	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics
	http://www.opensource.org , http://en.wikipedia.org
	https://www.ddegjust.ac.in/2019/4/mal%20641_19042019.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	3
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	3
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER IV
Part-I
Core Paper
DIFFERENTIAL GEOMETRY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC 42	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To Understand the concept of curvature of a space curve and signed curvature of a plane curve									
LO2	To get introduced to the concept of a regular parameterized curve in n									
LO3	To get introduced to the notion of Serret-Frenet frame for space curves and the involutes and evolutes of space curves with the help of examples									
LO4	To be able to compute the curvature and torsion of space curves									
LO5	To be able to understand the fundamental theorem for space curves.									
UNIT	DETAILS									
I	UNIT-I : Space curves: Definition of a space curve – Arc length – tangent – normal and binormal – curvature and torsion – contact between curves and surfaces- tangent surface- involutes and evolutes- Intrinsic equations – Fundamental Existence Theorem for space curves- Helices. Chapter I : Sections 1 to 9.									
II	UNIT-II :Intrinsic properties of a surface: Definition of a surface – curves on a surface – Surface of revolution – Helicoids – Metric- Direction coefficients – families of curves- Isometric correspondence- Intrinsic properties. Chapter II: Sections 1 to 9.									
III	UNIT-III : Geodesics: Geodesics – Canonical geodesic equations – Normal property of geodesics- Existence Theorems – Geodesic parallels – Geodesics curvature- Gauss- Bonnet Theorem – Gaussian curvature- surface of constant curvature. Chapter II: Sections 10 to 18.									
IV	UNIT-IV :Non Intrinsic properties of a surface: The second fundamental form- Principle curvature – Lines of curvature – Developable - Developable associated with space curves and with curves on surface - Minimal surfaces – Ruled surfaces. Chapter III: Sections 1 to 8.									
V	UNIT-V :Differential Geometry of Surfaces : Compact surfaces whose points are umbilics- Hilbert’s lemma – Compact surface of constant curvature – Complete surface and their characterization – Hilbert’s Theorem – Conjugate points on geodesics. Chapter IV : Sections 1 to 8 (Omit 9 to 15).									

Course Outcomes		
CO1	Explain space curves, Curves between surfaces, metrics on a surface, fundamental form of a surface and Geodesics	PO1
CO2	Evaluate these concepts with related examples.	PO1,PO2
CO3	Compose problems on geodesics	PO4,PO6
CO4	Recognize applicability of developable	PO4,PO5, PO6
CO5	Construct and analyze the problems on curvature and minimal surfaces	PO3,PO8

Text Books (Latest Editions)	
1	T.J.Willmore, <i>An Introduction to Differential Geometry</i> , Oxford University Press,(17 th Impression) New Delhi 2002. (Indian Print)
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Struik, D.T. <i>Lectures on Classical Differential Geometry</i> , Addison – Wesley, Mass. 1950.
2	Kobayashi. S. and Nomizu. K. <i>Foundations of Differential Geometry</i> , Inter science Publishers, 1963.
3	Wilhelm Klingenberg: <i>A course in Differential Geometry</i> , Graduate Texts in Mathematics, Springer-Verlag 1978
4	J.A. Thorpe <i>Elementary topics in Differential Geometry</i> , Undergraduate Texts in Mathematics, Springer - Verlag 1979
Web Resources	
	http://mathforum.org , http://ocw.mit.edu/ocwweb/Mathematics
	http://www.opensource.org , www.physicsforum.com

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	2
CO2	2	1	3	1	3	3	3	2	1	1
CO3	3	2	3	1	3	3	3	2	1	1
CO4	1	2	3	2	3	3	3	2	1	2
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

**Mapping with Programme Specific
Outcomes**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER IV

Part-I

Core Paper

FLUID MECHANICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212 AEC 43	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	To understand the properties of fluids and fluid statics									
LO2	To derive the equation of conservation of mass and its application									
LO3	To solve kinematic problems such as finding particle paths and stream lines									
LO4	To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems									
LO5	To analyze laminar and turbulent flows and understand the various flow measuring devices									
UNIT	DETAILS									
I	INTRODUCTION- Note to Students - Definition of a Fluid - Scope of Fluid Mechanics - Basic Equations -Methods of Analysis - System and Control Volume - Differential versus Integral Approach Methods of Description - Dimensions and Units -TO Systems of Dimensions - Systems of Units -Preferred Systems of Units - Summary - Problems									
II	INTRODUCTION: Note to Students /1 Definition of a Fluid - Scope of Fluid Mechanics - Basic Equations - Methods of Analysis 15 System and Control Volume - Differential versus Integral Approach Methods of Description /8 Dimensions and Units-TO Systems of Dimensions - Systems of Units - Preferred Systems of Units - Summary - Problems - FUNDAMENTAL CONCEPTS - Fluid as a Continuum - Velocity Field - One-, Two-, and Three- Dimensional Flows - Timelines, Pathlines, Streaklines, and Streamlines - Stress Field - Viscosity /26 Newtonian Fluid - Non-Newtonian Fluids - Surface Tension - Description and Classification of Fluid Motion - Viscous and Inviscid Flows - Laminar and Turbulent Flows - Compressible and Incompressible Flows - Internal and External Flows - Summary - References - Problems									
III	INTRODUCTION: Note to Students - Definition of a Fluid - Scope of Fluid Mechanics - Basic Equations - Methods of Analysis - System and Control Volume - Differential versus Integral Approach Methods of Description - Dimensions and Units -TO Systems of Dimensions - Systems of Units - Preferred Systems of Units - Summary - Problems - FUNDAMENTAL CONCEPTS- Fluid as a Continuum - Velocity Field - One-, Two-, and Three- Dimensional Flows - Timelines, Pathlines, Streaklines, and Streamlines - Stress Field - Viscosity - Newtonian Fluid -Non-Newtonian Fluids - Surface Tension -									

	<p>Description and Classification of Fluid Motion - Viscous and Inviscid Flows - Laminar and Turbulent Flows - Compressible and Incompressible Flows - Internal and External Flows - Summary - References - Problems</p> <p>FLUID STATICS- The Basic Equation of Fluid Statics -The Standard Atmosphere - Pressure Variation in a Static Fluid - Incompressible Liquids: Manometers - Gases - Hydraulic Systems - Hydrostatic Force on Submerged Surfaces - Hydrostatic Force on a Plane Submerged Surface - Hydrostatic Force on a Curved Submerged Surface Buoyancy and Stability Fluids in Rigid-Body Motion (CD-ROM) - Summary - References - Problems -</p>
IV	<p>BASIC EQUATIONS IN INTEGRAL FORM FOR A CONTROL VOLUME: Basic Laws for a System -Conservation of Mass - Newton's Second Law - The Angular-Momentum Principle - The First Law of Thermodynamics - The Second Law of Thermodynamics - Relation of System Derivatives to the Control Volume Formulation - Derivation - Physical Interpretation - Conservation of Mass - Special Cases - Momentum Equation for Inertial Control Volume - Differential Control Volume Analysis - Control Volume Moving with Constant Velocity - Momentum Equation for Control Volume with Rectilinear Acceleration - Momentum Equation for Control Volume with Arbitrary Acceleration (CD-ROM) - The Angular-Momentum Principle - Equation for Fixed Control Volume - •Equation for Rotating Control Volume (CD-ROM) - The First Law of Thermodynamics -Rate of Work Done by a Control Volume -Control Volume Equation - The Second Law of Thermodynamics - Summary - Problems</p>
V	<p>INTRODUCTION TO DIFFERENTIAL ANALYSIS OF FLUID MOTION : Conservation of Mass Rectangular Coordinate System Cylindrical Coordinate System - Stream Function for Two-Dimensional Incompressible Flow - Motion of a Fluid Particle (Kinematics) - Fluid Translation: Acceleration of a Fluid Particle in a Velocity Field - Fluid Rotation - Fluid Deformation - Momentum Equation - Forces Acting on a Fluid Particle - Differential Momentum Equation - Newtonian Fluid: Navier-Stokes Equations - Summary - References - Problems</p>

Course Outcomes		
CO1	Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics	PO1
CO2	Calculate the forces that act on submerged planes and curves	PO1,PO2
CO3	Identify and analyse various types of fluid flows. • Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces. • Draw simple hydraulic and energy gradient lines.	PO4,PO6

CO4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.	PO4,PO5, PO6
CO5	Draw simple hydraulic and energy gradient lines	PO3,P08

Text Books (Latest Editions)	
1	Fluid Mechanics, P. N. Modi and S. M. Seth, Standard book house, New Delhi
2	A text of Fluid mechanics and hydraulic machines, R. K. Bansal - Laxmi Publications (P) ltd., New Delhi
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	Mechanics of Fluids, Merle C. Potter, David C. Wiggert and Bassem H. Ramadan, CENGAGE Learning
2	Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.
Web Resources	
	https://home.iitk.ac.in/~nikhilk/Book.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECONDYEAR -SEMESTER IV
Part-I
Elective -VI
RESOURCE MANAGEMENT TECHNIQUES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212GSC45	ELECTIVE-VI	4	1	-	-	3	5	25	75	100
Learning Objectives										
LO1	To understand the methodology of OR problem solving and formulate linear programming problem									
LO2	To develop formulation skills in transportation models and finding solutions									
LO3	To understand the basics in the field of game theory and assignment problems									
LO4	To know how project management techniques help in planning and scheduling a project									
LO5	To know the basics of dynamic programming and simulation.									
UNIT	DETAILS									
I	Linear Programming : Definition and Scope of Operations Research, Mathematical formulation of the problem, graphical method, Simplex method, artificial basis technique, dual Simplex method. Degeneracy, alternative optima, unbounded solution, infeasible solution.									
II	Transportation Problem : Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation problem and Maximization in transportation model.									
III	Assignment Problem : One to one assignment problem, optimal solutions, unbalanced assignment matrix, travelling sales man problem, maximization in A.P									
IV	Sequencing Problems – Introduction – Step-wise procedure for determining the optimal sequence for n jobs on 2 machines (Johnson's method) – Processing n jobs on three machines – Processing n jobs on m machines – Processing of two jobs on 'n' machines.									
V	Project Planning through Networks : Introduction, Basic steps in PERT/CPM techniques, Network diagram representation, Rules of drawing network diagram, Fulkerson's rule, Time estimates and Critical path in network analysis, floats, Project evaluation and review technique, Application areas of PERT/CPM techniques.									

Course Outcomes		
CO1	Recognize the importance and value of Operations Research and linear programming in solving practical problems in industry	PO1
CO2	Interpret the transportation models' solutions and infer solutions to the real-world problems.	PO1,PO2
CO3	Recognize and solve game theory and assignment problems.	PO4,PO6
CO4	Gain knowledge of drawing project networks for quantitative analysis of projects	PO4,PO5, PO6
CO5	To know when simulation and dynamic programming can be applied in real world problems.	PO3,PO8

Text Books (Latest Editions)	
1	Operations Research - S.D.Sharma, Kedarnath Ram nath& Co, 2008
2	Operations Research - Theory and Applications, J.K Sharma, Macmillan Publications India Ltd, 2013
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Operations Research by Kantiswarup
2	Resource Management Techniques (Operations Research) V.Sundaresan
3	Operations Research Methods and Applications
Web Resources	
	http://www2.informs.org/Resources/
	http://www.ieor.columbia.edu/
	http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
	http://www.mit.edu/~orc

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	1	3
CO2	2	3	3	3	2	3	3	2	1	3
CO3	3	3	3	2	3	3	3	2	1	3
CO4	3	3	3	3	3	3	3	2	1	3
CO5	3	2	3	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER IV
Part-II
Skill Enhancement Course
PROFESSIONAL COMPETENCY SKILL

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23212TCE-	SEC	4	-	-	-	2	4	25	75	100
Learning Objectives										
LO1	To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.									
LO2	To prepare and explain the fundamentals related to various possibilities and probabilities related to quantitative aptitude.									
LO3	To critically evaluate numerous possibilities related to puzzles									
LO4	To categorize and explain various principles of grammar in order to help students to minimize errors in English									
LO5	To critically evaluate a given reading material for improving ones' reading skills and comprehension									
UNIT	DETAILS									
I	Arithmetic: Profit, Loss and Discount Simple Interest and Compound Interest Time and Work Work and wages									
II	Problem Solving: Puzzle Number series Inequalities Missing number Arithmetic problems									
III	Analogy: Semantic Symbolic Number Figural									
IV	Series: Semantic Number Figural									
V	Coding and Decoding: Alphabetic codes Word-group Meaning words Symbolic coding and decoding									
Course Outcomes										
CO1	Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests								PO1	
CO2	Solve questions related to Time and distance and time and work etc. from								PO1,PO2	

	company specific and other competitive tests.	
CO3	Understand and solve puzzle related questions from specific and other competitive tests	PO4, PO6
CO4	Detect errors of grammar and usage in a given sentence/text and rectify them by making appropriate changes	PO4, PO5, PO6
CO5	Solve questions based on critical reasoning	PO3, PO8

Text Books (Latest Editions)	
1	Quantitative Aptitude by Arihant
2	Quantitative Aptitude by Dr. R.S Aggarwal, S. Chand Publication
3	Verbal & Non-verbal by Dr. R.S Aggarwal, S. Chand Publication
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Competitive Exam Book by Rakesh Yadav
Web Resources	
	https://drive.google.com/file/d/1-K4w9JrDY3jA4trHGEhpFssBOh1Flp9D/view?pli=1

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

VALLAM, THANJAVUR-613403

**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF MATHEMATICS
B.Sc- CURRICULUM- 2023-REGULATION**

**COURSE STRUCTURE
Credit Distribution for UG Programme in Mathematics**

**B.Sc.,
MATHEMATICS**

COURSE STRUCTURE & SYLLABUS

**FROM THE ACADMIC YEAR
2023-2024**



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956
Vallam, Thanjavur-613403

**DEPARTMENT OF MATHEMATICS
B.Sc- MATHEMATICS- 2023-REGULATION**

**COURSE STRUCTURE
SEMESTER – I**

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC11/ 23111AEC11/ 23132AEC11/ 23135AEC11	Tami – I/Advanced English-I/Hindi-I/ French - I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23112AEC13	Algebra &Trigonometry	4	1	0	4
23112AEC14	Differential Calculus	4	1	0	4
23113AEC15	Numerical Methods with Applications	4	1	0	4
23113GEC16	Bio-Mathematics	0	1	0	2
SKILL ENHANCEMENT COURSE					
23112SEC17	Foundation Course FC	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE					
231AECINC	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	2	0	0	1
Total		24	06		25

SEMESTER – II

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Tamil – II/ Advanced English-II/Hindi-II/ French – II	3	1	0	3
23111AEC22	English-II	3	1	0	3
23112AEC23	Analytical Geometry (Two & Three Dimensions)	4	1	0	4
23112AEC24	Integral Calculus	4	1	0	4
23114AEC25	Calculus of finite Differences	3	1	0	4
SKILL ENHANCEMENT COURSE					

23112SEC26	LaTeX	2	1	0	2
23112SEC27	Computational Mathematics	2	1	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE					
231AECCCMS	Communication Skill	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioral Etiquette	0	0	0	1
Total		23	07	0	25

SEMESTER – III

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC31/ 23132AEC31/ 23111AEC31/ 23135AEC31	Tamil – III/Hindi-III/Advanced English-III/ French – III	3	1	0	3
23111AEC32	English-III	3	1	0	3
23112AEC33	Vector Calculus and Applications	4	1	0	4
23112AEC34	Differential Equations and Applications	4	1	0	4
23112AEC35	Actuarial Mathematics	4	0	0	4
SKILL ENHANCEMENT COURSE					
23112SEC36	Entrepreneurial Based on Mathematics	3	0	0	1
23112SEC37	Statistics with R Programming	3	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE					
23112RMC38	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	0	0	0	1
Total		26	04	0	24

SEMESTER – IV

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV	3	0	0	3
23111AEC42	English-IV	3	0	0	3
23112AEC43	Industrial Mathematics	5	1	0	4
23112AEC44	Elements of Mathematical Analysis	4	1	0	4
23112AEC45	Financial Mathematics	4	1	0	4
SKILL ENHANCEMENT COURSE					
23112SEC46	Introduction to Data Science	2	0	0	2
23112SEC47	Computing Mathematics	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE					
23112BRC48	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	0		2

AUDIT COURSE					
231LSCLS	Leadership and Management Skills	0	0	0	1
Total		27	03	-	27

**SEMESTER – V
SEMESTER – VI**

Course Code	Course Title	L	T	P	C
23112AEC51	Abstract Algebra	4	1	0	4
23112AEC52	Real Analysis	4	1	0	4
23112AEC53	Mathematical Modelling	4	1	0	4
23112AEC54	Mechanics	4	1	0	3
23112DSC55_	Discipline Specific Elective 1	4	0	0	3
23112DSC56_	Discipline Specific Elective 2	4	0	0	3
23112SEC57	Internship / Industrial Training	0	0	0	2

AUDIT COURSE					
231ACLSPSL	Professional Skills	0	0	0	1
231AECCVED	Value Education -1	2	0	0	2
Total		26	04	0	26

Course Code	Course Title	L	T	P	C
THEORY					
23112AEC61	Complex Analysis	5	1	0	4
23112AEC62	Graph Theory	5	1	0	4
23112DSC63_	Discipline Specific Elective -III	5	1	0	3
23112PRW64	Project with Viva voce	10	0	0	4
231SECPC65	Professional Competency Skill	2	0	0	2
231EXACT	Extension Activity	0	0	0	1
AUDIT COURSE					
231ACSIKS	Indian Knowledge System	0	0	0	2
Total		27	03	-	20

DISCIPLINE SPECIFIC ELECTIVES (DSC)

SEMESTER	SUBJECT CODE	SUBJECT NAME
V	23112DSC55A	Fuzzy Sets and its applications
	23112DSC55B	Number Theory
	23112DSC56A	Stochastic Process
	23112DSC56B	Linear Algebra
VI	23112DSC63A	Astronomy
	23112DSC63B	Elements of Space

AUDIT COURSE CREDIT DISTRIBUTION

Sem	Audit
I	1
II	1
III	1

IV	1
V	3
VI	2
Total	9

7 7.1 Suggestive Topics in Core Component

- A. Classical Algebra
- B. Trigonometry
- C. Differential Calculus
- D. Integral Calculus
- E. Analytical Geometry (2D / 3D)
- F. Vector Analysis
- G. Differential Equations
- H. Abstract Algebra
- I. Linear Algebra
- J. Sequences & Series
- K. Fourier Series
- L. Real Analysis
- M. Transform Techniques (Laplace, Fourier)
- N. Complex Analysis
- O. Mechanics (Statics / Dynamics)
- P. Mathematical Modeling
- Q. Industrial Mathematics and more

7.2 Suggestive Topics in Elective Courses (Generic / Discipline-centric)

Group I:

- A. Allied Physics
- B. Allied Chemistry
- C. Statistical Methods
- D. Bio Mathematics
- E. Bio Statistics
- F. Programming Language with practical (C, Python, Java, R, etc.)
- G. Object Oriented Programming with C++
- H. Principles of Econometrics
- I. Introduction to Actuarial Science
- J. Principles of Accounting practices
- K. Logistics & Supply chain management
- L. Forecasting Techniques
- M. Simulation
- N. Introduction to Data Science
- O. Cloud Computing
- P. Introduction to Machine Learning
- Q. Data Structures
- R. Introduction to Artificial Intelligence
- S. Neural network models
- T. Financial Mathematics and more

Group II –Suggestive Elective Courses (Discipline-centric)

- A. Numerical Methods with Applications
- B. Mathematical Statistics
- C. Optimization Techniques
- D. Graph Theory & Applications
- E. Special functions with Applications
- F. Discrete Mathematics
- G. Combinatorial Mathematics
- H. Number Theory & Cryptography
- I. Difference equations with application
- J. Formal Languages & Automata Theory
- K. Astronomy / Elements of Space Science
- L. Stochastic Processes
- M. Fuzzy Sets & its applications
- N. Introduction to Research Methodology
- O. Integral Transforms & Z Transforms
- P. Algorithms
- Q. Computational Geometry and more

7.3 Suggestive Topics in Skill Enhancement Courses (SEC)

Group III - Skill Enhancement Courses (SEC)

- A. Statistics with R / Excel / SPSS
- B. LaTeX
- C. E- Commerce & Tally
- D. Computing skills (Office Automation)
- E. Android App development
- F. Web Designing
- G. Professional Competency Skill
- H. Computational Mathematics
- I. Data Analysis using latest package
(R / Matlab / Maxima/ Torus / GeoGebra /GIMP) and more

7.4 Suggestive Topic in Skill Enhancement Courses (SEC)

Group IV - Skill Enhancement Courses (SEC)

- a. Indian knowledge System
- b. Disaster Management

Credit Distribution Credit Distribution

SEM	AEC	SEC	GEC	DSC	AECC	Research	Others	TOTAL
I	18	2	2	-	2	-	1	25
II	18	4	-	-	2	-	1	25
III	18	3	-	-	-	2	1	24
IV	18	4	-	-	4	-	1	27
V	15	2	-	6	-	-	3	26
VI	8	-	-	3	-	4	5	20
TOTAL	95	15	2	9	8	6	12	147

HOD

DEAN ACADEMIC AFFAIRS

DEAN

இக்கால இலக்கியம்

23110A EC 11

முதல் பருவம்

பாடநூல்கள் :

1.இக்கால தமிழ் இலக்கிய வகைகளின் மாதிரிகளைக் கற்பித்து அபுர்ரில்
ஸுபான்ஸாபும், கவைக்கும் திறனையும் ஏற்படுத்தும்.

பயன்கள் :

- மொழி அனுபவத் திறன் பெறுதல்.
- சமூக சிந்தனையை வளர்த்துக் கொள்ளுதல்.
- பாடப்பாடல்களை உருவாக்கும் திறனைப் பெறுதல்.

அபகு - 1 மரபுக்கவிதை

1. பாறதியார்--விடுதலை, வந்திய மாதாம் ,சாற்று
- 2.பாறதிநான் - அழகின் சிறப்பு ,தமிழனுக்கு வீழ்ச்சி இல்லை
- 3.கவிமணி தேசியவிநாயகம் பிள்ளை-- தொழிலாளியின் முன்னாடு
- 4.நாமக்கல் கவிஞர்-- தருணம் இதுவே ,
- 5.கண்ணதாசன்-- அழகவம்

அபகு - 2 புதுக்கவிதைகள்

- 1.அப்துல் ரசூபான் -வெற்றி
- 2.அறிவுமதி-நட்புக் காவல்
- 3.வைரமுத்து- குசி, சிற்பி- ஒடு ஒடு சங்கிலி
- 4.மு.கேத்தா- வெளிச்சம் வெளியே இல்லை

அபகு - 3 நாட்டுப்புறவியல்

- 1.புறமொழிகள்
2. விடுகதைகள்
3. தொழில் பாடல்

பிழை- 4 சிறுகதை

1. தடயம் - மா. ஜெயராமசாமி
2. ஷாந்தம் - க. தமிழ்ச்செல்வி
3. நீதி - முனை

பிழை- 5 இலக்கியவரலாறு

கவிதை, சிறுகதை நாட்டுப்புறப்பாடல்

பொதுக்கட்டுரை - மனித நேயம், வாழ்வியல் சிற்பிகள்

மனப்பாடல் பகுதி : பாறியார் கவிதை- வேண்டும், பாறியாசன் கவிதை-செந்தாமரை

பார்வை நூல்கள் :

1. பாறியார் கவிதைகள் - மணிவாசகர் பதிப்பகம் சென்னை
2. பாறியாசன் கவிதைகள் - பாதி இலையம், சென்னை
3. தமிழ் இலக்கிய வரலாறு - மு. வரதராஜன் சாதித்திய பிழைநெயி, சென்னை
4. நாட்டுப்புறப்பாடல் - முனைவர். ஆறு. ராமநாதன் ,மணிவாசகர் பதிப்பகம், சென்னை
5. தமிழ் சிறுகதைகளும் தோற்றம் வளர்ச்சி - தமிழ் புத்தக இலையம், சென்னை

இணையதளம் - www.tamiliv.org

www.ncolulagam.com

FIRST YEAR -SEMESTER I
Part-II
Language
ENGLISH - I

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC12	Language	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	To enable learners to acquire the linguistic competence necessarily required in various life situations.									
LO2	To help them understand the written text and able to use skimming, scanning skills									
LO3	To assist them in creative thinking abilities									
LO4	To enable them become better readers and writers									
LO5	To assist them in developing correct reading habits, silently, extensively and intensively									
UNIT	DETAILS									
I	Poetry 1.1 A Patch of Land - SubramaniaBharati 1.3 A Nation's Strength – Ralph Waldo Emerson 1.4 Love Cycle - Chinua Achebe									
II	Prose 2.1 JRD - Harish Bhat 2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim									
III	Short Stories 3.1 The Faltering Pendulum- Bhabani Bhattacharya 3.2 How I Taught my Grandmother to Read- Sudha Murthy 3.3 The Gold Frame- R.K. Laxman									
IV	Language Competency 4.1 Vocabulary : Synonyms, Antonyms, Word Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction									
V	English for Workplace 5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions									

Course Outcomes		
CO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	PO1
CO2	Understand the total content and underlying meaning in the context.	PO1,PO2
CO3	Form the habit of reading for pleasure and for information	PO4,PO6
CO4	Comprehend material other than the prescribed text	PO4,PO5, PO6
CO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	PO3,PO8

Text Books (Latest Editions)	
1	Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi: SahityaAkademi, 1967
2	How I taught my Grandmother to Read and other Stories, Murthy, Sudha,Penguin Books, India, 2004
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	English in use - A textbook for College Students (English ,Paper back, - T.Vijay Kumar, K DurgaBhavani, YL Srinivas
2	Practical English Usage - 4th Edition By Michael Swan
3	The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace -Margaret Shepherd,Penny Carter, (Illustrator), Sharon Hogan, 2005.
Web Resources	
1	A patch of land by SubramaniaBharati translated by UshaRajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
2	The Sparrow by Paul Laurence Dunbar https://poets.org/poem/sparrow-0
3	A Nation's Strength by Emerson https://poets.org/poem/nations-strength
4	Love cycle by Chinua Achebe : https://www.best-poems.net/chinua-achebe/love-cycle.html
5	JRD by Harish Bhat https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories
6	Us and Them by David Sedaris From Dress Your Family in Corduroy and Denim https://legacy.npr.org/programs/morning/features/2004/jun/sedaris/usandthem.html
7	Uncle Podger Hangs a Picture: http://rosyhunt.blogspot.com/2013/01/uncle-podger-hangs-picture.html

8	The Gold Frame: https://fybaenglish.blogspot.com/2018/12/the-gold-frame-r-k-laxman.html
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M

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

**Mapping with Programme
Specific Outcomes**

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	1 5	1 5	15	1 5	1 5
Weighted percentage of Course Contribution to POs	3. 0	3 0	3.0	3 0	3. 0

3 – Strong, 2 – Medium, 1 - Low

FIRST YEAR -SEMESTER I
Part-III
CORE PAPER
ALGEBRA & TRIGONOMETRY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC13	Core	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Basic ideas on the Theory of Equations, Matrices and Number Theory.									
LO2	Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems									
LO3	To enable learners to find Eigen values and Eigen Vectors-Similar matrices and Finding powers of square matrix, Inverse of a square matrix									
LO4	Able to find Expansions of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ - Expansion of $\tan n\theta$ in terms of $\tan\theta$									
LO5	Relation between circular and hyperbolic functions Inverse hyperbolic functions									
UNIT	DETAILS									
I	Reciprocal Equations-Standard form-Increasing or decreasing the roots of a given equation- Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems.									
II	Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems.									
III	Characteristic equation – Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems.									
IV	Expansions of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ - Expansion of $\tan n\theta$ in terms of $\tan\theta$, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta \sin^n\theta$ –Expansions of $\tan(\theta_1+\theta_2+\dots+\theta_n)$ -Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ - related problems.									
V	Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems.									
Course Outcomes										
CO1	Classify and Solve reciprocal equations								PO1	
CO2	Find the sum of binomial, exponential and logarithmic series								PO1,PO2	
CO3	Find Eigen values, Eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix								PO4,PO6	

CO4	Expand the powers and multiples of trigonometric functions in terms of sine and cosine	PO4,PO5, PO6
CO5	Determine relationship between circular and hyperbolic functions and the summation of trigonometric series	PO3,PO8

Text Books (Latest Editions)	
1	MODERN ALGEBRA by S.Arumugam and S.T. Issac published on 2015
2	Algebra and Trigonometry, sixth edition by Michel Sullivan published on 2001
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Algebra and Trigonometry, seventh edition by Sullivan published on 2004
2	Algebra and Trigonometry, fourth edition by James Stewart, LotharRedlin, Saleem Watson
Web Resources	
1	https://assets.openstax.org/oscms-prodcms/media/documents/Algebra-and-Trigonometry-2e-WEB.pdf?_gl=1*tl8aq*_ga*MTcyNjE0NzAwMy4xNjg5ODQ3ODEz*_ga_T746F8B0QC*MTY4OTg0Nzg3NC41LjAuMA..

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	2	3	4	5	6	1	2	3	1
CO2	3	1	3	-	-	-	3	2	1	3
CO3	2	1	3	1	-	-	3	2	1	2
CO4	3	1	3	1	-	-	3	2	1	3
CO5	3	1	3	-	-	-	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I
Part-III
Core Paper
DIFFERENTIAL CALCULUS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC14	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	The basic skills of differentiation, successive differentiation, and their applications.									
LO2	Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems									
LO3	To Understand and to Find Homogeneous functions, Partial derivatives of a function of two variables and Lagrange's method of undetermined multipliers.									
LO4	To able to find Envelope of family of curves which are quadratic in the parameter.									
LO5	To understand the Definition of Curvature, Circle, Radius and Centre of Curvature and The Radius of Curvature in Polar Co-ordinates									
UNIT	DETAILS									
I	Successive Differentiation: Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product – Feynman's method of differentiation									
II	Partial Differentiation: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions.									
III	Partial Differentiation (Continued): Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers.									
IV	Envelope: Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.									
V	Curvature: Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutives – Radius of Curvature in Polar Co-ordinates									

Course Outcomes		
CO1	Find the nth derivative, form equations involving derivatives and apply Leibnitz formula	PO1
CO2	Find the partial derivative and total derivative coefficient	PO1,PO2
CO3	Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers	PO4,PO6
CO4	Find the envelope of a given family of curves	PO4,PO5, PO6
CO5	Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates	PO3,PO 8

Text Books (Latest Editions)	
1	Differential Calculas by D.Somasundaram, B.Chowdhary by Narosa Publishing house on 2005
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Differential Calculas by Shanti Narayan, Dr.P.K.Mittal 2005
2	Differential Calculas by H.SDhami, published by New age International Publishers on 1998
Web Resources	
	https://library.um.edu.mo/ebooks/b31290735.pdf

Mapping with Programme Outcomes

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG(S), MEDIUM (M) and LOW(L).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S	M
CO3	M	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	M	S	S	S	S	S	S	S	S	S

FIRST YEAR -SEMESTER I

Part-III

Core Paper

Numerical Methods with Applications

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23113AEC15	CORE	4	1	-	-	4	3	25	75	100

Learning Objectives

LO1	This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology
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UNIT

DETAILS

I	Solution of Equations and Eigen value Problems: Solution of algebraic and transcendental equations, Fixed point iteration method, Newton Raphson method, Solution of linear system of equations.
II	Gauss elimination method, Pivoting, Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method.
III	Interpolation and Approximation: Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation .
IV	Interpolation with equal intervals - Newton's forward and backward difference formulae.
V	Numerical Differentiation and Integration: Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule

Course Outcomes

CO1	Understand and define the laws involved in gravitation and elasticity.	PO1
CO2	Develop the knowledge about heat and thermodynamics, sound and spectroscopy.	PO1,PO2
CO3	Understand the concept of properties of matter and to recognize their applications in various real problems.	PO4,PO6
CO4	After studying this course, The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from Industry, management and other engineering fields.	PO4,PO5, PO6
CO5	Understand the magnetic properties	PO3,PO8

Text Books (Latest Editions)

1	Grewal. B.S. and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 9th Edition, New Delhi
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References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi.
2	Chapra. S.C. and Canale. R. P., "Numerical Methods for Engineers, Tata McGraw Hill, New Delhi.
Web Resources	
	https://www.azdocuments.in/2021/11/numerical-methods-and-applications.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	3	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I

Part-III

Core Paper

Bio Mathematics

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23113GEC16	CORE	-	1	0	-	2	3	25	75	100
Learning Objectives										
LO1										
Unit	DETAILS									
Minimum of Eight Experiments from the list:										
1.	Population Dynamics: The Malthusian growth ; The Logistic equation; A model of species competition; The Lotka-Volterra predator-prey model; Age-structured Populations : Fibonacci's rabbits; The golden ratio Φ ; The Fibonacci numbers in a sunflower; Rabbits are an age-structured population; Discrete age-structured populations; Continuous age-structured populations; The brood size of a hermaphroditic worm.									
2.	Stochastic Population Growth : A stochastic model of population growth; Asymptotics of large initial populations; Derivation of the deterministic model; Derivation of the normal probability distribution; Simulation of population growth.									
3.	Infectious Disease Modeling: The SI model; The SIS model; The SIR epidemic disease model; Vaccination ; The SIR endemic disease model ; Evolution of virulence.									
4.	Population Genetics: Haploid genetics; Spread of a favored allele; Mutation-selection balance ; Diploid genetics; Sexual reproduction; Spread of a favored allele; Mutation-selection balance; Heterosis; Frequency-dependent selection; Linkage equilibrium; Random genetic drift.									
5.	Biochemical Reactions: The law of mass action; Enzyme kinetics; Competitive inhibition; Allosteric inhibition; Cooperativity. Sequence Alignment: DNA ; Brute force alignment; Dynamic programming; Gaps; Local alignments; Software.									
Course Outcomes										
CO1	Understand and define the laws involved in gravitation and elasticity.								PO1	
CO2	Develop the knowledge about heat and thermodynamics, sound and spectroscopy.								PO1,PO2	
CO3	Understand the concept of properties of matter and to recognize their applications in various real problems.								PO4,PO6	
CO4	After studying this course, The students will have a clear								PO4,PO5,	

	perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from Industry, management and other engineering fields.	PO6
CO5	Understand the magnetic properties	PO3,PO8

Text Books (Latest Editions)	
1	Leah Edelstein-Keshet, "Mathematical Models in Biology," SIAM Press, ISBN-13: 978-0-898715-54-5
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	https://new.kuk.ac.in/lms/syllabus?did=Mjc=&sid=MTQ4MA==&pn=TS5TYy4gKE1hdGhlfWF0aWNzKQ==
Web Resources	
	https://kuk.ac.in/wp-content/uploads/notes/Notes_5090_MMATH21-413-Unit%201.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	3	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I
Part-IV
Skill Enhancement Course
BRIDGE MATHEMATICS
 Foundation course FC

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC17	SEC	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	To bridge the gap and facilitate transition from higher secondary to tertiary education									
LO2	To Find confidence among stakeholders and inculcate interest for Mathematics									
UNIT	DETAILS									
I	Algebra: Binomial theorem, General term, middle term, problems based on these concepts									
II	Sequences and series (Progressions). Fundamental principle of counting. Factorial n.									
III	Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.									
IV	Trigonometry: Introduction to trigonometric ratios, proof of $\sin(A+B)$, $\cos(A+B)$, $\tan(A+B)$ formulae, multiple and sub multiple angles, $\sin(2A)$, $\cos(2A)$, $\tan(2A)$ etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule									
V	Calculus: Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method									
Course Outcomes										
CO1	Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems								PO1	
CO2	Find the various sequences and series and solve the problems related to them. Explain the principle of counting								PO1,PO2	
CO3	Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations								PO4,PO6	

CO4	Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.	PO4,PO5, PO6
CO5	Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function	PO3,PO8

Text Books (Latest Editions)	
1	Tamil Nadu State Board 11 th mathematics book
2	Tamil Nadu State Board 12 th mathematics book
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	CBSE Board 11 th Mathematics book
2	CBSE Board 12 th Mathematics book
Web Resources	
	https://drive.google.com/file/d/1G4tb4PZTvCgruLhW93q5hNsEmwxTN4lh/view
	https://drive.google.com/file/d/1H75A2RThiInsh9M29BGamCqhgyqkduET/view

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	2	3	4	5	6	1	2	1	2
CO2	1	1	1	1	1	1	1	1	1	1
CO3	2	1	1	2	2	1	2	1	2	1
CO4	2	1	1	2	2	1	2	1	2	1
CO5	1	1	1	1	1	1	2	1	1	1

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I
Part-IV
Ability Enhancement Compulsory Course
INDIAN CONSTITUTION

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCINC	AECC	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	To make the students understand about the democratic rule and parliamentary administration									
LO2	To appreciate the salient features of the Indian constitution									
LO3	To know the fundamental rights and constitutional remedies									
LO4	To make familiar with powers and positions of the union executive, union parliament and the Supreme Court									
LO5	To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy									
UNIT	DETAILS									
I	The making of Indian constitution: The constitution assembly organization - character - work salient features of the constitution- written and detailed constitution - socialism -secularism-democracy and republic.									
II	Fundamental rights and fundamental duties of the citizens: Right of equality -right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies -fundamental duties.									
III	Directive principles of state policy: Socialistic principles-Gandhi an principles-liberal and general principles -differences between fundamental rights and directive principles									
IV	The union executive, union parliament and Supreme Court : Powers and positions of the president -qualification - method of election of president and vice president -prime minister -Rajya Sabah -Lok Sabah .the supreme court -high court -functions and position of supreme court and high court									

V	State council -election system and parliamentary democracy in India: State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.	
Course Outcomes		
CO1	Students can know about constitution our fundamental rights and duties	PO1
CO2	Students can get knowledge of the Indian administrative systems.	PO1,PO2
CO3	Students will be able to understand the Nature of Indian Politics	PO4,PO6
CO4	Students will be able to understand the Indian constitution and Fundamental rights and Duties.	PO4,PO5, PO6
CO5	Integrate knowledge of the diversity of cultures and peoples.	PO3,PO8

Text Books (Latest Editions)	
1	India's Constitution by M.V.Pylee., 16 th edt.,S.Chand& Company Ltd, Ram Nagar, New Delhi-110055.
2	Introduction to the Constitution of India by Durga Das Basu · 2015,.LexisNexis publication,SBN:9789351434467, 935143446X.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Palekar.s.a. Indian constitution government and politics, ABD publications, India
2	Aiyer, alladikrishnaswami, Constitution and fundamental rights 1955.
3	Markandan. K.c.directive Principles in the Indian constitution 1966.
Web Resources	
	https://www.google.co.in/books/edition/India_s_Constitution_16th_Edition/yjJlDwAAQBAJ?hl=en&gbpv=1&dq=indian+constitution+pdf&printsec=frontcover

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
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CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I

Part-IV

Audit Course

UNIVERSAL HUMAN VALUES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCUHV	AC	-	-	-	-	1	-	25	75	100
Learning Objectives										
LO1	The present course deals with meaning, purpose, and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials									
UNIT	DETAILS									
I	<p>Introduction: What is love? Forms of love for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living</p> <p>Love and compassion and inter-relatedness</p> <p>Love, compassion, empathy, sympathy and non-violence</p> <p>Individuals who are remembered in history for practicing compassion and love.</p> <p>Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing love and compassion: What will learners learn gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?</p> <p>Sharing learner's individual and/or group experience(s)</p> <p>Simulated Situations</p> <p>Case studies</p>									

II	<p>Introduction: What is truth? Universal truth, truth as value, truth as fact(veracity, Sincerity, honesty among others)</p> <p>Individuals who are remembered in history for practicing this value</p> <p>Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?</p> <p>Learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Case studies</p>
III	<p>Introduction: What is non violence? Its need. Love, compassion, empathy sympathy</p> <p>for others as pre-requisites for non-violence</p> <p>Ahimsa as non-violence and non-killing</p> <p>Individuals and organizations that are known for their commitment to non-violence</p> <p>Narratives and anecdotes about non-violence from history, and literature including local folklore</p> <p>Practicing on-violence: What will learners learn/gain if they practice non-violence? What will learners lose if they don't practice it?</p> <p>Sharing learner's individual and/or group experience(s) about non-violence</p> <p>Simulated situations</p> <p>Case studies</p>
IV	<p>Introduction: What is righteousness?</p> <p>Righteousness and <i>dharma</i>, Righteousness and Propriety</p> <p>Individuals who are remembered in history for practicing righteousness</p> <p>Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?</p> <p>Sharing learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Case studies</p>
V	<p>Introduction: What is peace? Its need, relation with harmony and balance</p> <p>Individuals and organizations that are known for their commitment to peace</p> <p>Narratives and Anecdotes about peace from history, and literature including local folklore</p> <p>Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?</p> <p>Sharing learner's individual and/or group experience(s) about peace</p> <p>Simulated situations</p> <p>Case studies</p>
VI	<p>Introduction: What is service? Forms of service, for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.</p> <p>Individuals who are remembered in history for practicing this value.</p> <p>Narratives and anecdotes dealing with instances of service from history, literature including local folklore</p> <p>Practicing service: What will learners learn/gain if they practice service? What will learners lose if they don't practice it?</p>

	<p>Sharing learners' individual and/or group experience(s) regarding service</p> <p>Simulated situations</p> <p>Case studie</p>
VII	<p>Introduction: What is renunciation? Renunciation and sacrifice. Self-restrain and</p> <p>Ways of overcoming greed. Renunciation with action as true renunciation</p> <p>Individuals who are remembered in history for practicing this value.</p> <p>Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.</p> <p>Practicing renunciation and sacrifice: What will learners learn/gain if they practice Renunciation and sacrifice? What will learners lose if they don't practice it?</p> <p>Sharing learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Casestudies</p>

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	2	2
CO2	3	3	3	2	3	3	3	2	3	2
CO3	2	3	3	3	2	3	3	2	2	2
CO4	3	3	3	3	3	3	3	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

பத்தி இலக்கியம்
23110A EC 21
இரண்டாம் பருவம்

தேர்தல்கள் :

- கலாச்சாரம் பத்தி இலக்கியம் வளர்ச்சிக்கு உதவியாகக் கட்டுவதும்.
- தலைப்புகள், அட்டைகளின் பத்தி கிராமப் பத்தி செய்தல்.

பயிற்சிகள் :

- தலைப்புகள் பத்தி கிராமப் பத்தி செய்தல்.
- அட்டைகளின் பத்தி செய்தல் செய்தல்.
- பத்தி இலக்கியம் கலாச்சாரம் வளர்ச்சிக்கு உதவியாகக் கட்டுவதும்.
- தலைப்புகள் இலக்கியம், கலாச்சாரம் செய்தல்.

பருவம் 1 பத்தி கிராமப் பத்தி

1. கிராமப் பத்தி - கிராமத்தின் பத்தி
2. கிராமப் பத்தி - கிராமத்தின் பத்தி
3. கிராமப் பத்தி - கிராமத்தின் பத்தி
4. கிராமப் பத்தி - கிராமத்தின் பத்தி

பருவம் 2 பத்தி அட்டைகள்

1. அட்டைகள் - கிராமத்தின் பத்தி
2. அட்டைகள் - கிராமத்தின் பத்தி
3. அட்டைகள் - கிராமத்தின் பத்தி

பருவம் 3 கிராமத்தின் பத்தி

1. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி
2. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி
3. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி

பருவம் 4 பத்தி

1. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி
2. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி

பருவம் 5 கிராமத்தின் பத்தி

1. கிராமத்தின் பத்தி
2. கிராமத்தின் பத்தி
3. கிராமத்தின் பத்தி
4. கிராமத்தின் பத்தி
5. கிராமத்தின் பத்தி

பருவம் 6 பத்தி

1. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி
2. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி
3. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி
4. கிராமத்தின் பத்தி - கிராமத்தின் பத்தி

இலக்கியம் - www.tamilv.org , www.noolulagam.com

FIRST YEAR -SEMESTER II
Part-II
Language
ENGLISH – II

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC22	LANGUAGE	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	To introduce learners to the essential skills of communication in English									
LO2	To enable them use these skills effectively in academic and non-academic contexts									
LO3	To help them identify and eliminate common mistakes in writing and speaking									
LO4	To enable them use various business communication strategies and to use advanced vocabulary									
LO5	To familiarize them in writing descriptive essays and respond to arguments orally and in writing									
UNIT	DETAILS									
I	Poetry 1.1 Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3 On Killing a Tree - Gieve Patel									
II	Prose 2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please - ShashiTharoor 2.3 The Spoon-fed Age- W.R. Inge									
III	Fiction Alchemist - Paulo Coelho									
IV	Language Competency 4.1 Homonyms, Homophones, HomographsPortmanteau words 4.2 Subject Verb Agreement									
V	English in the Workplace 5.1 Reading for General and Specific information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes									

Course Outcomes		
CO1	On completion of this course, students will;	PO1
CO2	Learn to introduce themselves and talk about everyday activities confidently	PO1,PO2
CO3	Be able to write short paragraphs on people, places and events	PO4,PO6
CO4	Identify the purpose of using various tenses and effectively employ them in speaking and writing	PO4,PO5, PO6
CO5	Gain knowledge to write subjective and objective descriptions	PO3,PO 8

Text Books (Latest Editions)	
1	The Alchemist - Paulo Coelho Harper - 2005
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2	Descriptive English. <u>SP Bakshi, Richa Sharma</u> · 2019, Arihant Publications (India) Ltd.
3	The Reading Book: A Complete Guide to Teaching Reading. <u>Sheena Cameron, Louise Dempsey</u> , S & L. Publishing, 2019.
4	Skimming and Scanning Techniques, <u>Barbara Sherman</u> , Liberty University Press, 2014
5	Brilliant Speed Reading: Whatever you need to read, however ... <u>Phil Chambers</u> , Pearson, 2013.
6	The Archer, <u>Paulo Coelho</u> . Penguin Viking, 2020.
Web Resources	
1	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40 %20 2020103001102714.pdf
2	Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise
3	The Flower by Tennyson: https://www.poemhunter.com/poem/the-flower-2/
4	On Killing a tree by Gieve Patel: https://www.poemhunter.com/poem/on-killing-a-tree/
5	If you are wrong, admit it: https://www.tbr.fun/if-youre-wrong-admit-it/
6	Kindly Adjust please - ShashiTharoor https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3IhtdXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKgiNKKwdkeSg3qWp-U/
7	The Spoon Fed Age: https://www.nrkacademy.com/2016/04/spoon-feeding-by-wringe.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	1 5	1 5	15	1 5	1 5
Weighted percentage of Course Contribution to POs	3. 0	3 0	3.0	3 0	3. 0

FIRST YEAR -SEMESTER II

Part-III

Core Paper

ANALYTICAL GEOMETRY (Two & Three Dimensions)

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC23	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes									
LO2	To present mathematical arguments about geometric relationships.									
LO3	To solve real world problems on geometry and its applications									
LO4	Able to solve the Equation of a sphere, general equation, section of a sphere by a plane and equation of the circle									
LO5	Understand Equation of a sphere-general equation-section of a sphere by a plane and the Equation of the circle and tangent plane									
UNIT	DETAILS									
I	Pole, Polar - conjugate points and conjugate lines – diameters – conjugate diameters of an ellipse - semi diameters- conjugate diameters of hyperbola									
II	Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola									
III	System of Planes-Length of the perpendicular–Orthogonal projection.									
IV	Representation of line–angle between a line and a plane – co – planar lines–shortest distance between two skew lines –length of the perpendicular–intersection of three planes.									
V	Equation of a sphere-general equation-section of a sphere by a plane-equation of the circle- tangent plane- angle of intersection of two spheres- condition for the orthogonality- radical plane									

Course Outcomes		
CO1	In Analytical Geometry, An algebraic symbolism and methods are used to represent and solve problems in geometry.	PO1
CO2	Learn about The three common seven-coordinate geometries are pentagonal bipyramidal, monocapped octahedral, and monocappedtrigonal prismatic.	PO1,PO2
CO3	Understand The different types of coordinate systems in use are Number Line, Cartesian, Polar, Homogeneous, Curvilinear, Log-Polar, Verycentric, and Trilinear coordinate systems.	PO4,PO6

CO4	Learning about Coordinate Plane, Cartesian Coordinates, Polar Coordinates, Equation of a Straight Line and Conic Sections.	PO4, PO5, PO6
CO5	to learn the properties of these figures. Here we shall try to know about the coordinate plane and the coordinates of a point, to gain an initial understanding of Analytical geometry.	PO3, PO8

Text Books (Latest Editions)	
1	Analytical Geometry 2D and 3D by P.R. Vittal published by Dorling Kindersley (india) pvt.ltd, South Asia, 2013
2	The Analytical Geometry Of The Conic Sections By Edward Harrison Askwith · 2018
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9 th Edition, 2010.
2	Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961
3	Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010.
4	William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006
5	John F. Randolph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969
6	Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962.
Web Resources	
	https://archive.org/details/analygeomspace00snydrich/page/n9/mode/2up

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	2	1	-	-	3	2	1	2
CO2	2	2	2	1	-	-	3	2	1	2
CO3	3	2	2	1	-	-	3	2	1	3
CO4	3	2	3	1	-	-	3	2	1	3
CO5	3	2	3	1	-	-	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
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CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER I
Part-III
Core Paper
INTEGRAL CALCULUS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC24	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals									
LO2	Knowledge about Beta and Gamma functions and their applications									
LO3	Skills to Determine Fourier series expansions									
LO4	Able to understand Beta and Gamma functions properties of Beta and Gamma functions, relation between Beta and Gamma functions and its Applications.									
LO5	Knowledge about Geometric and Physical Applications of Integral calculus.									
UNIT	DETAILS									
I	Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula, Feynman's technique of integration									
II	Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates - Change of order of integration									
III	Triple integrals –applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces–change of variables – Jacobian									
IV	Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions - Applications.									
V	Geometric and Physical Applications of Integral calculus.									

Course Outcomes		
CO1	Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae	PO1
CO2	Evaluate double and triple integrals and problems using change of order of integration	PO1,PO2

CO3	Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution	PO4,PO6
CO4	Explain beta and gamma functions and to use them in solving problems of integration	PO4,PO5, PO6
CO5	Explain Geometric and Physical applications of integral calculus	PO3,PO 8

Text Books (Latest Editions)	
1	Integral Calculus by A.K.Sharma published by Discovery Publishing House, NE Delhi,2005
2	Differential And Integral Calculus by Richard Courant in 1937 published by Wiley Interscience
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Introduction to Integral Calculus by Ulrich L.Rohde, G.C. Jain, Ajay K. Paddar and A.K.Gosh in 2010
Web Resources	
	https://www.infobooks.org/pdfview/11236-clp-2-integral-calculus-joel-feldman-andrew-rechnitzer-elyse-yeager/

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	-	-	-	3	2	1	3
CO2	3	1	3	-	-	-	3	2	1	3
CO3	3	1	3	-	-	-	3	2	1	3
CO4	3	1	3	-	-	-	3	2	1	3
CO5	3	1	3	-	2	1	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II
Part-III
Core Paper
Calculus of Finite Differences

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23114AEC25	CORE	3	1	-	-	4	4	25	75	100
Learning Objectives										
LO1	To enable the students to - Know and understand									
LO2	Numerical Methods. - Distinguish between Numerical differences , integration and classical difference & Integration									
LO3	Apply the knowledge Extensively in Engineering and Statistics.									
UNIT	DETAILS									
I	Finite Differences – Introduction , Forward and Backward Differences, Differences Formulae, Fundamental theorem of the differential calculus.									
II	The Difference table. Effects of an error in a tabular value – To express any value of the function in terms of leading term and the leading differences of a difference table, The Operator E of finite differences and differential coefficient D of differential calculus, one or more missing terms, Factorial Notation.									
III	Generalized factorial notations, Methods of representing any given polynomial in factorial notation. Differences of zero, Recurrence relation									
IV	Newton-Gregory forward formula for Interpolation, Newton-Gregory formula for backward Interpolation.									
V	Introduction, Illustration examples of Newton – Gregory forward (backward) formula, Central Difference Formulae, Newton’s divided difference formula.									

Course Outcomes		
CO1	To describe structure and functions of biologically important coordination compounds.	PO1
CO2	To apply eletromeric and resonance effect to predict reactivity	PO1,PO2

	and stability of organic compounds	
CO3	To classify the drugs based on their mode of actions.	PO4,PO6
CO4	To predict conditions for spontaneous and non-spontaneous reactions.	PO4,PO5, PO6
CO5	To calculate Gibb's free energy, work function and entropy of a reaction	PO3,PO8

Text Books (Latest Editions)	
1	Calculus of Finite Differences And Numerical Analysis by Prof. P.P.Gupta and G.S. Malik – Krishna Prakashan Media (P) Ltd. Meerut (U.P) (2006)
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Numerical Methods – Dr. V.N.Vedamurthy & Dr. N.Ch.S.N.lyenger – Vikas Publishing House Pvt. Ltd. Jangpura, New Delhi (2005)
2	Numerical Analysis – G.Shankar Rao – New Age International Pvt. Ltd. New Delhi.(1997)

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	3	3	3	3	2	2	3
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	3	3	3	3	3	3	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II
Part-IV
Skill Enhancement Course
LaTeX

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC26	SEC	2	1	-	-	2	2	25	75	100
Learning Objectives										
LO1	To explain and use TeX and LaTeX. Describes the development process of TeX and LaTeX. Explains the difference between TeX and LaTeX. Tells the advantages of LaTeX over other more traditional softwares. install and use MikTeX. Lists LaTeX compatible operating systems. Explains how to obtain LaTeX.									
UNIT	DETAILS									
I	TeX Templates									
II	Introduction to TeX									
III	LaTeX Symbols									
IV	Introduction to Beamer									
V	Finding Templates & Packages 5.1 LaTeX & Beamer Templates 5.2 TeX Packages 5.3 Beamer Themes									

Course Outcomes		
CO1	To make conference proceedings and presentations. ❖ Use the	PO1

	preamble of LaTeX file to define document class and layout options. ❖ Use BibTeX to maintain bibliographic information and to generate a bibliography for a particular document.	
Text Books (Latest Editions)		
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1	https://mgo.syr.edu/resources/latex-resources/#TeX_Templates	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	3	3	2	3	3	2	2	2
CO2	3	3	3	3	3	3	3	2	3	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR -SEMESTER II
Part-IV
Skill Enhancement Course
COMPUTATIONAL MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC27	SEC	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	The roll of numerical analysis is to develop and analyze the numerical techniques									
LO2	In this paper, different methods for finding the roots of algebraic and transcendental equations, solutions of simultaneous equations, solutions of ordinary differential equations Solution of Linear systems, Numerical differentiation and integration interpolation with equal & unequal intervals are concentrated.									
LO3	Learn about Numerical differentiation, integration, Trapezoidal rule and Simpson's rule									
LO4	Understand the solution of Linear systems, Gauss Elimination method									
LO5	Able to solve Numerical solution of Ordinary and Differential Equations. Solution by Taylor's series									
UNIT	DETAILS									
I	Solutions of Algebraic and transcendental equation iterative method, Bisection method-Aitken's process Method of False Position-Newton-Raphson methods									

II	Finite differences-Forward differences backward differences Central differences symbolic relations-Newton's formula for interpolation. Interpolation with unevenly spaced points Lagrange's interpolation formula-divided differences and their properties Newton's General interpolation formula	
III	Numerical differentiation — integration — Trapezoidal rule and Simpson's rule	
IV	Solution of Linear systems Gaussian Elimination method — Iterative methods Jacobi and Gauss seidal Methods.	
V	Numerical solution of Ordinary -Differential Equations. Solution by Taylor's series - Picard's method of successive approximations - Euler method Modifies Euler's method –RungeKutta methods	
Course Outcomes		
CO1	Solving problems in algebraic and transcended equations	PO1
CO2	Understand about finite differences	PO1,PO2
CO3	Students develop and analyze numerical techniques	PO4,PO6
CO4	Applying Various numerical methods to solve the ordinary differential equations	PO4,PO5, PO6
CO5	Students gets the Research inquiry and analytical thinking abilities	PO3,PO8

Text Books (Latest Editions)	
1	Numerical Methods in Science and Engineering by M.K.Venkatraman
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Introductory methods of Numerical Analysis by S.S. Sastry- Prentice Hall of India Pvt. Ltd. Chapters:2. 2.1 to 2.5 Chapters:3.3.1,3.3,3.6,3.9, 3.9.1,3.10,3.10.1 Chapters:4. 4.2, 4.4, 4.4.1, 4.4.2 Chapters:5. 5,4 Chapters:6. 6.1 to 6.5 and 6.6.1 and 6.6.2
Web Resources	
	https://perhuaman.files.wordpress.com/2014/07/metodos-numericos.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	2	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRSTYEAR -SEMESTER II
Part-IV
Ability Enhancement Compulsory Course
SOFT SKILL -2-COMMUNICATION SKILL

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCCMS	AECC	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	Identify common communication problems that may be holding learners back									
LO2	Identify what their non-verbal messages are communicating to others									
LO3	Understand role of communication in teaching-learning process									
LO4	Learning to communicate through the digital media									
LO5	Understand the importance of empathetic listening									
LO6	Explore communication beyond language.									
UNIT	DETAILS									
I	:Listening <ul style="list-style-type: none"> • Techniques of effective listening • Listening and comprehension • Probing questions • Barriers to listening 									

II	<p>Speaking</p> <ul style="list-style-type: none"> • Pronunciation • Enunciation • Vocabulary • Fluency • Common Errors
III	<p>Reading</p> <ul style="list-style-type: none"> • Techniques of effective reading • Gathering ideas and information from a given text <ul style="list-style-type: none"> i. Identify the main claim of the text ii. Identify the purpose of the text iii. Identify the context of the text iv. Identify the concepts mentioned • Evaluating these ideas and information <ul style="list-style-type: none"> i. Identify the arguments employed in the text ii. Identify the theories employed or assumed in the text • Interpret the text <ul style="list-style-type: none"> i. To understand what a text says ii. To understand what a text does iii. To understand what a text means
IV	<p>Writing and different modes of writing</p> <ul style="list-style-type: none"> • Clearly state the claims • Avoid ambiguity, vagueness, unwanted generalizations and oversimplification of issues • Provide background information • Effectively argue the claim • Provide evidence for the claims • Use examples to explain concepts • Follow convention • Be properly sequenced • Use proper signposting techniques • Be well structured <ul style="list-style-type: none"> i. Well-knit logical sequence ii. Narrative sequence iii. Category groupings • Different modes of Writing - <ul style="list-style-type: none"> i. E-mails ii. Proposal writing for Higher Studies iii. Recording the proceedings of meetings iv. Any other mode of writing relevant for learners
V	<p>Digital Literacy</p> <ul style="list-style-type: none"> • Role of Digital literacy in professional life • Trends and opportunities in using digital technology in workplace • Internet Basics • Introduction to MS Office tools <ul style="list-style-type: none"> i. Paint ii. Office iii. Excel

	iv. PowerPoint
VI	Effective use of Social Media <ul style="list-style-type: none"> • Introduction to social media websites • Advantages of social media • Ethics and etiquettes of social media • How to use Google search better • Effective ways of using Social Media • Introduction to Digital Marketing
VII	Non-verbal communication <ul style="list-style-type: none"> • Meaning of non-verbal communication • Introduction to modes of non-verbal communication • Breaking the misbelieves • Open and Closed Body language • Eye Contact and Facial Expression • Hand Gestures • Do's and Don'ts • Learning from experts • Activities-Based Learning

Course Outcomes		
CO1	By the end of this program participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.	PO1

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	SenMadhucchanda (2010), <i>An Introduction to Critical Thinking</i> , Pearson, Delhi
2	Silvia P. J. (2007), <i>How to Read a Lot</i> , American Psychological Association, Washington DC

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	2	2	2
CO3	2	3	3	3	2	3	3	2	2	2
CO4	3	3	3	2	3	3	3	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

காங்கிய இலக்கியம்
மூன்றாம் பருவம்
23110AEC31

மேலதரநிலை :

- தமிழ்ச் கவிப்பாடல்களை அறிமுகப்படுத்துதல்.
- கவிப்பாடல்கள் கூறும் கருவிகள் அறிவுரைகள் அளிப்பதுதல்.
- காங்கிய இலக்கியப்பாடல்களில் இலக்கியக் கருவிகள் அறிந்துகொள்ளுதல்.
- தமது இலக்கியத்தில் அறிந்துகொள்ளுதல் அறிந்துகொள்ளுதல்.

மேலதரநிலை :

- இலக்கியப்பாடல்களில் கருவிகளை அறிந்துகொள்ளுதல்.
- காங்கியக் கருவிகள் வழி அறிந்துகொள்ளுதல் பெறுதல்.
- பண்டித காங்கிய கருவிகளை அறிந்துகொள்ளுதல் பெறுதல்.
- தமது மனப்பாடல்களில் கருவிகளை அறிந்துகொள்ளுதல் பெறுதல்.

பகுதி-1 கவிப்பாடல்கள்

- 1.கவிப்பாடல்கள் - மருகு அமைப்பு (கருவிகளை அறிந்துகொள்ளுதல்)
- 2.மேலதரநிலை - கருவிகளை அறிந்துகொள்ளுதல்.
- 3.கவிதை கருவிகளை அறிந்துகொள்ளுதல் இலக்கியம்

பகுதி-2 கவிப்பாடல்கள்

- 1.கவிப்பாடல்கள்- கருவிகளை அறிந்துகொள்ளுதல்
- 2.மேலதரநிலை- கருவிகளை அறிந்துகொள்ளுதல்

பகுதி-3 கருவிகளை அறிந்துகொள்ளுதல்

1. கவிப்பாடல்கள்- இலக்கியப்பாடல்கள் அறிந்துகொள்ளுதல்
2. கருவிகளை அறிந்துகொள்ளுதல் - கருவிகளை அறிந்துகொள்ளுதல்
- 3.கருவிகளை அறிந்துகொள்ளுதல் - கருவிகளை அறிந்துகொள்ளுதல்

பகுதி-4 - தமது - கவிதை கருவிகளை அறிந்துகொள்ளுதல்

- இலக்கியப்பாடல்கள்,
- கவிதை கருவிகளை அறிந்துகொள்ளுதல்,
- கவிதை கருவிகளை அறிந்துகொள்ளுதல்
- கவிதை கருவிகளை அறிந்துகொள்ளுதல்

பகுதி-5 இலக்கிய கருவிகளை அறிந்துகொள்ளுதல்

- கவிதை கருவிகளை அறிந்துகொள்ளுதல்,
- கவிதை கருவிகளை அறிந்துகொள்ளுதல்

மேலதரநிலை :

1. கவிதை கருவிகளை அறிந்துகொள்ளுதல், கவிதை கருவிகளை அறிந்துகொள்ளுதல்.
2. தமிழ் கவிதை கருவிகளை - கவிதை கருவிகளை அறிந்துகொள்ளுதல், கவிதை கருவிகளை அறிந்துகொள்ளுதல்.
3. தமிழ் கவிதை கருவிகளை - கவிதை கருவிகளை அறிந்துகொள்ளுதல், கவிதை கருவிகளை அறிந்துகொள்ளுதல்.
4. இலக்கியப்பாடல்கள் - www.tamilia.org, www.noolubagam.com

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III

Part-II

Language

ENGLISH - III

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC32	LANGUAGE	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	To enhance the level of literary and aesthetic experience of students and to help them respond creatively.									
LO2	To sensitize them to the major issues in the society and the world.									
LO3	To provide them with an ability to build and enrich their communication skills									
LO4	To equip them to utilize the digital knowledge resources effectively for their chosen fields of study									
LO5	To help them think and write imaginatively and critically.									
UNIT	DETAILS									
I	Poetry: 1.1 The Voice of the Mountains -Mamang Dai 1.2 A Song of Hope -Oodgeroo Noonuccal 1.3 In an Artist's Studio - Christina Rossetti									
II	Scenes From Shakespeare: 2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene									
III	Speeches of Famous personalities 3.1 Yes, We Can-Barack Obama 3.2 You've Got to Find What You Love-Steve Jobs									
IV	Language Competency 4.1 Writing letters and emails 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram.facebook] 4.3 Learning netiquette, email etiquette									
V	English for Workplace 5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used 5.4 Conducting and participating in a meeting									

Course Outcomes		
CO1	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	PO1
CO2	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society	PO1,PO2
CO3	Produce grammatically and idiomatically correct language.	PO4,PO6
CO4	Gain knowledge in writing techniques to meet academic and professional needs.	PO4,PO5, PO6
CO5	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	PO3,PO8

Text Books (Latest Editions)

1	Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011)
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References Books (Latest editions, and the style as given below must be strictly adhered to)

1	The Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
2	Famous Speeches by Mahatma Gandhi, Createspace Independent Publishing Platform, 2016
3	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish , Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
4	Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse , Michigan Teacher Training, 2016.
5	Role Play-Theory and Practice. Krysia M Yardley-Matwiejczuk , SAGE publications ltd, 1997

Web Resources

1	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3	In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4	Sita by Toru Dutt: https://www.poetrynook.com/poem/s%E2%94%9C%C2%ABta
5	Tryst with Destiny: https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html#:~:text=Jawaharlal%20Nehru%2C%20delivering%20his%20Tryst%20with%20Destiny%20speech.&text=%22Long%20years%20ago%20we%20made,awake%20to%20life%20and%20freedom.
6	Yes, We Can: https://www.englishspeecheschannel.com/english-speeches/barack-obama-speech/
7	You've got to find what you love: https://www.businessbusinessbusiness.com.au/steve-jobs-youve-got-to-find-what-

<p>you- love/#:~:text=Steve%20Jobs%2C%20in%20his%20commencement,emphasizes%20on%20believing%20in%20oneself.</p>

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	1 5	15	1 5	1 5
Weighted percentage of Course Contribution to POs	3. 0	3 . 0	3.0	3 . 0	3. 0

SECOND YEAR -SEMESTER III

Part-III

Core Paper

VECTOR CALCULUS AND APPLICATIONS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC33	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Knowledge about differentiation of vectors and on differential operators. Knowledge about derivatives of vector functions									
LO2	Skills in evaluating line, surface and volume integrals									
LO3	The ability to analyze the physical applications of derivatives of vectors.									
LO4	Ability to Understand Surface integral and Volume Integral									
LO5	Understand the Gauss divergence Theorem, Stoke's Theorem, Green's Theorem in two dimensions and its Applications									
UNIT	DETAILS									
I	Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product									
II	The vector operator 'del', The gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors – simple applications									
III	Laplacian operator, Vector identities - Line integral - simple problems.									
IV	Surface integral - Volume integral – Applications									
V	Gauss divergence Theorem, Stoke's Theorem, Green's Theorem in two dimensions – Applications to real life situations									
Course Outcomes										
CO1	Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products								PO1	
CO2	Applications of the operator 'del' and to Explain solenoidal and ir-rotational vectors								PO1,PO2	
CO3	Solve simple line integrals								PO4,PO6	
CO4	Solve surface integrals and volume integrals								PO4,PO5, PO6	
CO5	Verify the theorems of Gauss, Stoke's and Green's(Two Dimension)								PO3,PO8	

Text Books (Latest Editions)	
1	Vector calculus by P.C.Matthews published by springer- verlag London Limited in1998
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	

1	Vector Analysis Versus Calculus by Antonio Galbis and Manuel Maestre published by Springer New York DorDreeht Heidelberg,London,2012
Web Resources	
	https://www.google.co.in/books/edition/Advanced_Calculus_Revised_Edition/aDA8DQAAQBAJ?hl=en&gbpv=1&dq=vector+calculus+and+its+applications+book+free+download&printsec=frontcover

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	-	-	3	2	1	3
CO2	3	2	3	1	2	-	3	2	1	3
CO3	3	3	3	3	-	-	3	3	1	3
CO4	3	3	3	3	-	-	3	3	1	3
CO5	3	3	3	3	2	-	3	3	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III

Part-III

Core Paper

DIFFERENTIAL EQUATIONS AND APPLICATIONS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC34	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Knowledge about the methods of solving Ordinary and Partial Differential Equations									
LO2	The understanding of how Differential Equations can be used as a powerful tool in solving problems in science.									
LO3	Learn about Simultaneous linear differential equations, - Linear Equations of the Second Order and the Method of Variation of Parameters									
LO4	Understand the Partial differential equation									
LO5	Knowledge about the Special methods, Standard forms, Charpit's Methods and Simple Applications									
UNIT	DETAILS									
I	Ordinary Differential Equations: Variable separable - Homogeneous Equation-Non-Homogeneous Equations of first degree in two variables -Linear Equation - Bernoulli's Equation-Exact differential equations.									
II	Equation of first order but not of higher degree: Equation solvable for dy/dx- Equation solvable for y-Equation solvable for x- Clairaut's form - Linear Equations with constant coefficients-Particular integrals of algebraic, exponential, trigonometric functions and their products.									
III	Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals-Reduction to the Normal form-Change of the Independent Variable-Method of Variation of Parameters									
IV	Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral-General integral-Lagrange's Linear Equations – Simple Applications.									
V	Special methods – Standard forms-Charpit's Methods – Simple Applications									

Course Outcomes		
CO1	Sundrapandian, V. Ordinary and Partial Differential Equations, Tata McGraw Hill Education Pvt.Ltd. New Delhi, 2013	PO1
CO2	Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products	PO1,PO2
CO3	Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters	PO4,PO6
CO4	Form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations	PO4,PO5, PO6
CO5	Explain standard forms and Solve Differential equations using Charpit's method	PO3,PO8

Text Books (Latest Editions)	
1	Boyce, W.E. and R.C.DiPrima. Elementary Differential Equations and Boundary Value Problems. (7th Edn.) John Wiley and Sons, Inc., New York. 2001.
2	Sundrapandian, V. Ordinary and Partial Differential Equations, Tata McGraw Hill Education Pvt.Ltd. New Delhi, 2013

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	D.A. Murray, Introductory course in Differential Equations, Orient and Longman
2	H.T. H. Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi, 1985
3	Horst R. Beyer, Calculus and Analysis, Wiley, 2010.
4	Braun, M. Differential Equations and their Applications. (3rd Edn.), Springer- Verlag, New York. 1983.
5	TynMyint-U and LognathDebnath. Linear Partial Differential Equations for Scientists and Engineers. (4th Edn.) Birhauser, Berlin. 2007

Web Resources	
	http://dl.konkur.in/post/Book/Paye/Differential-Equations-and-Boundary-Value-Problems-Edwards-5th-Edition-%5Bkonkur.in%5D.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	1	-	3	2	1	3
CO2	3	1	3	2	1	-	3	2	1	3
CO3	3	1	3	2	1	-	3	3	1	3
CO4	3	1	3	2	2	1	3	3	1	3
CO5	3	1	3	2	2	1	3	3	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III

Part-III

Core Paper

ACTUARIAL MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112GEC35	CORE	4	-	-	-	4	3	25	75	100
Learning Objectives										
LO1	The basics of actuarial science Valuing series of cash flows									
LO2	Incorporating uncertainty into cash flows due to investment and mortality									
LO3	Monte-Carlo simulation of uncertain cash flows in Excel (or an equivalent spreadsheet tool)									
LO4	Applying actuarial techniques to life insurance and predicting human life expectancy									
LO5	How actuarial science is used in finance, investments, banking and insurance									
UNIT	DETAILS									
I	Cash flows -An analogy with currencies-Discout functions - Calculating the discount function -Interest and discount rates -Constant interest-Values and actuarial equivalence -Vector notation -Regular pattern cash flows -Balances and reserves-Basic concepts -Relation between balances and reserves-Prospective versus retrospective methods -Recursion formulas									
II	Basic definitions-Probabilities -Constructing the life table from the values of q_x -Life expectancy-Choice of life tables -Standard notation and terminology -A sample table									
III	Introduction -Calculating annuity premiums -The interest and survivorship discount function-The basic definition-Relations between y_x for various values of x -Guaranteed payments -Deferred annuities with annual premiums -Some practical considerations -Gross premiums -Gender aspects-Standard notation and terminology-Spreadsheet calculations									
IV	Introduction -Calculating life insurance premiums -Types of life insurance -Combined insurance–annuity benefits -Insurances viewed as annuities -Summary of formulas -A general insurance–annuity identity-The general identity -The endowment identity-Standard notation and terminology - Single-premium notation -Annual-premium notation-Identities -Spreadsheet applications									
V	Introduction to reserves -The general pattern of reserves –Recursion-Detailed analysis of an insurance or annuity contract-Gains and losses - The risk–savings decomposition-Bases for reserves-Nonforfeiture values-Policies involving a return of the reserve -Premium difference and paid-up formulas-Premium difference formulas -Paid-up formulas - Level endowment reserves -Standard notation and terminology - Spreadsheet applications									

Course Outcomes		
CO1	Describe, interpret and discuss mathematical techniques used to model and	PO1
CO2	Show a comprehensive understanding of the complex techniques applicable to solve problems in actuarial mathematics;	PO1,PO2
CO3	Demonstrate a critical appreciation of recent developments in Actuarial Mathematics.	PO4,PO6
CO4	The links between the theory of Actuarial Mathematics and their practical application	PO4,PO5, PO6
CO5	Describe the value cash flows which are contingent on mortality and morbidity risks	PO3,PO8

Text Books (Latest Editions)	
1	Fundamentals of Actuarial Mathematics ., by S. David Promislow .,Third Edition., John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, United Kingdom ISBN 978-1-118-78246-0 Unit-1 Chapter:2 Sec:2.1-2.10 Unit-2 Chapter: 3 Sec: 3.1-3.7 Unit-3 Chapter: 4 Sec: 4.1-4.8 Unit-4 Chapter: 5 Sec: 5.1-5.9 Unit-5 Chapter: 6 Sec: 6.1-6.10
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Arrow, K.J. (1963). Uncertainty and the welfare of medical care. <i>American Economic Review</i> 53,941–973
2	Bowers, N., Gerber, H., Hickman, J., Jones, D. and Nesbitt, C. (1997). <i>Actuarial Mathematics</i> , 2nd edn
3	Brillinger, D.R. (1961). A justification of some common laws of mortality. <i>Transactions of the Society of Actuaries</i> XIII, 116–119
4	Daniel, J.W. and Vaaler, L.J.F. (2009). <i>Mathematical Interest Theory</i> , 2nd edn. Mathematical Association of America.
5	Frees, E., Carriere, J. and Valdez, E. (1996). Annuity valuation with dependent mortality. <i>Journal of Risk and Insurance</i> 63, 229–261.
6	Gerber, H. and Shiu, E.S. (1998). On the time value of ruin. <i>North American Actuarial Journal</i> 2, 48–78
Web Resources	
	https://www.actuariayfinanzas.net/images/sampledato/FundamentalsofActuarialMathematics_S.DavidPromislow2015.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	2	2
CO2	3	2	3	3	3	3	3	2	2	3
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	3	2
CO5	2	3	3	3	2	3	3	2	2	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III
Part-IV
Skill Enhancement Course
ENTREPRENEURIAL BASED ON MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC36	SEC	3	-	-	-	1	1	25	75	100
Learning Objectives										
LO1	Develop logical and problem-solving skills									
LO2	Becoming familiar with some of the basic techniques used to construct mathematical proof									
LO3	Develop writing skills									
LO4	Learn to communicate mathematical concepts									
LO5	Be able to construct independently basic mathematical proofs.									
UNIT	DETAILS									
I	Arithmetic: Ratios and Proportions Simple and Compound interest including application of Annuity Bill Discounting and Average Due Date Mathematical reasoning – basic application									
II	Algebra: Set Theory and simple application of Venn Diagram Variation, Indices, Logarithms Permutation and Combinations – basic concepts									
III	Statistical Representation of Data: Diagrammatic representation of data Frequency distribution Graphical representation of Frequency Distribution – Histogram, Frequency Polygon, Ogive, Pie-chart									
IV	Index Numbers: Uses of Index Numbers Problems involved in construction of Index Numbers Methods of construction of Index Numbers									
V	Time Series Analysis: Basic application including Moving Average Moving Average Method Method of Least Squares									

Course Outcomes

CO1	Apply the knowledge of Mathematics (Algebra, Matrices, Calculus, and Optimization) in solving business problems.	PO1
CO2	Demonstrate critical thinking, modelling, and problem-solving skills in a variety of contexts	PO1,PO2
CO3	Demonstrate mathematical skills required in mathematically intensive areas in Commerce such as Finance and Economics.	PO4,PO6
CO4	Understand the important role Mathematics plays in all facets of the business world.	PO4,PO5, PO6
CO5	Understand the use of equations, formulae, and mathematical expressions and relationships in a variety of contexts	PO3,PO8

Text Books (Latest Editions)	
1	Business statistics by S.C. Gupta, Himalaya Publication, 2 nd edition.2013
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Business Statistics by Sunita Mall.
2	Introductory Business Statistics by Alexander Holmes, the university of Oklahoma Barbara Illowsky, De Anza college Susan dean, de Anza college.
Web Resources	
	https://www.geektonight.com/business-mathematics-notes/
	https://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/Business-Statistics-by-Gupta.pdf
	https://www.ddegjust.ac.in/studymaterial/mcom/mc-106.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III
Part-IV
Skill Enhancement Course
STATISTICS WITH R PROGRAMMING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC37	SEC	3	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	Use R for statistical programming, computation, graphics, and modeling									
LO2	Write functions and use R in an efficient way									
LO3	Fit some basic types of statistical models									
LO4	Use R in their own research,									
LO5	Be able to expand their knowledge of R on their own									
UNIT	DETAILS									
I	Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.									
II	R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation- Extended Example: A Binary Search Tree									
III	Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability Cumulative Sums and Products-Minima and Maxima- Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files.									
IV	Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.									
V	Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression-									

	other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,
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Course Outcomes		
CO1	List motivation for learning a programming language	PO1
CO2	Access online resources for R and import new function packages into the R workspace	PO1,PO2
CO3	Import, review, manipulate and summarize data-sets in R	PO4,PO6
CO4	Explore data-sets to create testable hypotheses and identify appropriate statistical tests	PO4,PO5, PO6
CO5	Perform appropriate statistical tests using R Create and edit visualizations with	PO3,PO8

Text Books (Latest Editions)	
1	The Art of R Programming, A K Verma, Cengage Learning
2	R for Everyone, Lander, Pearson
3	The Art of R Programming, Norman Matloff, No starch Press
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	R Cookbook, Paul Teetor, Oreilly
2	R in Action, Rob Kabacoff, Manning
Web Resources	
	: https://www.jntuk396.com/2019/08/r-programming.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	2	2	2
CO3	3	2	3	3	3	3	3	2	2	3
CO4	2	3	3	3	2	3	3	2	2	2
CO5	3	3	3	2	3	3	3	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III
Part-IV
Ability Enhancement Compulsory Course
Soft Skill-3
RESEARCH METHODOLOGY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112RMC38	AECC	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	Able to Understand Definition, Objectives, Motivation and purpose – types of research – Pure and applied, survey, case study experimental, exploratory – Concept of Research Design									
LO2	Knowledge about the Definition & need of research problem, Types & selection of proper research question and suitable research design									
LO3	Understand the Methods of data collection, Primary and secondary data and pre-testing, Survey vs Experiment, Practical Exercises									
LO4	Able to editing, coding, transcription, tabulation, outline of statistical analysis, descriptive statistics and elements of processing through computer and packages for analysis									
LO5	Review of literature, Report writing, target audience									
UNIT	DETAILS									
I	Research – Definition, Objectives, Motivation and purpose – types of research – Pure and applied, survey, case study experimental, exploratory – Concept of Research Design –Criteria of Good Research, Problems Encountered by Researchers in India. General guidelines for Good housekeeping & Lab-safety- Hygiene (Eye, foot, skin and hand protection) – Safety rules -Equipment protection – Respiratory protective equipment – safety equipment – Leaking, compressed gas cylinders – electrical safety. Fire – extinguishers									
II	Research Problem: Definition & need of research problem, Types & selection of proper research question and suitable research design with Examples, Literature types- compendia and tables of information, Reviews, General treatises, Monographs									
III	Methods of data collection – Primary and secondary data – observation – interview – Questionnaire – Tools for questionnaire; surveying & literature survey, spreadsheets, Technical writing, Construction of tools for data collection – testing validity – pilot study and pre-testing, Survey vs Experiment, Practical Exercises									
IV	Processing and analysis of data – editing – coding – transcription – tabulation –outline of statistical analysis – descriptive statistics – elements of processing through computer- packages for analysis (Excel).									
V	Review of literature, Report writing – target audience – types of reports – contents of reports – styles and Conventions in									

	reporting – steps in drafting a report. Technical Presentation
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Course Outcomes		
CO1	Demonstrate the ability to choose methods appropriate to research aims and objectives.	PO1
CO2	Understand the limitations of particular research methods.	PO1,PO2
CO3	Develop skills in qualitative and quantitative data analysis and presentation.	PO4,PO6
CO4	Develop advanced critical thinking skills.	PO4,PO5, PO6
CO5	Demonstrate enhanced writing skills	PO3,PO8

Text Books (Latest Editions)	
1	R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 1999.
2	Ajai.S.Gaur, SanjayaS.Gaur, Statistical Methods for Practice and Research, Response, 2009.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	C.R. Kothari, Research Methodology-Methods & Techniques, 2 nd Edition, New Age Int. (P) Ltd, 2004.
2	R. Gopalan, Thesis writing, Vijay Nicole Imprints Private Ltd., 2005
3	S.P.Gupta, “Statistical Methods”, 7th Edition, S. Chand and Co. Ltd., 2004
Web Resources	
	https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	3	3	3	3	2	2	3
CO2	3	3	3	3	3	3	3	2	3	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	2	3	3	3	2	3	3	2	2	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER III
Part-IV
Audit Course
OFFICE AUTOMATION

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCOAN	AC	-	-	-	-	1	-	25	75	100
Learning Objectives										
LO1	To provide an in-depth training in use of office automation, internet and internet tools.									
LO2	The course also helps the candidates to get acquainted with IT.									
LO3	learn about the various computer systems and software as well as the components of the operating system									
LO4	Understand about word processing and other relevant software.									
LO5	Knowledge about Data Management, Data Exchange, Accuracy.									
UNIT	DETAILS									
I	Knowing the basics of Computers									
II	Word Processing (MS word)									
III	Spread Sheet (MS XL)									
IV	Presentation (MS Power Point)									
V	Communicating with Internet									
Course Outcomes										
CO1	After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with internet.								PO1	
CO2	To develop relevant skills in candidates related to computer application, office management practices, and office automation techniques.								PO1,PO2	
CO3	Deals with the basic operations of an office automation system								PO4,PO6	
CO4	The program teaches the important aspects of computer gear and software to digitally create, gather, store, and manage electronic business information.								PO4,PO5, PO6	
CO5	To improve efficiency, accuracy, and speed in business processes.								PO3,PO8	

Text Books (Latest Editions)	
1	Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
2	Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
2	Microsoft Office 2007 Bible - John Walkenbach,HerbTyson,FaitheWempen,caryN.Prague,MichaelR.groh,PeterG. Aitken, and Lisa a.Bucki - Wiley India pvt.ltd.

Web Resources	
	https://en.wikipedia.org
	https://wiki.openoffice.org/wiki/Documentation
	http://windows.microsoft.com/en-in/windows/windows-basics-all-topics

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	3	3	3	3	2	2	3
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	3	3	3	3	3	3	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

**சங்க இலக்கியம்
நாண்காப் புதுவம்
23110AEC41**

பாட்டுக்கள் :

- பழந்தமிழ் இலக்கிய வளத்தை அணிநீட்டும்.
- சங்க அக, புற பாடல் படிப்பதன் மூலம் புகழ்பெறும்.
- புற இலக்கியங்கள் மூலம் வாய்மையை அறிந்துகொள்ளும்.

பாடல்கள் :

- பழந்தமிழ் இலக்கிய வளம் அறிவர்.
- சங்க இலக்கியங்களில் உள்ள அழகியல் கூறுகளை அறிவர்.
- வாய்மையை அறிந்துகொள்ளும் மூலம் வளம் பெறும் அறிவர்.

அகநாடகம்

1. சூழல்நெருக்கம் - பாடல் எண் : 28, 38
2. கந்திரவணம் - பாடல் எண் : 1, 27, 28, 167, 168
3. ஐயத்தாறுநாறு - பாடல் எண் : இளங்கோவின் பத்து

அகநாடகம்

1. கந்திரவணம் - பாடல் எண் : 3, 7
2. அகநாடகம் - பாடல் எண் : 5, 42, 100
3. புறநாடகம் - பாடல் எண் : 182, 204, 41, 121

அகநாடகம்

சிறப்பான நூல்கள் - முழுப்பகுதி

அகநாடகம்

சிறப்பான நூல்கள் - செவ்வாய் அறிவு, கூடல் தாய்மொழிநூல்கள்
நூல்கள் - பாடல் எண் : 1, 172, 215, 253

அகநாடகம்

- இலக்கிய வளம்
1. சங்க இலக்கியம்
 2. அகநாடகம், பத்துப்பாட்டு
 3. பதினெண் கீழ்க்கணக்கு நூல்கள்

பாடல்கள் நூல்கள்

1. சூழல்நெருக்கம் - அழக வெளியீடு, சென்னை
2. கந்திரவணம் - அழக வெளியீடு, சென்னை
3. ஐயத்தாறுநாறு - அழக வெளியீடு, சென்னை
4. கந்திரவணம் - அழக வெளியீடு, சென்னை
5. அகநாடகம் - அழக வெளியீடு, சென்னை
6. புறநாடகம் - அழக வெளியீடு, சென்னை
7. சிறப்பான நூல்கள் - அழக வெளியீடு, சென்னை
8. இணையத்தளம் - www.tamilvu.org, www.noolulagam.com

SECOND YEAR -SEMESTER IV

Part-II

Language

ENGLISH - IV

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC42	LANGUAGE	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.									
LO2	To enable them use receptive skills through reading and listening to acquire good exposure to language and literature.									
LO3	To help them develop style in speech and writing and manipulate the tools of language for effective communication.									
LO4	To provide exposure to plays, autobiographies and expose them to value based ideas.									
LO5	To enhance their language skills especially in the areas of grammar and pronunciation.									
UNIT	DETAILS									
I	Life Writing 1.1 I am Malala-MalalaYousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2									
II	One Act Plays 2.1The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov									
III	Interviews 3.1 Nelson Mandela’s Interview with Larry King. 3.2 Rakesh Sharma’s Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)									
IV	Language Competency 4.1 Refuting, Arguing & Debating 4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help 4.3 Interviews (face to face, telephone and video conferencing)									
V	English for Workplace 5.1 Job Applications: Covering letters, CV and Resume 5.2 Creating a digital profile - LinkedIn 5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM,Credit/debit card 5.4 Body Language -Practical Skills for Interviews									

Course Outcomes		
CO1	Learn to communicate effectively and appropriately in real life situation.	PO1

CO2	Use English effectively for study purpose across the curriculum	PO1,PO2
CO3	Develop interest in and appreciation of Literature	PO4,PO6
CO4	Develop and integrate the use of the four language skills	PO4,PO5, PO6
CO5	Enhance their language skills especially in the areas of grammar and pronunciation.	PO3,PO8

Text Books (Latest Editions)		
1	I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by <u>Malala Yousafzai, Christina Lamb</u> , Little Brown, 2013.	
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition	
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1	Writing Your Life: A Guide to Writing Autobiographies , Mary Borg, Taylor & Francis, 2021	
2	One-act Plays for Acting Students: An Anthology of Short <u>nan A. Bert</u> · 1987 ·	
3	The One-Act Play Companion: A Guide to plays, playwrights ... <u>Dolley, Rex Walford</u> · 2015	
4	to Build a Professional Digital Profile Kindle Edition <u>anne Kelly Bernish, Bernish Communications Associates, LLC</u> ; 1st edition (May 29, 2012)	
5	Play-Theory and Practice. <u>Kryisia M Yardley-Matwiejczuk</u> , SAGE publications ltd, 1997	
Web Resources		
1	Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s (the link to the performance; refer scripts by Aaron Sheperd)	
2	http://BBC learn English.com	
3	http://onestopenglish.com	
4	http://hearn-english-today.com	
5	http://talkenglish.com	
6	The Zoo Story: http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pdf	
7	The Proposal: https://www.one-act-plays.com/comedies/proposal.html	
8	Nelson Mandela with Larry King Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lk1.00.html	
9	Rakesh Sharma with Indira Gandhi Interview : https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-told-indira-gandhi-about-india-from-space-2204839	
10	Lionel Messi with Sid Lowe Interview: https://www.worldsoccer.com/world-soccer-latest/lionel-messi-interview-part-one-338553	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	1 5	1 5	15	1 5	1 5
Weighted percentage of Course Contribution to POs	3. 0	3 .0	3.0	3 .0	3. 0

SECOND YEAR -SEMESTER IV
Part-III
Core Paper
INDUSTRY MODULE-INDUSTRIAL MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC43	CORE	3	1	-	-	3	4	25	75	100
Learning Objectives										
LO1	The course aims at building capabilities in the students for analysing different situations in the industrial/ business scenario involving limited resources and finding the optimal solution within constraints									
LO2	The objective of this course is to enable the student to understand and analyse managerial and engineering problems to equip him to use the resources such as capitals, materials, productions, controlling, directing, staffing, and machines more effectively and Statistics provides the methodology for the planning and execution for any scientific enquiry, which has been accepted as a valid tool in this content									
LO3	In this course Central Limit Theorem, Discrete and Continuous Distributions, Small and Large Sampling would be taught									
LO4	Able to Solve Test of Hypothesis, Null and alternative hypothesis , One tail and two tail tests									
LO5	Able to Solve Test of significance based on chi square and F-distributions for variance, test for goodness of fit and independence of attributes Analysis of variance									
UNIT		DETAILS								
I	Introduction to OR-Meaning and scope of O.R, Definition of O.R, LPP (Linear Programming Problem). Formulation of LPP, graphical solution of LPP- Problems									
II	Transportation problem- Its definition, feasible solution by North-West corner rule, matrix minima VAM methods. Optimal solution through MODI & stepping stone method for balanced and unbalanced transportation problem									
III	PERT and CPM network - critical and sub critical jobs -Determining the critical path. Network calculation PERT networks probability aspect of PERT- PERT time -PERT cist (omitting Crashing)									
IV	Test of Hypothesis-Null and alternative hypothesis(Concept only) One tail and two tail tests, tests of significance based on normal and t-distribution for mean, simple correlation and properties									

V	Test of significance based on chi square and F-distributions for variance, test for goodness of fit and independence of attributes Analysis of variance -One way and two - way classifications with simple problems
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Course Outcomes		
CO1	Students using OR techniques in business tools for decision making	PO1
CO2	Students develop PERT and CPM networks and finding the shortest path	PO1,PO2
CO3	Understand the concept of sequencing problems and game theory	PO4,PO6
CO4	Students gets the knowledge about inventory theory Understand the concept of Bivariate Distribution	PO4,PO5, PO6
CO5	A knowledge of test of significance based on parametric and non – parametric test. Understood the concept of sampling theory	PO3,PO8

Text Books (Latest Editions)	
1	Operations Research by Kantiswarup, P.K. Gupta and Manmohan.
2	Fundamentals of Mathematical Statistics — S.C.Gupta and V.K.Kapoor, Sultan Chand & Sons, New Delhi

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Fundamentals of Applied Statistics — S.C.Gupta and V.K.Kapoor. Sultan Chand & Sons.
2	Resource Management Techniques (Operations Research) V.Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan

Web Resources	
	https://soaneemrana.com/onewebmedia/ADVANCED%20ENGINEERING%20MATHEMATICS%20BY%20ERWIN%20ERESZIG1.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	2	3	3	3	2	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3

CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER IV
Part-III
CORE PAPER
ELEMENTS OF MATHEMATICAL ANALYSIS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC44	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Identify and characterize sets and functions and Understand, test and analyze the convergence and divergence of sequences, series.									
LO2	Understand metric spaces with suitable examples									
LO3	Able to Understand Operations on convergent sequences and operations on divergent sequences									
LO4	Learn about Series of Real Numbers									
LO5	Able to understand Limits and Metric Spaces, Limit of a function on a real line, Metric spaces and Limits in metric spaces									
UNIT	DETAILS									
I	Sets and Functions: Sets and elements- Operations on sets- functions- real valued functions- equivalence-countability- real numbers- least upper bounds									
II	Sequences of Real Numbers: Definition of a sequence and subsequence-limit of a sequence – convergent sequences–divergent sequences- bounded sequences-monotone sequences									
III	Operations on convergent sequences – operations on divergent sequences – limit superior and limit inferior-Cauchy sequences.									
IV	Series of Real Numbers: Convergence and divergence – series with non – negative terms-alternating series-conditional convergence and absolute convergence- tests for absolute convergence.									
V	Limits and Metric Spaces: Limit of a function on a real line - Metric spaces - Limits in metric spaces – Continuous Functions on Metric Spaces: Function continuous at a point on there a line-Function continuous on a metric space.									

Course Outcomes		
CO1	Explain in detail about sets and functions, equivalence and	PO1

	countability and the LUB axiom	
CO2	Explain Sequence and Subsequence of real numbers and to find the limit of sequence to test for convergent, divergent, bounded and monotone sequences	PO1,PO2
CO3	Explain the operations on convergent and divergent sequences and to Explain the concepts of limit superior and limit inferior and the notion of Cauchy sequences	PO4,PO6
CO4	Classify the series of real numbers and the alternating series and their convergence and divergence, the conditional convergence and absolute convergence and solve problems on convergence of the sequences	PO4,PO5, PO6
CO5	Explain about the metric spaces and functions continuous on a Metric space	PO3,PO8

Text Books (Latest Editions)	
1	E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983
2	K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2	R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
Web Resources	
	https://d3bxy9euw4e147.cloudfront.net/oscms-prod/media/documents/CalculusVolume1-OP.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	2	-	3	2	1	3
CO2	3	3	2	3	2	-	3	2	1	3
CO3	3	3	3	3	2	-	3	2	1	3
CO4	3	3	3	3	2	-	3	2	1	3
CO5	3	3	2	3	2	-	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15

Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0
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SECOND YEAR -SEMESTER IV
Part-III
CORE PAPER
FINANCIAL MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112GEC45	CORE	4	-	-	-	4	3	25	75	100
Learning Objectives										
LO1	To develop problem-solving skills.									
LO2	To develop inductive and deductive skills in reasoning.									
LO3	To understand the significance of central mathematical theorems and their applications.									
LO4	To appreciate the precision and breadth presented in mathematical theories.									
LO5	To solve the applying mathematical formulas and equations to financial problems, market modeling and data analysis.									
UNIT	DETAILS									
I	The Arbitrage Theorem 4.1 The Concept of Arbitrage 4.2 Duality Theorem of Linear Programming 4.2.1 Dual Problems 4.3 The Fundamental Theorem of Finance									
II	Random Walks and Brownian Motion 5.1 Intuitive Idea of a Random Walk 5.2 First Step Analysis 5.3 Intuitive Idea of a Stochastic Process 5.4 Stock Market Example 5.5 More About Stochastic Processes 5.6 Ito's Lemma									
III	Derivatives of Black-Scholes Option Prices 8.1 Theta 131 8.2 Delta 133									

	8.3 Gamma 8.4 Vega 8.5 Rho 8.6 Relationships Between Δ , Θ and Γ
IV	Hedging 9.1 General Principles 9.2 Delta Hedging 9.3 Delta Neutral Portfolios 9.4 Gamma Neutral Portfolios
V	Optimizing Portfolios 10.1 Covariance and Correlation 10.2 Optimal Portfolios 10.3 Utility Functions 10.4 Expected Utility 10.5 Portfolio Selection 10.6 Minimum Variance Analysis 10.7 Mean Variance Analysis

Course Outcomes

CO1	Understand the mathematical foundations of quantitative finance understand the standard and advanced quantitative methodologies and techniques of importance to a range of careers in investment banks and other financial institutions	PO1
CO2	Appreciation of emerging theory and techniques in the area of financial mathematics. Create and evaluate potential models for the price of shares. Construct, evaluate and analyze models for investments and securities	PO1,PO2
CO3	Design, build, investigate and evaluate forward contract using arbitrage-free pricing methods. Develop connections within branches of Financial Mathematics and between Probability and other disciplines	PO4,PO6
CO4	Solve problems using a range of formats and approaches in basic science show the ability to work independently and within groups. Apply scientific models and tools effectively.	PO4,PO5, PO6
CO5	Use the internet to write reports about basic Financial Mathematics principles. Apply knowledge gained during the course using computer applications.	PO3,PO8

Text Books (Latest Editions)

1	An Undergraduate Introduction To Financial Mathematics by J Robert Buchanan., World Scientific Publishing Co. Pte. Ltd.5 Toh Tuck Link, Singapore 596224.,ISBN 981-256-637-6
	Unit-I Chapter:4 Sec:4.1- 4.3
	Unit-II Chapter:5 Sec:5.1- 5.6
	Unit-III Chapter:8 Sec:8.1- 8.6
	Unit-IV Chapter:9 Sec:9.1- 9.4
	Unit-V Chapter:10 Sec:10.1- 10.7

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Marek Capinski and Tomasz Zastawniak, "Mathematics for Finance", Springer
2	AmbadNazriWahidudin, "Financial Mathematics and its Applications", Ventura Publishing ApS
Web Resources	
	https://pdfrock.com/compress-pdf-free.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	3	3	3	3	2	2	3
CO2	3	3	3	3	3	3	3	2	3	2
CO3	2	3	3	3	2	3	3	2	2	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	3	3	2	3	3	3	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER IV
Part-IV
SKILL ENHANCEMENT COURSE
INTRODUCTION TO DATA SCIENCE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC46	SEC	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	To offer highest professional and academic standards in terms of personal growth and satisfaction.									
LO2	Make the society as the hub of emerging technologies and thereby capture opportunities in new age technologies.									
LO3	To create a benchmark in the areas of research, education and public outreach.									
LO4	To provide students a platform where independent learning and scientific study are encouraged with emphasis on latest engineering techniques									
LO5	Compute probabilities of transition between states and return to the initial state after long time intervals in Markov chains.									
UNIT	DETAILS									
I	Statistics: Introduction-Defining the Problem- Collecting The Data-Summarizing The Data- Analyzing Data-Interpreting The Analyses And Communicating Results- Reasons to Study Statistics- Statistics And The Data Analysis Process- The Data Analysis Process- Observational Studies- Experimental Studies- Types of Data And Some Simple Graphical Displays- Frequency Distributions and Bar Charts For Categorical Data-									

	Bar Charts-Pie Chart
II	Probability: Introduction- Properties of Probability- Combinatorial Principles- Conditional Probability- Independence of Events- Baye's Theorem- Bayes Theorem Applications With Simple Problems
III	Sampling: Bias in Sampling- Sampling Techniques/Designs- Analysis Of Variance
IV	Statistical Inference: Estimation- Point Estimation- Criteria of a Good Estimator- Methods Of Estimation
V	Stochastic Process-Markov Chain-Transition Probabilities-Classification of States

Course Outcomes		
CO1	Our study of statistics closely parallels the scientific method, which is a set of principles and procedures used by successful scientists in their pursuit of knowledge	PO1
CO2	The method involves the formulation of research goals, the design of observational studies and/or experiments, the collection of data, the modeling/ analyzing of the data in the context of research goals, and the testing of hypotheses.	PO1,PO2
CO3	These steps are often the formulation of new research goals for another study	PO4,PO6
CO4	When dealing with probability, the outcomes of a process are the possible results	PO4,PO5 PO6
CO5	In mathematical language, an event is a set of outcomes, which describe what outcomes correspond to the "event" happening	PO3,PO8

Text Books (Latest Editions)	
1	Probability and Statistics by Michael J. Evans and Jeffrey S. Rosenthal Second Edition.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Fundamental of Mathematical Statistics by S. C. Gupta & V. K. Kapoor.
Web Resources	
	https://Mrcet.Com/Downloads/Digital_Notes/Cseds/Statistical%20foundations%20in%20data%20science.Pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	2	2
CO2	3	3	3	3	3	3	3	2	3	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	2	3	3	3	2	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER IV
Part-IV
Skill Enhancement Course
COMPUTING MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC47	SEC	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	The basic mathematics to the students. It assumes that the students have minimal knowledge to the subject									
LO2	To help them acquire skills in solving quantitative aptitude by simple methods (mainly based on demonstration).									
LO3	During class time students are expected to engage in pair work									
LO4	The main focus of the students will be on quantitative aptitude in short span of time.									
LO5	Understand how trigonometric functions relate to right triangles and solve word problems involving right triangles.									
UNIT	DETAILS									

I	Problems based on Ages, Simplification	
II	Simple and Compound interest	
III	Time and work, Work and Wages	
IV	Problems on Clocks, Problems on Calendars	
V	Trigonometry, Odd man out and Series	
Course Outcomes		
CO1	Provide a platform to the students for building the fundamentals of basic mathematics for competitive examinations preparation strategy.	PO1
CO2	Establish a framework to help students acquire knowledge and expertise necessary to secure employment opportunities in the Government sector	PO1,PO2
CO3	the ability to apply mathematics to real-world problems	PO4,PO6
CO4	appreciation for the abstract structures and abstract reasoning at the heart of mathematics;	PO4,PO5, PO6
CO5	Understand the basic applications of the analytical plane and solid geometry.	PO3,PO8

Text Books (Latest Editions)	
1	Quantitative Aptitude by R.V.Praveen, PHI Learning Private Limited, Delhi, ISBN:978-81-203-4777-9 Unit-I Chapter: 7, 39 Unit-II Chapter: 17, 18 Unit-III Chapter: 19, 20 Unit-IV Chapter: 27, 28 Unit-V Chapter: 31, 32
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Quantitative Aptitude by RS Aggarwal
Web Resources	
1	https://drive.google.com/file/d/1bUy6LdvObe-OoSDY8LJT4IrF-sbQq3eo/view
2	https://sarkaribooklet.com/math-book-pdf/

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	3	3	2	3	3	2	2	2
CO2	3	3	3	2	3	3	3	2	3	2
CO3	3	3	3	3	3	3	3	2	2	2
CO4	3	3	3	3	3	3	3	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SECOND YEAR -SEMESTER IV
Part-IV
Ability Enhancement Compulsory Course
ENVIRONMENTAL STUDIES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCEVS	AECC	1	-	-	-	1	1	25	75	100
Learning Objectives										
LO1	Understand the multidisciplinary nature of environmental studies									
LO2	Describe the importance, need, scope and public awareness of environmental studies									
LO3	Write about natural resources and their consumption as well as overexploitation									
LO4	Explain the different types of ecosystem and energy flow									
ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY										

I	Definition, scope, and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – the concept of an ecosystem – structure, and function of an ecosystem – producers, consumers, and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes
II	ENVIRONMENTAL POLLUTION Definition - causes, effects, and control measures of (a) Air pollution (Atmospheric chemistry - Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen, and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission,
III	NATURAL RESOURCES Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and groundwater, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing.
IV	SOCIAL ISSUES AND THE ENVIRONMENT From unsustainable to sustainable development – urban problems related to energy – water conservation, rainwater harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – the role of non-governmental organization environmental ethics:
V	HUMAN POPULATION AND THE ENVIRONMENT Population growth, variation among nations – population explosion – family welfare program – environment and human health – human rights – value education – HIV / AIDS – women and child welfare.

Course Outcomes		
CO1	Understand the multidisciplinary nature of environmental studies	PO1
CO2	Describe the importance, need, scope and public awareness of environmental studies	PO1,PO2
CO3	Write about natural resources and their consumption as well as overexploitation	PO4,PO6
CO4	Explain the different types of ecosystem and energy flow	O4,PO5, PO6
CO5	Understand the multidisciplinary nature of environmental studies	PO3,PO8

Text Books (Latest Editions)	
1	Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi,(2006).

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2	Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia',Jaico Publ., House, Mumbai, 2001.
3	Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.
4	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	3	3	2	3	3	2	2	2
CO2	3	3	3	3	3	3	3	2	3	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution	3.0	3.0	3.0	3.0	3.0

to POs					
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SECOND YEAR -SEMESTER IV
Part-IV
Audit Course
LEADERSHIP AND MANAGEMENT SKILLS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCLMS	AC	-	-	-	-	1	-	25	75	100
Learning Objectives										
LO1	Help students to develop essential skills to influence and motivate others									
LO2	Inculcate emotional and social intelligence and integrative thinking for effective leadership									
LO3	Create and maintain an effective and motivated team to work for the society									
LO4	Nurture a creative and entrepreneurial mindset									
LO5	Make students understand the personal values and apply ethical principles in professional and social contexts.									
UNIT	DETAILS									
I	Leadership Skills Understanding Leadership and its Importance <ul style="list-style-type: none"> • What is leadership? • Why Leadership required? • Whom do you consider as an ideal leader? <i>b.</i> Traits and Models of Leadership <ul style="list-style-type: none"> • Are leaders born or made? • Key characteristics of an effective leader • Leadership styles • Perspectives of different leaders <i>c.</i> Basic Leadership Skills <ul style="list-style-type: none"> • Motivation • Teamwork • Negotiation • Networking 									
II	Managerial Skills <i>a.</i> Basic Managerial Skills <ul style="list-style-type: none"> • Planning for effective management • How to organize teams? • Recruiting and retaining talent • Delegation of tasks • Learn to coordinate • Conflict management 									

	<p>b. Self Management Skills</p> <ul style="list-style-type: none"> • Understanding self concept • Developing self-awareness • Self-examination • Self-regulation
III	<p>Entrepreneurial Skills</p> <p>a. Basics of Entrepreneurship</p> <ul style="list-style-type: none"> • Meaning of entrepreneurship • Classification and types of entrepreneurship • Traits and competencies of entrepreneur <p>b. Creating Business Plan</p> <ul style="list-style-type: none"> • Problem identification and idea generation • Idea validation • Pitch making
IV	<p>Innovative Leadership and Design Thinking</p> <p>a. Innovative Leadership</p> <ul style="list-style-type: none"> • Concept of emotional and social intelligence • Synthesis of human and artificial intelligence • Why does culture matter for today's global leaders <p>b. Design Thinking</p> <ul style="list-style-type: none"> • What is design thinking? • Key elements of design thinking: <ul style="list-style-type: none"> - Discovery - Interpretation - Ideation - Experimentation - Evolution. • How to transform challenges into opportunities? • How to develop human-centric solutions for creating social good?
V	<p>Ethics and Integrity</p> <p>a. Learning through Biographies</p> <ul style="list-style-type: none"> • What makes an individual great? • Understanding the persona of a leader for deriving holistic inspiration • Drawing insights for leadership • How leaders sail through difficult situations? <p>b. Ethics and Conduct</p> <ul style="list-style-type: none"> • Importance of ethics • Ethical decision-making • Personal and professional moral codes of conduct • Creating a harmonious life

Course Outcomes		
CO1	Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision	PO1
CO2	Learn and demonstrate set of practical skills such as time management, self management, handling conflicts, team	PO1,PO2

	leadership, etc.	
CO3	Understand the basics of entrepreneurship and develop business plans	PO4,PO6
CO4	Apply the design thinking approach for leadership	PO4,PO5, PO6
CO5	Appreciate the importance of ethics and moral values for making of a balanced personality.	PO3,PO8

Text Books (Latest Editions)	
1	Ashokan, M. S. (2015). <i>Karmayogi: A Bbiography of E. Sreedharan</i> . Penguin,UK.
2	Brown, T. (2012). <i>Change by Design</i> . HarperBusiness
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Elkington, J., &Hartigan, P. (2008). <i>The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World</i> . Harvard Business Press.
2	GolemanD. (1995). <i>Emotional Intelligence</i> . Bloomsbury Publishing India PrivateLimited
3	Kalam A. A. (2003). <i>Ignited Minds: Unleashing the Power within India</i> . Penguin BooksIndia
4	Kelly T., Kelly D. (2014). <i>Creative Confidence: Unleashing the Creative Potential WithinUsAll</i> .WilliamCollins
5	KurienV.,& Salve G. (2012). <i>I Too Had a Dream</i> . Roli Books PrivateLimited
6	Livermore D. A. (2010). <i>Leading with cultural intelligence: The New Secret to Success</i> . New York: American ManagementAssociation
7	McCormackM.H.(1986). <i>WhatTheyDon'tTeachYouatHarvardBusinessSchool:NotesFromA Street-Smart Executive</i> . RHUS
8	O'Toole J. (2019) <i>The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good</i> .Harpercollins
9	SinekS. (2009). <i>Start with Why: How Great Leaders Inspire Everyone to Take Action</i> .Penguin
10	Sternberg R. J., Sternberg R. J., &BaltesP. B. (Eds.). (2004). <i>International Handbook of Intelligence</i> . Cambridge UniversityPress.

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	3	3	3	3	2	2	3
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	3	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	3	3	2	3	3	3	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3

CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

THIRD YEAR -SEMESTER V

Part-III

CORE PAPER

ABSTRACT ALGEBRA

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC51	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Concepts of Sets, Groups and Rings									
LO2	Construction, characteristics and applications of the abstract algebraic structures									
LO3	Enable to use in the solution of some of the stiff problems in arithmetic.									
LO4	It helps to secure communication, in physics to understand symmetries and conservation laws, and in engineering to design error-correcting codes.									
LO5	To Determine the domain and range of a functional relationship.									
UNIT	DETAILS									
I	Introduction to groups- Subgroups- cyclic groups and properties of cyclic groups- Lagrange's Theorem-A counting principle – Examples									
II	Normal subgroups and Quotient group- Homomorphism- Automorphism -Example									
III	Cayley's Theorem-Permutation groups - Examples									
IV	Definition and examples of ring- Some special classes of rings- homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings									
V	The field of quotients of an integral domain-Euclidean Rings - The particular Euclidean Ring – Examples									
Course Outcomes										
CO1	Explain groups, subgroups and cyclic groups								PO1	
CO2	Explain about Normal subgroup, Quotient groups, Homomorphisms and Automorphisms and verify the functions for homomorphism and automorphism properties								PO1,PO2	
CO3	Explain Permutation groups and apply Cayley's theorem to problems								PO4,PO6	
CO4	Explain Rings, Ideals and Quotient Rings and examine their structure								PO4,PO5, PO6	

CO5	Discuss about the field of quotient of an integral domain and to Explain in detail about Euclidean Rings	PO3,PO8
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Text Books (Latest Editions)	
1	M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2	Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
Web Resources	
	https://mdu.ac.in/UpFiles/UpPdfFiles/2020/Jan/BASIC%20ABSTRACT%20ALGEBRA.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	1	-	3	3	1	3
CO2	3	3	2	3	1	-	3	3	1	3
CO3	3	3	2	3	2	-	3	3	1	3
CO4	3	3	2	3	1	-	3	3	1	3
CO5	3	3	2	3	2	-	3	3	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
REAL ANALYSIS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC52	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Real Numbers and properties of Real-valued functions.									
LO2	Connectedness, Compactness, Completeness of Metric spaces									
LO3	Convergence of sequences of functions, Examples and counter examples									
LO4	Describe the fundamental properties of the real numbers that under pin the formal development of real analysis									
LO5	Demonstrate an understanding of the theory of sequences and series, continuity, differentiation and integration.									
UNIT	DETAILS									
I	Continuous Functions on Metric Spaces: Open sets– closed sets– Discontinuous function on \mathbb{R}^1 . Connectedness, Completeness and Compactness: More about open sets-Connected sets.									
II	Bounded sets and totally bounded sets: Complete metric spaces-compact metric spaces, continuous functions on a compact metric space, continuity of inverse functions, uniform continuity									
III	Calculus: Sets of measure zero, definition of the Riemann integral, existence of the Riemann integral-properties of Riemann integral.									
IV	Derivatives-Rolle's theorem, Law of mean, Fundamental theorems of calculus									
V	The derivative of a Real function - Mean value theorems - The continuity Of Derivatives-L'Hospital's Rule -Derivatives of Higher order -Taylor's theorem.									

Course Outcomes		
CO1	Explain the concepts of Continuous and Discontinuous functions, open and close sets, Connectedness, Completeness and Compactness	PO1
CO2	Explain the concepts of bounded and totally bounded sets, continuity of inverse functions and Uniform continuity	PO1,PO2
CO3	Define the sets of measure zero, to Explain about the existence and properties of Riemann integral	PO4,PO6
CO4	Explain the concept of differentiability and to Explain Rolle's theorem, Law of mean, and Fundamental theorem of calculus	PO4,PO5, PO6
CO5	Explain the point wise and uniform convergence of sequence of function and to derive the Taylor's theorem	PO3,PO8

Text Books (Latest Editions)	
1	Principles of Mathematical Analysis by Walter Rudin, Tata McGraw Hill Education, Third edition (1 July 2017).
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Introduction to Real Analysis by William F. Trench, 2003 published by Prentice Hall/Pearson Education
2	Mathematical Analysis Tom M A postal, Narosa Publishing House, 2 nd edition (1974), Addison-Wesley publishing company, New Delhi
Web Resources	
	https://s2pnd-matematika.fkip.unpatti.ac.id/wp-content/uploads/2019/03/Real-Analysis-4th-Ed-Royden.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	3	1	-	3	1	1	3
CO2	3	3	1	3	1	-	3	1	1	3
CO3	3	3	1	3	1	-	3	1	1	3
CO4	3	3	1	3	1	-	3	1	1	3
CO5	3	3	1	3	1	-	3	1	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution	3.0	3.0	3.0	3.0	3.0

to POs					
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THIRD YEAR -SEMESTER V

Part-III

CORE PAPER

MATHEMATICAL MODELLING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC53	CORE	4	1	-	-	4	5	25	75	100
Learning Objectives										
LO1	Construction and Analysis of Mathematical models found in real life problems									
LO2	Modelling through differential and difference equations									
LO3	Introduce students to the elements of the mathematical modeling process;									
LO4	Present application-driven mathematics motivated by problems from within and outside mathematics;									
LO5	Demonstrate connections among different mathematical topics.									
UNIT DETAILS										
I	Mathematical Modelling: Simple situations requiring mathematical modelling, characteristics of mathematical model									
II	Mathematical Modelling through differential equations: Linear Growth and Decay Models. Non-Linear growth and decay models, Compartment models									
III	Mathematical Modelling, through system of Ordinary differential equations of first order: Prey-predator models, Competition models, Model with removal and model with immigrations. Epidemics: simple epidemic model, Susceptible-infected- susceptible (SIS) model, SIS model with constant number of carriers. Medicine: Model for Diabetes Mellitus									
IV	Introduction to difference equations.									
V	Mathematical Modelling through difference equations: Harrod Model, cob web model application to Actuarial Science									

Course Outcomes		
CO1	Explain simple situations requiring Mathematical Modelling and to Determine the characteristics of such models	PO1
CO2	Using differential equations in-terms of linear growth and Decay models	PO1,PO2
CO3	Model using systems of ordinary differential equations of first order, to discuss about various models under the categories 'Epidemics' and 'Medicine'	PO4,PO6
CO4	Explain in detail about difference equations	PO4,PO5, PO6
CO5	Model using difference equations	PO3,PO8

Text Books (Latest Editions)

1	Mathematical Modeling applications with Geogebra by Jonas Hall & Thomas Ligefjard, John Wiley & Sons, 2017
2	Mark M. Meerschaert: Mathematical Modeling, Elsevier Publ., 2007.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Mathematical Modeling by Bimalk. Mishra and DipakK.Satpathi. Ane Books Pvt. Ltd(1 January 2009)
2	Mathematical Modeling Models, Analysis and Applications, by Sandip Banerjee, CRC Press, Taylor & Francis group, 2014
3	Edward A. Bender: An introduction to mathematical Modeling, CRC Press,2002
4	Walter J. Meyer, Concepts of Mathematical Modeling, Dover Publ., 2000
Web Resources	
	http://mtm.ufsc.br/~daniel/matap/IntMatMod.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	3	3	2	2	2	3	2	2
CO2	2	3	3	3	2	2	2	3	2	2
CO3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	2	2	-	1	2	3	2	3
CO5	2	3	3	3	2	2	2	3	2	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

THIRD YEAR -SEMESTER V

Part-III

CORE PAPER

MECHANICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC54	CORE	4	1	-	-	3	5	25	75	100
Learning Objectives										
LO1	Determine the components of a force in rectangular or nonrectangular coordinates									
LO2	Determine the resultant of a system of forces.									
LO3	Draw complete and correct free-body diagrams and write the appropriate equilibrium equations from the free-body diagram.									
LO4	Determine the support reactions on a structure.									
LO5	Determine the connection forces in trusses and in general frame structures									
UNIT	DETAILS									
I	Force: Newton's laws of motion – Resultant of two forces on a particle - Equilibrium of a Particle: Equilibrium of a particle – Limiting equilibrium of a particle on an inclined plane									
II	Forces on a Rigid Body: Moment of a Force – General motion of a body – Equivalent systems of forces- Parallel Forces – Forces acting along a Triangle - A specific reduction of Forces: Reduction of coplanar forces into a force and couple – Problems involving frictional forces									
III	Work, Energy and Power: Work – Conservative field of force – Power - Rectilinear Motion under Varying Force: Simple Harmonic Motion - along a horizontal line – along a vertical line.									
IV	Projectiles: Forces on a projectile – Projectile projected on an inclined plane									
V	Central Orbits: General orbits – Central orbit – Conic as a centered orbit									

Course Outcomes		
CO1	Define Resultant, Component of a Force, Coplanar forces, like and unlike parallel forces, Equilibrium of a Particle, Limiting equilibrium of a particle on an inclined plane	PO1
CO2	Define Moment of a force and Couple with examples. Define Parallel Forces and Forces acting along a Triangle, Solve problems on frictional forces	PO1,PO2

CO3	Define work, energy, power, rectilinear motions under varying forces. Define Simple Harmonic Motion and find its Geometrical representation.	PO4,PO6
CO4	Define Projectile, impulse, impact and laws of impact. Prove that the path of a projectile is a parabola. Find the direct and oblique impact of smooth elastic spheres	PO4,PO5, PO6
CO5	Define central orbits, explain conic as centered orbits and solve problems related to central orbits	PO3,PO8

Text Books (Latest Editions)	
	A. K. Dhiman, P.Dhinam and D. Kulshreshtha, Engineering Mechanics (Statics and Dynamics) ,McGraw Hill Education(India) Private Limited, New Delhi, 2015.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
	J.L. Meriam and L. G. Kraige, Engineering Mechanics: Statics, Seventh Edition,Wiley and sons Pvt ltd., New York, 2012.
	J.L. Meriam, L. G. Kraige, and J.N. Bolton, Engineering Mechanics: Dynamics, 8 th edn, Wiley and sons Pvt ltd., New York, 2015.
Web Resources	
	https://www.ae-info.org/attach/User/Gallavotti_Giovanni/gallavotti_giovanni_publicatios.pdf/book.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	2	1	1	3	3	2	3
CO2	3	2	3	2	1	1	3	3	2	3
CO3	3	2	3	2	1	1	3	3	2	3
CO4	3	2	3	2	1	1	3	3	2	3
CO5	3	2	3	2	1	1	3	3	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution	3.0	3.0	3.0	3.0	3.0

to POs					
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THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
FUZZY SETS AND ITS APPLICATIONS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112DSC55	CORE	4	-	-	-	3	4	25	75	100
Learning Objectives										
LO1	Humans have a remarkable capability to reason and make decisions in an environment of uncertainty, imprecision, incompleteness of information, and partiality of knowledge, truth and class membership									
LO2	The principal objective of fuzzy logic is formalization/mechanization of this capability.									
LO3	Make applications on Fuzzy logic membership function and fuzzy inference systems.									
LO4	Use the fuzzy set theory on the statistical method which is given and analyse statistical data by using fuzzy logic methods.									
LO5	Compare statistical methods against fuzzy logic methods and get theory of the statistics fuzzy logic theory together									
UNIT	DETAILS									
I	Fuzzy sets-basic types-basic concepts- \square cuts-additional properties of \square cuts-extension principle for fuzzy sets									
II	Operation on fuzzy sets-types of operations- fuzzy complements-t-norms- fuzzy unions-combinations of operations									
III	Fuzzy Arithmetic - Fuzzy numbers-Arithmetic operations on intervals Arithmetic operations on fuzzy numbers									
IV	Fuzzy relations-Binary fuzzy relation-fuzzy equivalence relation-fuzzy compatibility relation-fuzzy ordering relations-fuzzy morphism									
V	Fuzzy relation equation-general discussion-problem partition ing-soluti on method-fuzzy relation equations based on sup-i compositions-fuzzy relation equations based on w_i compositions									

Course Outcomes		
CO1	Be able to get the knowledge and understand Classical Sets vs Fuzzy Sets (FS) – Types of FS – Operations on FS	PO1
CO2	Be able to get the knowledge and understand Zadeh's Extension Principle	PO1,PO2
CO3	Be able to get the knowledge and understand Fuzzy Relations – Fuzzy Relational Equations – Possibility Theory	PO4,PO6
CO4	Be able to get the knowledge and understand Fuzzy Measures.	PO4,PO5, PO6
CO5	Fuzzy relation equations based on sup-i compositions-fuzzy relation equations based on w_i compositions	PO3,PO8

Text Books (Latest Editions)	
1	Introduction to Fuzzy Sets, Fuzzy Logic, and Fuzzy Control Systems, By Guanrong Chen, Trung Tat Pham,2000
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Fuzzy Sets, Fuzzy Logic and Their Applications, MDPI - Multidisciplinary Digital Publishing Institute,2020
2	Introduction to FUZZY LOGICBy RAJJAN SHINGHAL, 2012 published by phi learning
Web Resources	
	https://cours.etsmtl.ca/sys843/REFS/Books/ZimmermannFuzzySetTheory2001.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	3	3	2	3	3	2	2	2
CO2	3	3	3	3	3	3	3	2	3	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
OPTIMIZATION TECHNIQUES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112DSC56	CORE	4	-	-	-	3	4	25	75	100
Learning Objectives										
LO1	Optimization is an important tool of modern applied mathematics									
LO2	This course gives an idea to the student to recognize potential linear programming problems.									
LO3	The objective of this paper is to highlight the theoretical, computational and applied aspects of linear programming problems									
LO4	To humiliate such problems as linear programming models, to employ the proper computational techniques									
LO5	To solve these problems, and to understand the mathematical aspects that tie together these elements of linear programming									
UNIT	DETAILS									
I	Introduction to operations Research — Elementary treatment of linear programming simplex Method $<, =, >, =$ constraints									
II	Application to Transportation problem - Transportation Algorithm - Degeneracy in Transportation problem, unbalanced transportation problem, Assignment problem - The assignment algorithm - unbalanced assignment problem									
III	PERT and CPM network — critical and sub critical jobs — Determining the critical path. Network calculation PERT networks probability aspect of PERT — PERT time — PERT cist (omitting Crashing)									
IV	Sequencing Problems – Introduction – Step-wise procedure for determining the optimal sequence for n jobs on 2 machines (Johnson’s method) – Processing n jobs on three machines – Processing n jobs on m machines – Processing of two jobs on ‘n ‘ machines									
V	Inventory Theory--Variables in an Inventory problem Techniques of Inventory Control with known demand. Purchasing model with no shortage. Purchasing model with shortages. Manufacturing model with no shortages, Manufacturing model with shortage. Technique of Inventory Control with uncertain demand. .Buffer stock of safety stock model									

Course Outcomes		
CO1	Students using OR techniques in business tools for decision making	PO1

CO2	Students develop PERT and CPM networks and finding the shortest path	PO1,PO2
CO3	Understand the concept of sequencing problems and game theory	PO4,PO6
CO4	Students gets the knowledge about inventory theory	PO4,PO5, PO6
CO5	Iteratively improving the accuracy of a machine learning model, lowering the degree of error.	PO3,PO8

Text Books (Latest Editions)	
1	Resource Management Techniques (Operations Research) V.Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan
2	Operations Research Methods and Applications, P.Mariappan
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Operations Research by Kantiswarup, P.K. Gupta and Manmohan
Web Resources	
	http://www.math.chalmers.se/Math/Grundutb/CTH/tma947/0405/kompendium_sub.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	2	3	3	3	3	3	2	2	3
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	3	3	2	3	3	3	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

THIRD YEAR -SEMESTER V
Part-IV
Skill Enhancement Course
VALUE EDUCATION - 1

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECVED	SEC	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	Provide insights into the central dogma of molecular biology and explain the mechanism of DNA replication.									
LO2	Elaborate the mechanism of transcription and reverse transcription.									
LO3	Highlight the characteristics of genetic code and describe the process of protein synthesis.									
LO4	Introduce the concept of regulation of gene expression in prokaryotes									
LO5	Familiarize the different types of mutations and explain the mechanism of DNA repair.									
UNIT	DETAILS									
I	Central Dogma of molecular Biology, DNA as the unit of inheritance. Experimentalevidences by Griffith's transforming principle, Avery, McLeod and McCarthy's experiment, and Hershey and Chase Experiment. Replication in prokaryotes: Modes of replication, Meselson and Stahl's experimental proof for semi conservative replication. Mechanism of Replication – Initiation, events at Ori C, Elongation – replication fork, semi discontinuous replication, Okazaki fragments, and termination. Bidirectional replication, Inhibitors of replication. Models of replication- theta, rolling circle and D loop model.									
II	Transcription - Mechanism of transcription: DNA dependent RNA polymerase(s), recognition, binding and initiation sites, TATA/ Prib now box, elongation and termination. Post-transcriptional modifications; inhibitor of transcription. RNA splicing and processing of mRNA, tRNA and rRNA. Reverse transcription.									
III	Genetic Code and its characteristics, Wobble hypothesis. Translation: Adaptor role of tRNA, Activation of amino acids, Initiation, elongation and termination of protein synthesis, post-translational modifications and inhibitors of protein synthesis.									

IV	RegulationOfGeneExpressionInProkaryotes– Principlesofgeneregulation,negativeandpositiveregulation,conceptofop erons,regulatory proteins, activators, repressors, regulation of lac oper on and trp operand.
V	Mutation:Types- Nutritional,Lethal,Conditionalmutants.Missensemutationandother point mutations. Spontaneous mutations; chemical and radiation – induced mutations.DNA repair: Direct repair, Photoreactivation, Excision repair, Mismatch repair, Recombination repair and SOS repair.

Course Outcomes		
CO1	IllustratetheCentralDogmaofmolecularbiology, explainthe multiplication of DNA in the cell and describe the types andmodesofreplication.	PO1
CO2	Elaborate the mechanism of transcribing DNA into RNA, discuss the formationofdifferentspeciesofRNA.	PO1,PO2
CO3	Decipher the genetic code and summarize the processoftranslation.	PO4,PO6
CO4	Comprehend the principles of geneexpression and explain the concept of operon inprokaryotes.	PO4,PO5, PO6
CO5	Distinguish the types of mutations and explain the various mechanismsofDNArepair.	PO3,PO8

Text Books (Latest Editions)	
1	Veer Bala Rastogi, 2008, Fundamentals of Molecular Biology, 1 st edition,AnebooksIndia.
2	David Friefelder,1987, Molecular Biology, 2 nd edition, Narosa PublishingHouse.
	Dr.P.S.VermaandDr.V.K.Agarwal,2013,Cellbiology, Genetics,MolecularBiology,EvolutionandEcology,1 st edition,S.Chand&CompanyPvt.Ltd .
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Karp,G.,2010,CellandMolecularBiology:ConceptsandExperiments,6 th edition,JohnWiley &Sons.Inc.
2	DeRobertis,E.D.P.andDeRobertis,E.M.F.,2010,CellandMolecularBiology,8 th editio n,LippincottWilliamsandWilkins,Philadelphia.
3	James.D.Watson,2013,MolecularBiologyoftheGene7 th edition,BenjaminCummings.
Web Resources	
	www.mednotes.net/notes/biology
	https://www.onlinebiologynotes.com/repair-mechanism-of mutation/
	https://teachmephysiology.com/biochemistry/protein-synthesis/dna-translation/

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	3	3	3	3	3	2	3	2
CO 2	2	3	3	3	2	3	3	2	2	2

CO 3	3	2	3	3	3	3	3	2	2	3
CO 4	3	3	3	3	3	3	3	2	2	2
CO 5	3	3	3	2	3	3	3	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

THIRD YEAR -SEMESTER VI

Part-III

CORE PAPER

COMPLEX ANALYSIS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC61	CORE	5	1	-	-	4	6	25	75	100
Learning Objectives										
LO1	Apply concept and consequences of analyticity and C-R equations.									
LO2	Understand the concept of mappings and transformations									
LO3	Compute complex contour integrals and applying Cauchy's integral in various versions									
LO4	Understand zeros and singularities of an analytic function, apply their properties in the evaluation of definite integral									
UNIT	DETAILS									
I	Analytic functions: Functions of a Complex variable –Limits – Theorem on limits –Continuity – Derivatives – Differentiation formulas – Cauchy Riemann equation – conditions for differentiability – Polar coordinates– Analytic functions– Harmonic functions									
II	Conformal mapping: Mappings – Mapping by exponential function – Linear transformation – The transformation $w = \frac{1}{z}$ – Mappings by $\frac{1}{z}$ – Linear fractional transformations (bilinear)									
III	Complex Integration: Contour integrals– Some examples – Simply and Multiply connected domains– Cauchy integral formula – Formula for derivatives– Liouville's theorem –Fundamental theorem of Algebra– Maximum modulus principle									
IV	Sequences and Series: Convergence of sequences – Convergence of series– Taylor's series – Laurent series– Absolute and uniform convergence of power Series – Continuity of sums of power series– Integration & differentiation of power series									
V	Residues and Poles: Isolated singular points – Residues– Cauchy Residue theorem – Residue at infinity – The three types of isolated singular points – Residues at poles – Zeros of analytical functions –									

	Zeros and poles – Evaluation of real improper integrals (excluding poles on the real axis).
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Course Outcomes		
CO1	Explain about analytic functions, their differentiation and continuity and to verify the Harmonic functions using analyticity conditions	PO1
CO2	Explain the concept of Conformal mappings and mappings by linear transformations and linear fractional transformations	PO1,PO2
CO3	Explain about the integrations of functions over simply and multiply connected domains and to derive the Cauchy integral formula, Liouville’s theorem, Fundamental theorem of Algebra and Maximum Module Principle	PO4,PO6
CO4	Find the convergence the sequences and series, to derive Taylor’s and Laurent’s series	PO4,PO5, PO6
CO5	Find the nature of singularities, to find the residue of a given function at a given singular point, to Explain about zeros and poles and to evaluate real improper integrals (Excluding poles on the real axis)	PO3,PO8

Text Books (Latest Editions)	
1	Richard A. Silverman, Introductory Complex Analysis. Dover Publications, 1972
2	S. Ponnusamy and H. Silverman, Complex variables with applications, Birkhauser, 2006
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Theodore W. Gamelan, Complex Analysis, Springer Verlag, 2008
2	Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.
Web Resources	
	https://s2pnd-matematika.fkip.unpatti.ac.id/wp-content/uploads/2019/03/John-M.-Howie-Complex-Analysis-Springer-Undergraduate-Mathematics-Series-Springer-2007.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	1	-	3	3	2	3
CO2	3	3	3	2	1	-	3	3	2	3
CO3	3	3	3	2	1	-	3	3	2	3
CO4	3	3	3	2	1	-	3	3	2	3
CO5	3	3	3	2	1	-	3	3	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
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CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weight age	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

THIRD YEAR -SEMESTER VI

Part-III

CORE PAPER

GRAPH THEORY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112DSC62	CORE	4	1	-	-	3	5	25	75	100
Learning Objectives										
LO1	Graph Theory is an integral part of Discrete Mathematics									
LO2	It has applications to many fields, including computer science, physics, chemistry, psychology and sociology									
LO3	In this course we teach basic topics in graph theory 20 such as Trees, Directed graphs, Connectivity, Euler tours, Hamilton cycles, Matchings, Colourings, Planar graphs									
LO4	Able to define the properties of bipartite graphs, particularly in trees.									
LO5	Able to understand the concept of colorings and theory.									
UNIT	DETAILS									
I	Definitions of graph — finite and infinite graphs — incidence and degree isolated and pendent vertices — isomorphism — sub graphs — walks, puths and circuits — Connected and disconnected graphs — components — Euler graphs — Operations on graphs — more on Euler graphs - Harniltonian paths and circuits									
II	Trees — Properties of trees — pendent vertices in a tree — distances and centers in a tree — Rooted and binary trees — Spanning trees — fundamental Circuits — Finding all spanning trees of a graph — Spanning trees in a weighted graph.									
III	Cut-sets — Properties of cut-set- All cut-sets in a graph — Fundamental circuits and cut-sets — connectivity and reparability.									
IV	Planar graphs — Knratowski's two graphs — Representation of a planar graph — Detection of planarity — Geometrical dual —									

	Combinational dual
V	<p>Matrix representation of graphs — Incidence Matrix — circuit matrix Fundamental circuit and matrix and rank of the circuit matrix — cut-set matrix — Adjacency matrix. Chromatic number — Chromatic partitioning — Chromatic polynomial. Treatment and content as in “Graph Theory with applications to engineering and computer science” by NarsingDeo, Prentice Hall of India, New Delhi.</p>

Course Outcomes		
CO1	Knowledge in Graph Theory	PO1
CO2	Understanding the properties of Graph Theory	PO1,PO2
CO3	Understanding the concept of Kuratowski's graph	PO4,PO6
CO4	Understanding Matrix representation of graphs	PO4,PO5, PO6
CO5	Explains basic results related with Eulerian and Hamiltonian graphs.	PO3,PO8

Text Books (Latest Editions)	
1	Graph Theory — S.A. Choudum, Macmillan India Limited —New Delhi — Madras.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Invitation to graph Theory' by Dr.S. Arumugam and Dr. S. Ramachandran
2	Graph Theory' — F. E-Haray, Narosa Publishing House, New Delhi — Madras - Bombay.
Web Resources	
https://www.maths.ed.ac.uk/~v1ranick/papers/wilsongraph.pdf	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	3	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

THIRD YEAR -SEMESTER VI

Part-III

CORE PAPER

ASTRONOMY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112DSC63	CORE	5	1	-	-	4	6	25	75	100
Learning Objectives										
LO1	Knowledge and understanding about celestial objects									
LO2	Apply scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations									
LO3	Discuss the astronomical refraction zones of Earth, phases of Moon, seasonal Variations, Kepler's law of motion, anomalies, eclipses.									
LO4	Able to identify, classify and compare the stars on the Hertzsprung-Russell diagram.									
LO5	Acquire knowledge of the Physical universe and its evolution.									
UNIT	DETAILS									
I	Relevant properties of a sphere & relevant formulae for spherical trigonometry (all without proof) -Celestial sphere -Diurnal motion									
II	Earth- Dip of the horizon-Twilight- Astronomical refraction- Tangent& Cosines Formula- Properties & simple problems applying them									
III	Keplar's laws of planetary motion (statement only) -Newton's deductions from them -Three anomalies of the Earth and relation between them .									
IV	Time: Equation of time – Seasons - Years and calendar – Conversion of time -Geocentric parallax - Heliocentric parallax- Aberration of light -simple problems in the above									
V	Moon(except Moon's librations)-Motions of planet(assume that orbits are circular- Eclipses									
Course Outcomes										
CO1	Understand about celestial objects								PO1	
CO2	Knowledge about Eclipses								PO1,PO2	
CO3	Different zones of Earth								PO4,PO6	
CO4	Astronomical refraction								PO4,PO5, PO6	
CO5	Different phases of Moon								PO3,PO8	

Text Books (Latest Editions)	
1	J V.Thiruvengkatacharya, A Text Book of Astronomy, S. Chand and Co., PvtLtd., 1972

2	An Introduction Of Astronomy and Cosmology by ianmarison, published by University of Manchester, UK
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	S. Kumaravelu and Prof. SusheelaKumaravelu, Astronomy, SKV Publications,2004 UNIT-I — Chapter1&2 UNIT-II — Chapter 3 Section 1,2,5,6 & Chapter 4 UNIT-III — Chapter 6 UNIT-IV — Chapter 7, Chapter 8 Section 190 - 193 & Chapter 9 UNIT—V—Chapter12,13&14
Web Resources	
	http://staff.ustc.edu.cn/~xuey/IAC/000_Introduction_to_Astronomy_and_Cosmology.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	2	3	3	3	2	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Part-IV
Core Paper
PROFESSIONAL COMPETENCY SKILL

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231SECPCS5	CORE	2	-	-	-	2	2	25	75	100
Learning Objectives										
LO1	To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.									
LO2	To prepare and explain the fundamentals related to various possibilities and probabilities related to quantitative aptitude.									
LO3	To critically evaluate numerous possibilities related to puzzles.									
LO4	To categorize and explain various principles of grammar in order to help students to minimize errors in English									
LO5	To critically evaluate a given reading material for improving ones' reading skills and comprehension									
UNIT		DETAILS								
I	Arithmetic: Profit, Loss and Discount Simple Interest and Compound Interest Time and Work Work and wages									
II	Problem Solving: Puzzle Number series Inequalities Missing number Arithmetic problems									
III	Analogy: Semantic Symbolic Number Figural									
IV	Series: Semantic Number Figural									
V	Coding and Decoding: Alphabetic codes Word-group Meaning words									

	Symbolic coding and decoding
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Course Outcomes		
CO1	Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests	PO1
CO2	Solve questions related to Time and distance and time and work etc. from company specific and other competitive tests.	PO1,PO2
CO3	Understandandsolvepuzzlerelatedquestionsfromspecificandother competitiveteststests	PO4,PO6
CO4	Detect errors of grammar and usage in a given sentence/text and rectify them by making appropriate changes	PO4,PO5, PO6
CO5	Solve questions based on critical reasoning	PO3,PO8

Text Books (Latest Editions)	
1	Quantitative Aptitude by Arihant
2	Quantitative Aptitude by Dr. R.S Aggarwal, S. Chand Publication
3	Verbal & Non-verbal by Dr. R.S Aggarwal, S. Chand Publication
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Competitive Exam Book by RakeshYadav
Web Resources	
	https://drive.google.com/file/d/1-K4w9JrDY3jA4trHGEhpFssBOh1Flp9D/view?pli=1

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0



PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

B.Sc., PHYSICS COURSE STRUCTURE REGULATION 2023

SEMESTER - I					
Course Code	Course Title	L	T	P	C
Theory					
23110AEC11	Tamil-I	3	1	0	3
23111AEC11	Advanced English-I				
23132AEC11	Hindi-I				
23135AEC11	French-I				
23111AEC12	English-I	3	1	0	3
23113AEC13	Properties of Matter and Sound	4	1	0	4
23112AEC14	Allied Mathematics - I	5	1	0	4
23112AEC15	Allied Mathematics - II	5	1	0	4
Practical					
23113SEC16	Physics Practical - I	0	0	3	3
Skill Enhancement Course					
23113SEC17	Physics for Everyday Life	3	0	0	2
23113SEC18	Introductory Physics	3	0	0	2
Ability Enhancement Compulsory Course					
23113AECC1	Indian Constitution	2	0	0	2
Audit Course					
231ACLSUHV	Universal Human Values	0	0	0	1
Total		23	4	3	24

SEMESTER - II					
Course Code	Course Title	L	T	P	C
Theory					
23110AEC21	Tamil-II	3	1	0	3

23111AEC21	Advanced English-II				
23132AEC21	Hindi-II				
23135AEC21	French-II				
23111AEC22	English-II	3	1	0	3
23113AEC23	Mechanics And special theory of Relativity	4	1	0	4
23112AEC24	Allied Mathematics - III	5	1	0	4
23112AEC25	Allied Mathematics - IV	5	1	0	4
Practical					
23113SEC26	Physics Practical - II	0	0	3	3
Skill Enhancement Course					
23113SEC27	Astro Physics	3	0	0	2
23113SEC28	Communication Physics	3	0	0	2
Ability Enhancement Compulsory Course					
23113AECC2	Communication Skills	2	0	0	2
Audit Course					
231ACLSUHV	Basic Behavioral Etiquette	0	0	0	1
Total		23	4	3	24

SEMESTER - III					
Course Code	Course Title	L	T	P	C
Theory					
23110AEC31	Tamil-III	3	1	0	3
23111AEC31	Advanced English-III				
23132AEC31	Hindi-III				
23135AEC31	French-III				
23111AEC32	English-III	3	1	0	3
23113AEC33	Thermodynamics and Statistical Physics	4	1	0	4
23112AEC34	Allied Chemistry - I	4	1	0	3
Practical					
23113SEC35	Physics Practical - III	0	0	3	3
23114SEC36	Allied Chemistry Practical - I	0	0	3	3
Skill Enhancement Course					
23113SEC37	Energy Physics	2	0	0	2
23113SEC38	Mathematical Physics	2	0	0	2
Ability Enhancement Compulsory Course					
23113AECC3	Research Methodology	1	0	0	2
23113AECC4	Environmental Studies	1	0	0	0
Audit Course					
231ACLSOAN	Office Automation	0	0	0	1

Total	20	4	6	26
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SEMESTER - IV					
Course Code	Course Title	L	T	P	C
Theory					
23110AEC41	Tamil-IV	3	1	0	3
23111AEC41	Advanced English-IV				
23132AEC41	Hindi-IV				
23135AEC41	French-IV				
23111AEC42	English-IV	3	1	0	3
23113AEC43	Optics and Spectroscopy	4	1	0	4
23112AEC44	Allied Chemistry - II	4	1	0	3
Practical					
23113SEC45	Physics Practical - IV	0	0	3	3
23114SEC46	Allied Chemistry Practical - II	0	0	3	3
Skill Enhancement Course					
23113SEC47	Advanced Mathematical Physics	2	0	0	2
23113SEC48	Numerical Methods and C programming	2	0	0	2
Ability Enhancement Compulsory Course					
23113AECC5	Participation in Bounded research	1	0	0	2
23113AECC6	Environmental Studies	1	0	0	2
Audit Course					
231ACLSLMS	Leadership and Management Skills	0	0	0	1
Total		20	4	6	28

SEMESTER - V					
Course Code	Course Title	L	T	P	C
Theory					
23113AEC51	Atomic Physics	4	1	0	4
23113AEC52	Basic Electronics	4	1	0	3
23113AEC53	Electricity and Magnetism	4	1	0	3
23113DSC54_	(A) Lasers and Fiber Optics / (B) Disaster Management	4	1	0	2
23113DSC55_	(A) Materials Science / (B) Digital Photography	4	1	0	2
Practical					
23113SEC56	Physics Practical - V	0	0	3	3
Skill Enhancement Course					

23113SEC57	Value Education	2	0	0	2
23113SEC58	Internship / Carried out in II Year Summer Vacation	0	0	0	2
Audit Course					
231ACLSPSL	Professional Skills	0	0	0	1
Total		22	5	3	22

SEMESTER - VI					
Course Code	Course Title	L	T	P	C
Theory					
23113AEC61	Nuclear and Particle Physics	4	1	0	3
23113AEC62	Digital Electronics and Microprocessor 8085	4	1	0	3
23113AEC63	Solid State Physics	4	1	0	3
23113AEC64	Project Work	5	0	0	4
23113DSC65_	(A) Nano Science / (B) Medical Instrumentation	4	1	0	2
Practical					
23113SEC66	Physics Practical - VI	0	0	3	3
Skill Enhancement Course					
23113SEC67	General Awareness for Competitive Examination	2	0	0	2
Audit Course					
231ACSIKWS	Indian Knowledge System	0	0	0	2
231EXACT	NSS/NCC/YRC/Physical Education	0	0	0	1
Total		23	4	3	23
Total Credits -Programme					140
Total Credits - Audit Courses					07
Total Credits					147

List of new courses

Non-Major Elective

New Course		
Course Code	23113SEC17	Board: Physics
Course Name	Physics for Everyday Life	Semester: I

Unit	Course
I	MECHANICAL OBJECTS: spring scales – bouncing balls –roller coasters – bicycles –rockets and space travel.
II	OPTICAL INSTRUMENTS AND LASER: vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – colour photography – holography and laser.
III	PHYSICS OF HOME APPLIANCES: bulb – fan – hair drier – television – air conditioners – microwave ovens – vacuum cleaners
IV	SOLAR ENERGY: Solar constant – General applications of solar energy – Solar water heaters – Solar Photo – voltaic cells – General applications of solar cells.
V	INDIAN PHYSICIST AND THEIR CONTRIBUTIONS: C.V.Raman, HomiJehangirBhabha, Vikram Sarabhai, Subrahmanyam Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability		Professional Ethics
✓	Gender Sensitization	✓	Human Values
	Social Awareness/Environment		Environment and Sustainability
	Intellectual Property Rights		

New Course		
Course Code	23113SEC18	Board: Physics
Course Name	Introductory Physics	Semester: I

Unit	Course
I	vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants
II	different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces
III	different forms of energy– conservation laws of momentum, energy – types of collisions –angular momentum– alternate energy sources–real life examples
IV	types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations
V	surface tension – shape of liquid drop – angle of contact – viscosity – lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use- conductors, insulators – thermal and electric

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability		Professional Ethics
	Gender Sensitization	✓	Human Values
✓	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

New Course		
Course Code	23113SEC26	Board: Physics
Course Name	Astro Physics	Semester: II

Unit	Course
I	TELESCOPES: Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes – Hubble space telescope.
II	SOLAR SYSTEM: Bode’s law of planetary distances – meteors, meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves – recent advances in astrophysics.
III	ECLIPSES: types of eclipses – solar eclipse – total and partial solar eclipse – lunar eclipse – total and partial lunar eclipse – transits. THE SUN: physical and orbital data – solar atmosphere – photosphere – chromosphere – solar corona – prominences – sunspots – 11 year solar cycle – solar flares.
IV	STELLAR EVOLUTION: H-R diagram – birth and death of low mass, intermediate mass and massive stars – Chandrasekar limit – white dwarfs – neutron stars – pulsars – black holes – supernovae. GALAXIES: classification of galaxies – galaxy clusters – interactions of galaxies, dark matter and super clusters – evolving universe.
V	ACTIVITIES IN ASTROPHYSICS: (i) Basic construction of telescope (ii) Develop models to demonstrate eclipses/planetary motion (iii) Night sky observation (iv) Conduct case study pertaining to any topic in this paper (v) Visit to any one of the National Observatories Any three activities to be done compulsorily.

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability	✓	Professional Ethics
	Gender Sensitization	✓	Human Values
	Social Awareness/Environment		Environment and Sustainability
	Intellectual Property Rights		

SEC

New Course		
Course Code	23113SEC27	Board: Physics
Course Name	Communication Physics	Semester: II

Unit	Course
I	RADIO TRANSMISSION AND RECEPTION: transmitter – modulation types of modulation – amplitude modulation – limitations of amplitude modulation – frequency modulation – comparison of FM and AM – demodulation- essentials in demodulation – receivers: AM radio receivers – types of AM radio receivers – stages of superheterodyne radio receiver, advantages – FM receiver – difference between FM and AM receivers.
II	FIBER OPTIC COMMUNICATION: introduction – basic principle of fiber optics – advantages – construction of optical fiber – classification based on the refractive index profile – classification based on the number of modes of propagation – losses in optical fibers – attenuation–advantages of fiberoptic communication
III	RADAR COMMUNICATION: introduction - basic radar system –radar range – antenna scanning –pulsed radar system – search radar –tracking radar – moving target indicator Doppler effect-MTI principle – CW Doppler radar
IV	SATELLITE COMMUNICATION: introduction history of satellites – satellite communication system – satellite orbits – basic components of satellite communication system – commonly used frequency in satellite – communication –multiple access communication – satellite communication in India
V	MOBILE COMMUNICATION: introduction – concept of cell –basic cellular mobile radio system – cellphone – facsimile – important features of fax machine – application of facsimile – VSAT (very small aperture terminals) modem IPTV (internet protocol television) -Wi-Fi-4G (basic ideas)

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
	Employability	✓	Professional Ethics
	Gender Sensitization	✓	Human Values
	Social Awareness/Environment		Environment and Sustainability
✓	Intellectual Property Rights		

New Course		
Course Code	23113SEC37	Board: Physics
Course Name	Energy Physics	Semester: III

Unit	Course
I	INTRODUCTION TO ENERGY SOURCES: energy consumption as a measure of prosperity – world energy future – energy sources and their availability – conventional energy sources – non-conventional and renewable energy sources – comparison – merits and demerits.
II	SOLAR ENERGY: solar energy Introduction – solar constant – solar radiation at the Earth’s surface – solar radiation geometry – Solar radiation measurements – solar radiation data –solar energy storage and storage systems – solar pond – solar cooker – solar water heater – solar greenhouse – types of greenhouses – solar cells.
III	WIND ENERGY: introduction –nature of the wind – basic principle of wind energy conversion – wind energy data and energy estimation – basic components of Wind Energy Conversion Systems (WECS) – advantages and disadvantages of WECS – applications – tidal energy
IV	BIOMASS ENERGY: introduction – classification – biomass conversion technologies –photosynthesis – fermentation - biogas generation –classification of biogas plants – anaerobic digestion for biogas – wood gasification – advantages & disadvantages.
V	ENERGY STORAGE: Energy storage systems – Mechanical Energy storage – Compressed Air storage – Electrical storage – Thermal energy storage - importance of energy storage- batteries - lead acid battery -nickel-cadmium battery – fuel cells – types of fuel cells – advantages and disadvantages of fuel cells – applications of fuel cells - hydrogen storage.

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
	Employability		Professional Ethics
	Gender Sensitization	✓	Human Values
✓	Social Awareness/Environment		Environment and Sustainability
	Intellectual Property Rights		

New Course		
Course Code	23113SEC38	Board: Physics
Course Name	Mathematical Physics	Semester: III

Unit	Course
I	MATRICES: types of matrices – symmetric, Hermitian, unitary and orthogonal matrices– characteristic equation of a matrix – Eigen values and Eigen vectors of a matrix – Cayley-Hamilton theorem – inverse of matrix by Cayley-Hamilton theorem – similarity transformations – diagonalization of 2x2 real symmetric matrices.
II	VECTOR CALCULUS: vector differentiation – directional derivatives – definitions and Physical significance of gradient, divergence, curl – Laplace operators– vector identities – line, surface and volume integrals – statement, proof and simple problems for Gauss’s divergence theorem, Stoke’s theorem, Green’s theorem.
III	ORTHOGONAL CURVILINEAR COORDINATES: tangent basis vectors – scale factors – unit vectors in cylindrical and spherical coordinate systems – gradient of a scalar –divergence and curl of a vector – Laplacian in these coordinate systems.
IV	FOURIER SERIES: periodic functions –Dirichlet’s conditions – general Fourier series – even and odd functions and their Fourier expansions – Fourier cosine and sine – half range series – change of length of interval. Fourier analysis of square wave, saw-tooth wave, half wave/full wave rectifier wave forms.
V	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (PDE): PDE for transverse vibrations in elastic strings (one dimensional wave equation) –one dimensional heat flow equation – solutions to these PDE’s by method of separation of variables – problems based on boundary conditions and initial conditions.

Course focuses on:

✓	Skill development		Entrepreneurial development
✓	Employability	✓	Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment		Environment and Sustainability
✓	Intellectual Property Rights		

New Course		
Course Code	23113SEC47	Board: Physics
Course Name	Advanced Mathematical Physics	Semester: IV

Unit	Course
I	MATRICES: introduction – special types of matrices – transpose – conjugate–conjugate transpose– symmetric and anti symmetric – Hermitian and skew Hermitian – orthogonal and unitary – properties – characteristic equation – roots and characteristic vectors – diagonalization– Cayley–Hamilton theorem –simple problems
II	VECTOR CALCULUS: ∇ operator – divergence – second derivative of vector functions or fields –Laplacian operator – curl of a vector – line integral – line Integral of a vector field around an infinitesimal rectangle – curl of conservative field – surface integral – volume integral (without problem) – Gauss’s divergence theorem and proof – Stroke’s theorem and proof –simple problems.
III	SPECIAL FUNCTIONS: definition –Beta function – Gamma function – evaluation of Beta function – other forms of Beta function – evaluation of Gamma function – other forms of Gamma function – relation between Beta and Gamma functions – simple problems.
IV	FROBENIUS METHOD AND SPECIAL FUNCTIONS: singular points of second order linear differential equations and importance –singularities of Bessels and Laguerre equations, Frobenius method and applications to differential equations: Legendre and Hermite differential equations – Legendre and Hermite polynomials – Rodrigues formula –generating function – orthogonality
V	PARTIAL DIFFERENTIAL EQUATIONS: solutions to partial differential equations using separation of variables - Laplace’s equation in problems of rectangular – cylindrical and spherical symmetry – conducting and dielectric sphere in an external uniform electric field – wave equation and its solution for vibrational modes of a stretched string

Course focuses on:

✓	Skill development		Entrepreneurial development
✓	Employability	✓	Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment		Environment and Sustainability
	Intellectual Property Rights		

New Course		
Course Code	23113SEC48	Board: Physics
Course Name	Numerical Methods and C programming	Semester: IV

Unit	Course
I	NUMERICAL SOLUTIONS: determination of zeros of polynomials – roots of linear and nonlinear algebraic and transcendental equations – bisection and Newton-Raphson methods – convergence and divergence of solutions
II	NUMERICAL DIFFERENTIATION, INTEGRATION AND CURVE FITTING: Newton’s forward and backward interpolation – Lagrange’s interpolation – Newton-Raphson method to find square root and cube roots – principle of least squares – fitting a straight line and exponential curve – trapezoidal rule – Simpson’s 1/3 and 1/8 rule
III	ALGORITHM, FLOW CHART AND PROGRAM: development of algorithm – flow chart for solving simple problems– average of set of numbers – greatest, smallest – conversion of Fahrenheit to Celsius and Celsius to Kelvin, miles to kilometer – sorting set of numbers in ascending and descending order – square matrix, addition, subtraction and multiplication of order (2x2) using arrays.
IV	INTRODUCTION TO C: importance of C – basic structure of C programming – constants, variables and data types – character set, key words and identifiers – declaration of variables and data types – operators – expressions: arithmetic, relational, logical, assignment – increment and decrement – conditional – comma operators
V	CONTROL STRUCTURE: decision making with if, if-else, nested if – switch –go to – break – continue –while, do while, for statements – arrays, one dimensional and two dimensional – declaring arrays – storing arrays in memory – initializing arrays – simple programs

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
	Employability		Professional Ethics
	Gender Sensitization	✓	Human Values
✓	Social Awareness/Environment		Environment and Sustainability
✓	Intellectual Property Rights		

DSC

New Course		
Course Code	23113DSC54A	Board: Physics
Course Name	Lasers and Fiber Optics	Semester: V

Unit	Course
I	FUNDAMENTALS OF LASER: basic principles: spontaneous and stimulated emission – Einstein’s coefficient – pumping mechanism: optical, electrical and laser pumping – population inversion – two and three level laser system – resonator configuration – quality factor – threshold condition – concept of Qswitching–Theory of mode locking– cavity dumping.
II	TYPES OF LASER: solid state laser: ruby laser, Nd:YAG laser, Nd:Glass laser– semiconductor laser: intrinsic semiconductor laser, doped semiconductor laser, injection laser – dye laser – chemical laser: HCL laser, DF- CO ₂ , CO chemical laser. Gas laser:neutral atom gas laser (He-Ne laser), CO ₂ laser, Copper vapour laser.
III	APPLICATIONS OF LASER: application of laser in metrology – optical communication – material processing: laser instrumentation of material processing, powder feeder, laser heating, laser welding, laser melting – medical application – Laser instrumentation for surgeries–laser in astronomy
IV	FIBER OPTICS: basic components of optical fiber communication – principles of light propagation through fiber – total internal reflection – optical fiber – coherent bundle – numerical aperture and skew mode – phase shift and attenuation during total internal reflection – types of fiber: single mode and multi-mode fiber – step index and graded index fiber – fiber optic sensors – application of fiber optics.
V	CHARACTERISTICS AND FABRICATION OF OPTICAL FIBER: fiber characteristics: mechanical and transmission characteristics – absorption loss and scattering loss measurements – dispersion – connectors and splicers – fiber termination – optical time domain reflectometer(OTDR) and its uses – fiber material – fiber fabrication – fiber optic cables design.

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability	✓	Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
	Intellectual Property Rights		

New Course		
Course Code	23113DSC54B	Board: Physics
Course Name	Disaster Management	Semester: V

Unit I: Introduction to Disasters

Chapter No.1 Disaster: Concept, Meaning, and Definition
Chapter No.2 History of Major Disaster Events in India
Chapter No.3 Types of Disasters–Natural Disasters: Famine, Drought, Flood, Cyclone, Tsunami, Earthquake

Unit II: Disaster Mitigation and Disaster Management

Chapter No.4 Man-made Disasters: Riots, Blasts, Industrial, Militancy
Chapter No.5 Profile, Forms and Reduction of Vulnerability
Chapter No. 6 Disaster Mitigation: Concept and Principles

Unit III: Impact of Disaster

Chapter No. 7 Disaster Management: Concept and Principles
Chapter No. 8 Pre-disaster-Prevention and Preparedness
Chapter No.9 Physical, Economic, Social, Psycho-socio Aspects, Environmental Impacts

Unit IV: Disaster Process and Intervention

Chapter No. 10 During Disaster-Rescue and Relief
Chapter No. 11 Post-disaster-Rehabilitation and Reconstruction
Chapter No. 12Victims of Disaster-Children, Elderly, and Women
Chapter No. 13 Displacement-Causes, Effects and Impact

Unit V: Disaster Intervention

Chapter No. 14 Major Issues and Dynamics in the Administration of Rescue, Relief, Reconstruction and Rehabilitation
Chapter No. 15 Components of Rescue, Relief, Reconstruction; Rehabilitation
Chapter No. 16 Disaster Policy in India; Disaster Management Authority-NDMA, SDMA, DDMA; Disaster Management Act, 2005

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability	✓	Professional Ethics
	Gender Sensitization	✓	Human Values
✓	Social Awareness/Environment	✓	Environment and Sustainability
	Intellectual Property Rights		

New Course		
Course Code	23113DSC55B	Board: Physics
Course Name	Digital Photography	Semester: V

Unit	Course
I	PHOTOGRAPHY AND BASIC PRINCIPLE OF IMAGE FORMATION: principle –chemical route and digital route –light, wavelengths, colours – shadows – light intensity and distance – making light form images –pin-hole images – practical limitations to pin-hole images – lens instead of pin-hole – focal length and image size – imaging of closer subjects.
II	LENSES – CONTROLLING THE IMAGES: photographic lens – focal length and angle of view (<i>problems</i>) – focusing movement – aperture and f-numbers (<i>problems</i>) – depth of field– depth of focus – image stabilization – lenses for digital cameras – lens and camera care
III	CAMERA USING FILMS AND ITS TYPES: camera and its essential components– shutter – aperture – light measurement – film housing – camera types: view camera– view finder camera – Reflex camera– single lens reflex (SLR) camera
IV	DIGITAL CAMERAS PRINCIPLE AND TYPES: principle of digital image capturing –comparison of digital and analog picture information – megapixel – grain, noise and pixel density – optical and digital zooming – image stabilizer – bit depth – white balance – colour modes – file formats (TIFF, RAW and JPEG) – storage cards and types – digital cameras: camera phones – compact camera – hybrid camera – digital SLR.
V	THE DIGITAL IMAGE – POSTPRODUCTION: hardware: computer and its peripherals – software: saving digital file – basic editing: navigating the image – undo/redo/history – crop – rotate – brightness andcontrast – colourbalance – hue/saturation – dodge/burn – cloning andretouching – removing an element in an image – advanced editing: histogram/levels – curves – selection tools: magic wand – printing digital images: inkjet printer – laser printer – dye sub printer – lambda/light jet printers.

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability	✓	Professional Ethics
	Gender Sensitization		Human Values
✓	Social Awareness/Environment		Environment and Sustainability
✓	Intellectual Property Rights		

New Course		
Course Code	23113DSC65A	Board: Physics
Course Name	Nanoscience	Semester: VI

Unit	Course
I	NANOSCIENCE AND NANOTECHNOLOGY: nanoscale– nature and nanostructures – nanostructures: 0D, 1D,2D– surface to volume ratio– size effect – excitons – quantum confinement– metal based nanoparticles (metal and metal oxide) – nanocomposites (non-polymer based) – carbon nanostructures – fullerene –SWCNT and MWCNT
II	PROPERTIES OF NANOMATERIALS: introduction –mechanical behavior – elastic properties – hardness and strength – ductility and toughness –superplastic behavior – optical properties – surface plasmon resonance – electrical properties – dielectric materials and properties – magnetic properties – super paramagnetism – electrochemical properties – properties of CNTs.
III	FABRICATION METHODS AND VACUUM TECHNIQUES: top-down and bottom-up approaches – electrochemical method – chemical and physical vapour depositions (CVD and PVD) – plasma arc discharge – sputtering – thermal evaporation – pulsed laser deposition – ball milling – lithography: photolithography – e-beam lithography – sol-gel methods – synthesis of CNT.
IV	CHARACTERIZATION TECHNIQUES: scanning probe microscopy – scanning tunneling microscopy – atomic force microscopy – scanning electron microscopy – transmission electron microscopy –powder XRD method: determination of structure and grain size analysis – UV-visible and photoluminescence spectroscopy.
V	APPLICATIONS OF NANOMATERIALS: medicine: drug delivery – photodynamic therapy – molecular motors –energy: fuel cells –rechargeable batteries – supercapacitors– photovoltaics. sensors: nanosensors based on optical and physical properties – electrochemical sensors – nanobiosensors. nanoelectronics: CNTFET – display screens – GMR read/write heads – nanorobots –applications of CNTs

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability	✓	Professional Ethics
✓	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
	Intellectual Property Rights		

New Course		
Course Code	23113DSC65B	Board: Physics
Course Name	Medical Instrumentation	Semester: VI

Unit	Course
I	BIOMETRICS: introduction to man-instrument system and its components – problems encountered in measuring living systems – transducers– force, motion, pressure transducers. AUDIOMETRY: mechanism of hearing – air and bone conduction – threshold of hearing – audiometer – masking in audiometry – pure tone and speech audiometer – evoked response audiometry – hearing aids
II	BIOELECTRIC POTENTIALS AND ELECTRODES: biomedical signals – sources of bioelectric potentials – resting, action and propagation of bioelectric potentials –bio-potential electrodes – skin surface, needle electrodes. BIOMEDICAL RECORDERS: electro-conduction system of heart – electro cardiogram (ECG) – Einthoven’s triangle — electro encephalogram (EEG) –brain waves – EEG instrumentation – recording of evoked potentials – electro myogram (EMG)–pulse oximeter.
III	DIAGNOSTIC RADIOLOGY: radiography – primary radiological image – contrast agents, filters – beam restrictor, grid – image quality COMPUTED TOMOGRAPHY: linear tomography – computed tomography – helical and multi slice – image quality– radiation dose. RADIOISOTOPES AND NUCLEAR MEDICINE: radioisotopes – radiopharmaceuticals – technetium generator – gamma camera – positron emission tomography – disposal of radioactive waste.
IV	ULTRASOUND IMAGING: ultrasound transducer – ultrasound imaging– Doppler ultrasound – ultrasound image quality and bio-effects. MAGNETIC RESONANCE IMAGING: proton and external magnetic field – precession – radiofrequency and resonance – MRI signal – relaxation time – MRI instrumentation – imaging sequences – biosafety
V	PROJECT ASSIGNMENT: clinical practice of <i>one</i> of the following: electro cardiogram, electro encephalogram, electro myogram, electro oculoqram, computed tomography, positron emission tomography, ultrasound

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability	✓	Professional Ethics
✓	Gender Sensitization		Human Values
	Social Awareness/Environment		Environment and Sustainability
	Intellectual Property Rights		

ALLIED PHYSICS

New Course		
Course Code	23113GEC34	Board: Physics
Course Name	Allied Physics – I	Semester: III

Unit	Course
I	PROPERTIES OF MATTER: Stress – Strain – Hooke’s law - bending of beams – depression of cantilever- Determination of Y by uniform and non-uniform bending method- Torsion in a wire- Determination of rigidity modulus by torsional pendulum - Newton’s law of Gravitation - Determination of G by Boy’s method - mass and density of earth – acceleration due to gravity - Determination of g by compound pendulum.
II	HEAT AND THERMODYNAMICS: Zeroth law of thermodynamics – First law of thermodynamics – Reversible and irreversible process – Carnot’s theorem – Second law of thermodynamics – Entropy – Change of entropy in reversible and irreversible processes – Third law of thermodynamics - Joule-Thomson effect – Porous plug experiment – liquefaction of gases: liquefaction of helium - Refrigerating mechanism –Air conditioning machines.
III	ATOMIC SPECTROSCOPY: Pauli’s exclusion principle - Optical spectra - Fine structure of sodium D line - Zeeman effect - Photo electric emission – laws – Lenard’s experiment – Richardson and Compton experiments – Einstein’s photoelectric equation – Experimental verification of Einstein’s photoelectric equation by Millikan’s experiment - X-Rays: Introduction – Production - Coolidge tube – Bragg’s law – derivation – X-Ray spectra – Continues – Characteristic – Moseley law and its importance.
IV	ELECTRICITY: Ohm’s law – Kirchoff’s law – Application to Wheatstone’s Bridge – Carey Foster Bridge – Potentiometer – Measurement of current and resistance – Calibration of low and high range voltmeter – Conversion of galvanometer into ammeter and voltmeter - Fleming’s left and right hand rule - Electromagnetic induction - Eddy current - Transformers: Theory, energy loss and applications
V	MAGNETISM: Magnetic properties of materials: Magnetic induction B – Magnetisation M – Magnetising field H – Relation between – B, H and M – Magnetic susceptibility – Magnetic permeability – Properties of dia, para and ferro magnetic materials – Curie temperature – Energy loss due to hysteresis – importance of hysteresis curves – magnetic circuit.

Course focuses on:

✓	Skill development		Entrepreneurial development
✓	Employability		Professional Ethics
	Gender Sensitization	✓	Human Values
	Social Awareness/Environment		Environment and Sustainability
✓	Intellectual Property Rights		

New Course		
Course Code	23113SEC36AL	Board: Physics
Course Name	Allied Physics Practical – I	Semester: III

1.	Young's modulus by non-uniform bending using pin and microscope
2.	Young's modulus by non-uniform bending using optic lever, scale and telescope
3.	Rigidity modulus by static torsion method.
4.	Rigidity modulus by torsional oscillations without mass
6.	Surface tension and interfacial Surface tension – drop weight method
7.	Comparison of viscosities of two liquids – burette method
8.	Specific heat capacity of a liquid – half time correction
9.	Verification of laws of transverse vibrations using sonometer
10.	Calibration of low range voltmeter using potentiometer
11.	Determination of thermo emf using potentiometer
12.	Verification of truth tables of basic logic gates using ICs
13.	Verification of De Morgan's theorems using logic gate ICs.
14.	Use of NAND as universal building block.

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability	✓	Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment		Environment and Sustainability
✓	Intellectual Property Rights		

New Course		
Course Code	23113GEC44	Board: Physics
Course Name	Allied Physics – II	Semester: IV

Unit	Course
I	MODERN PHYSICS: Photo electric effect – Laws of photo electric effect – Einstein’s photo electric equation – verification of Einstein’s photo electric equation by Millikan’s experiment – photo electric cells – applications. <i>Wave mechanics:</i> De Broglie matter waves – determination of De Broglie wave length – Experimental study of De Broglie matter wave by G.P. Thomson experiment.
II	NUCLEAR PHYSICS: Characteristics of nuclear forces – nuclear structure by liquid drop model – Binding energy – mass defect – particle accelerators – cyclotron and betatron – artificial transmutations by α – particles - nuclear Fission and nuclear Fusion – elementary particles – Leptons, Mesons and Baryons
III	LASER PHYSICS: Purity of spectral lines – Coherence length and time – spontaneous and induced emissions – population inversion – meta stable state – conditions for laser actions – Ruby laser – Helium – neon laser – applications of lasers – Raman effect – Raman shift – stokes and anti-stokes lines – Laser Raman Spectrometer.
IV	SEMICONDUCTOR PHYSICS: Volt – Ampere Characteristics of P-N junction Diode – Zener diode – applications of Zener diodes – photo diode- Principles of LED– Frequency Modulation and Amplitude modulation – basic principles of antennas – block diagram of Superhetrodyne receiver – block diagram of monochrome TV receiver – basic principles and applications of RADAR
V	DIGITAL ELECTRONICS: number systems – conversion of binary into decimal – conversion of decimal to binary – binary addition and subtraction - Complements, Codes: BCD, Gray – Basic logic gates – NAND and NOR as an universal logic gates – Demorgan’s theorems – Boolean algebra – applications of Demorgans theorems – Half adder and Half subtractor – Multiplexers(1*4) – Demultiplexer(4*1) – Registers and Counters (statement only)

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
	Employability	✓	Professional Ethics
✓	Gender Sensitization	✓	Human Values
✓	Social Awareness/Environment		Environment and Sustainability
	Intellectual Property Rights		

New Course		
Course Code		Board: Physics
Course Name	Allied Physics Practical – II	Semester: IV

1.	Radius of curvature of lens by forming Newton's rings
2.	Thickness of a wire using air wedge
3.	Wavelength of mercury lines using spectrometer and grating
4.	Refractive index of material of the lens by minimum deviation
5.	Refractive index of liquid using liquid prism
6.	Determination of AC frequency using sonometer
7.	Specific resistance of a wire using PO box
8.	Thermal conductivity of poor conductor using Lee's disc
9.	Determination of figure of merit table galvanometer
10.	Determination of Earth's magnetic field using field along the axis of a coil
11.	Characterization of Zener diode
12.	Construction of Zener/IC regulated power supply
13.	Construction of AND, OR, NOT gates using diodes and transistor
14.	NOR gate as a universal building block

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability		Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

List of new value added courses

1. Certificate course on regulated power supply
2. Certificate course on cosmology and structure formation

Subject Code	Subject Name
23513RPS	Certificate course on Regulated Power Supply

Course Objectives:

To impart knowledge on

- Working principles of electrical and electronic circuits
- Operation of electrical and electronic circuits

Unit I

Basic elements (Resistor, Inductor & Capacitor) & its working. Colour coding of resistor & current rating of resistance. Transformers its principal working, types of transformer current rating of transformer. Multi-meter & testing of components using multi- meter

Unit II

Instantaneous current time period, frequency, wavelength, peak or maximum amplitude, peak to peak value, effective current or RMS value of current & voltage, the average current & Voltage, power in ac circuit. Phase & phase difference. Inductive reactance & capacitive reactance.

Unit III

Working of half wave, full wave & bridge rectifier. Rectifier with capacitor filter (shunt capacitor filter), with series inductor filter, LC filter & π - section filter. Ripple factor, efficiency & voltage regulation for each filter.

Unit IV

Zener diode: Its working & characteristics, Zener diode as regulated power supply. Design consideration with one example.

Unit V

Concept of IC, Three pin IC regulator block diagram, 78xx series & 79xx series. Dual power supply.

Course Outcomes:

At the end of the course the students will be able to

- Understand the working principles of electrical and electronic circuits
- Comprehend the operation of electrical and electronic circuits

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability		Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23513CSF	Certificate course on Cosmology and Structure Formation

Course Objectives

This course is a graduate-level introduction to astrophysical cosmology, with emphasis on the “standard” big bang theory of the universe and, in the latter part of the course, its extension to a more detailed theory (the inflation + cold dark matter + cosmological constant model) that is presently the leading scenario for explaining the origin of structure in the universe.

Unit I

Introduction: observational and theoretical basis of the standard model

Unit II

The homogeneous universe - A minimal sketch of general relativity

Unit III

Homogeneous cosmological models (the Friedmann-Robertson Walker universe) Thumbnail sketch of cosmic history - The cosmic microwave background - Primordial nucleosynthesis Horizons and inflation

Unit IV

The inhomogeneous universe - Perturbation theory- Spherical collapse - The cold dark matter paradigm

Unit V

The cosmic expansion history and dark energy - Microwave background fluctuations - Large- scale structure- Galaxy formation

Course Outcomes:

At the end of the course the students will be able to

- Know the “standard” big bang theory of the universe
- Realize the origin of structure in the universe

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability		Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		



PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

M.Sc., PHYSICS COURSE STRUCTURE REGULATION 2023

Course Code	Course Title	L	T	P	C
SEMESTER I					
23213AEC11	Mathematical Physics	5	1	0	4
23213AEC12	Classical Mechanics and Relativity	5	1	0	4
23213AEC13	Linear and Digital ICs and Applications	5	1	0	4
23213SEC14L	Spectroscopy and General Electronics Lab	0	0	4	4
23213DSC15	Discipline Specific Elective – I	5	1	0	3
23213RMC16	Research Methodology	2	0	0	2
	Total	22	4	4	21
SEMESTER II					
23213AEC21	Statistical Mechanics	4	1	0	4
23213AEC22	Quantum Mechanics - I	4	1	0	4
23213AEC23	Condensed Matter Physics	4	1	0	4
23213SEC24L	Advanced General Experiments and Electronics Lab	0	0	4	4
23213DSC25	Discipline Specific Elective – II	4	1	0	3
23213SEC26	Medical Physics	4	1	0	3
23213BRC27	Participation in Bounded Research	2	0	0	2
23213SEC28	Industrial Visit	-	-	-	2
	Total	22	5	4	26

SEMESTER III					
23213AEC31	Electromagnetic Theory	5	1	0	4
23213AEC32	Nuclear and Particle Physics	4	1	0	4
23213AEC33	Quantum Mechanics - II	4	1	0	4
23213SEC34L	Advanced Electronics Lab	0	0	4	4
23213DSC35_	Discipline Specific Elective – III	4	1	0	3
23213SEC36	Sewage And Waste Water Treatment And Reuse	4	1	0	3
23213SEC37	Internship / Industrial Activity	-	-	-	2
	Total	21	5	4	24
SEMESTER IV					
23213AEC41	Advanced Optics	4	1	0	4
23213AEC42	Spectroscopy	4	1	0	4
23213DSC43_	Discipline Specific Elective – IV	4	1	0	3
23213DSC44_	Discipline Specific Elective – V	4	1	0	3
23213PRW45	Project Work	0	0	10	4
23213SEC46	Industrial activity	-	-	-	2
	Total	16	4	10	20
	Total Credits for the Programme				91

Subject Code	Subject Name
23213AEC13	LINEAR AND DIGITAL ICs AND APPLICATIONS

UNITS	Course Details
UNIT I: INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER	Introduction, Classification of IC's, basic information of Op-Amp 741 and its features, the ideal Operational amplifier, Op-Amp internal circuit and Op-Amp. Characteristics.
UNIT II: APPLICATIONS OF OP-AMP	LINEAR APPLICATIONS OF OP-AMP: Solution to simultaneous equations and differential equations, Instrumentation amplifiers, V to I and I to V converters. NON-LINEAR APPLICATIONS OF OP-AMP: Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger, Multivibrators, Triangular and Square waveform generators.
UNIT III: ACTIVE FILTERS & TIMER AND PHASE LOCKED LOOPS	ACTIVE FILTERS: Introduction, Butterworth filters – 1st order, 2nd order low pass and high pass filters, band pass, band reject and all pass filters. TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, description of functional diagram, monostable and astable operations and applications, Schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566), low pass filter, monolithic PLL and applications of PLL
UNIT IV: VOLTAGE REGULATOR & D to A AND A to D CONVERTERS	VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators, Switching Regulator. D to A AND A to D CONVERTERS: Introduction, basic DAC techniques -weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A to D converters -parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.
UNIT V: CMOS LOGIC, COMBINATIONAL CIRCUITS USING TTL 74XX ICs &	CMOS LOGIC: CMOS logic levels, MOS transistors, Basic CMOS Inverter, NAND and NOR gates, CMOS AND-OR-INVERT and OR-AND-INVERT gates, implementation of any function using CMOS logic. COMBINATIONAL CIRCUITS USING TTL 74XX ICs: Study of logic gates using 74XX ICs, Four-bit parallel adder (IC 7483), Comparator (IC 7485), Decoder (IC 74138, IC

SEQUENTIAL CIRCUITS USING TTL 74XX ICs	74154), BCD to 7-segment decoder (IC7447), Encoder (IC74147), Multiplexer (IC74151), Demultiplexer (IC 74154). SEQUENTIAL CIRCUITS USING TTL 74XX ICs: Flip Flops (IC 7474, IC 7473), Shift Registers, Universal Shift Register (IC 74194), 4- bit asynchronous binary counter (IC 7493).
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability		Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213DSC15A	ENERGY PHYSICS

UNITS	Course Details
UNIT I: INTRODUCTION TO ENERGY SOURCES	Conventional and non-conventional energy sources and their availability–prospects of Renewable energy sources– Energy from other sources–chemical energy–Nuclear energy– Energy storage and distribution.
UNIT II: ENERGY FROM THE OCEANS	Energy utilization–Energy from tides–Basic principle of tidal power–utilization of tidal energy – Principle of ocean thermal energy conversion systems.
UNIT III: WIND ENERGY SOURCES	Basic principles of wind energy conversion–power in the wind–forces in the Blades– Wind energy conversion–Advantages and disadvantages of wind energy conversion systems (WECS) - Energy storage–Applications of wind energy.
UNIT IV: ENERGY FROM BIOMASS	Biomass conversion Technologies– wet and dry process– Photosynthesis - Biogas Generation: Introduction–basic process: Aerobic and anaerobic digestion – Advantages of anaerobic digestion–factors affecting bio digestion and generation of gas- bio gas from waste fuel– properties of biogas-utilization of biogas.
UNIT V: SOLAR ENERGY SOURCES	Solar radiation and its measurements–solar cells: Solar cells for direct conversion of solar energy to electric powers–solar cell parameter–solar cell electrical characteristics– Efficiency–solar water Heater –solar distillation– solar cooking–solar greenhouse – Solar pond and its applications.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability		Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213DSC15B	COMMUNICATION ELECTRONICS

UNITS	Course Details
UNIT I: ANTENNAS AND WAVE PROPAGATION	Radiation field and radiation resistance of short dipole antenna-grounded antenna-ungrounded antenna-antenna arrays-broadside and end side arrays-antenna gain-directional high frequency antennas-sky wave-ionosphere- Eccles and Larmor theory- Magneto ionic theory-ground wave propagation
UNIT II: MICROWAVES	Microwave generation—multi cavity Klystron-reflex klystron-magnetron travelling wave tubes (TWT) and other microwave tubes-MASER-Gunn diode-wave guides-rectangular wave guides-standing wave indicator and standing wave ratio(SWR)
UNIT III: RADAR AND TELEVISION	Elements of a radar system-radar equation-radar performance Factors radar transmitting systems-radar antennas-duplexers-radar receivers and indicators-pulsed systems-other radar systems- colour TV transmission and reception-colour mixing principle-colour picture tubes- Delta gun picture tube-PIL colour picture tube-cable TV, CCTV and theatre TV
UNIT IV: OPTICAL FIBER	Propagation of light in an optical fibre-acceptance angle-numerical aperture-step and graded index fibres-optical fibres as a cylindrical wave guide-wave guide equations-wave guide equations in step index fibres - fibre losses and dispersion-applications
UNIT V: SATELLITE COMMUNICATION	Orbital satellites-geostationary satellites-orbital patterns-satellite system link models-satellite system parameters-satellite system link equation link budget-INSAT communication satellites
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
✓	Employability		Professional Ethics
	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213AEC21	STATISTICAL MECHANICS

UNITS	Course Details
UNIT I: FOUNDATIONS	Microstate and Macrostate of macroscopic system, Phase space and Phase space density, Liouville theorem, Ergodic hypothesis, Postulate of Equal a priori probabilities, Microcanonical Ensemble, Number of microstates and relation to thermodynamic entropy, Calculation of the number of microstates to (a) Ideal gas: Equation of state, Gibbs paradox, correct counting (b) Crystalline solid: Dulong Petit's law, Einstein's theory of specific heat and (c) Paramagnetism: Curie's law, Negative temperature, and Schottky anomaly in specific heat (d) Elasticity of a rubber.
UNIT II: STATISTICAL MECHANICS AND THERMODYNAMICS	Specification of states of a system - Micro canonical ensemble - Phase space – Entropy - Connection between statistics and thermodynamics – Entropy of an ideal gas using the micro canonical ensemble - Entropy of mixing and Gibb's paradox.
UNIT III: CANONICAL AND GRAND CANONICAL ENSEMBLES	Trajectories and density of states - Liouville's theorem - Canonical and grand canonical ensembles - Partition function - Calculation of statistical quantities - Energy and density fluctuations.
UNIT IV: CLASSICAL AND QUANTUM STATISTICS	Density matrix - Statistics of ensembles - Statistics of indistinguishable particles - Maxwell-Boltzmann statistics - Fermi-Dirac statistics – Ideal Fermi gas – Degeneracy - Bose-Einstein statistics - Plank radiation formula - Ideal Bose gas - Bose-Einstein condensation.
UNIT V: REAL GAS, ISING MODEL AND FLUCTUATIONS	Cluster expansion for a classical gas - Virial equation of state – Calculation of the first Virial coefficient in the cluster expansion - Ising model - Mean-field theories of the Ising model in three, two and one dimensions - Exact solutions in one dimension. Correlation of space-time dependent fluctuations - Fluctuations and transport phenomena - Brownian motion - Langevin's theory - Fluctuation-dissipation theorem - The Fokker-Planck equation
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development		Entrepreneurial development
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	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213DSC25A	SOLAR ENERGY UTILIZATION

UNITS	Course Details
UNIT I: HEAT TRANSFER & RADIATION ANALYSIS	Conduction, Convection and Radiation – Solar Radiation at the earth’s surface - Determination of solar time – Solar energy measuring instruments.
UNIT II: SOLAR COLLECTORS	Physical principles of conversion of solar radiation into heat flat plate collectors - General characteristics – Focusing collector systems – Thermal performance evaluation of optical loss.
UNIT III: SOLAR HEATERS	Types of solar water heater - Solar heating system – Collectors and storage tanks – Solar ponds – Solar cooling systems.
UNIT IV: SOLAR ENERGY CONVERSION	Photo Voltaic principles – Types of solar cells – Crystalline silicon/amorphous silicon and Thermo - electric conversion - process flow of silicon solar cells- different approaches on the process-texturization, diffusion, Antireflective coatings, metallization.
UNIT V: NANOMATERIALS IN FUEL CELL APPLICATIONS	Use of nanostructures and nanomaterials in fuel cell technology - high and low temperature fuel cells, cathode and anode reactions, fuel cell catalysts, electrolytes, ceramic catalysts. Use of Nano technology in hydrogen production and storage. Industrial visit – data collection and analysis - presentation
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
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	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213DSC25B	PLASMA PHYSICS

UNITS	Course Details
UNIT I: FUNDAMENTAL CONCEPTS OF PLASMA	Kinetic pressure in a partially ionized - mean free path and collision cross section - Mobility of charged particles - Effect of magnetic field on the mobility of ions and electrons-Thermal conductivity- Effect of magnetic field- Quasi- neutrality of plasma Debye shielding distance - Optical properties of plasma.
UNIT II: MOTION OF CHARGED PARTICLES IN ELECTRIC AND MAGNETIC FIELD	Particle description of plasma- Motion of charged particle in electrostatic field- Motion of charged particle in uniform magnetic field - Motion of charged particle in electric and magnetic fields- Motion of charged particle inhomogeneous magnetic field - Motion of charged particle in magnetic mirror confinement - motion of an electron in a time varying electric field- Magneto- hydrodynamics - Magneto-hydrodynamic equations – Condition for magneto hydrodynamic behaviour.
UNIT III: PLASMA OSCILLATIONS AND WAVES	Introduction, theory of simple oscillations - electron oscillation in a plasma – Derivations of plasma oscillations by using Maxwell’s equation - Ion oscillation and waves in a magnetic field - thermal effects on plasma oscillations - Landau damping - Hydro magnetic waves - Oscillations in an electron beam.
UNIT IV: PLASMA DIAGNOSTICS TECHNIQUES	Single probe method - Double probe method - Use of probe technique for measurement of plasma parameters in magnetic field - microwave method - spectroscopic method - -laser as a tool for plasma diagnostics-X-ray diagnostics of plasma - acoustic method - conclusion.
UNIT V: APPLICATIONS OF PLASMA PHYSICS	Magneto hydrodynamic Generator - Basic theory - Principle of Working-Fuel in MHD Generator - Generation of Microwaves Utilizing High Density Plasma - Plasma Diode.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development		Entrepreneurial development
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	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213SEC26	MEDICAL PHYSICS

UNITS	Course Details
UNIT I: X-RAYS AND TRANSDUCERS	Electromagnetic Spectrum – Production of X-Rays – X-Ray Spectrum – Bremsstrahlung – Characteristic X-Ray – X-Ray Tubes – Coolidge Tube – X-Ray Tube Design – Thermistors – photo electric transducers – Photo voltaic cells – photo emissive cells –Photoconductive cells– piezoelectric transducer
UNIT II: BLOOD PRESSURE MEASUREMENT S	Introduction –Sphygmomanometer – Measurement of heart rate – basic principles of electrocardiogram (ECG) –Basic principles of electro-neurography (ENG) – Basic principles of magnetic resonance imaging (MRI).
UNIT III: RADIATION PHYSICS	Radiation Units – Exposure – Absorbed Dose – Rad to Gray – Kera Relative Biological Effectiveness –Effective Dose – Sievert (Sv) – Inverse Square Law – Interaction of radiation with Matter – Linear Attenuation Coefficient – Radiation Detectors –Thimble Chamber – Condenser Chambers – Geiger Counter – Scintillation Counter
UNIT IV: MEDICAL IMAGING PHYSICS	Radiological Imaging – Radiography – Filters – Grids – Cassette – X-Ray Film – Film processing – Fluoroscopy – Computed Tomography Scanner – Principal Function – Display – Mammography – Ultrasound Imaging – Magnetic Resonance Imaging – Thyroid Uptake System – Gamma Camera (Only Principle, Function and display)
UNIT V: RADIATION PROTECTION	Principles of Radiation Protection – Protective Materials – Radiation Effects – Somatic – Genetic Stochastic and Deterministic Effect – Personal Monitoring Devices – TLD Film Badge – Pocket Dosimeter
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

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	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213AEC33	QUANTUM MECHANICS – II

UNITS	Course Details
UNIT 1: SCATTERING THEORY	Scattering amplitude – Cross sections – Born approximation and its validity – Scattering by a screened coulomb potential – Yukawa potential – Partial wave analysis – Scattering length and Effective range theory for s wave – Optical theorem – Transformation from centre of mass to laboratory frame.
UNIT II: PERTURBATION THEORY	Time dependent perturbation theory – Constant and harmonic perturbations – Fermi Golden rule – Transition probability Einstein’s A and B Coefficients – Adiabatic approximation – Sudden approximation – Semi – classical treatment of an atom with electromagnetic radiation – Selection rules for dipole radiation
UNIT III: RELATIVISTIC QUANTUM MECHANICS	Klein – Gordon Equation – Charge And Current Densities – Dirac Matrices – Dirac Equation – Plane Wave Solutions – Interpretation Of Negative Energy States – Antiparticles – Spin of Electron – Magnetic Moment Of An Electron Due To Spin
UNIT IV: DIRAC EQUATION	Covariant form of Dirac Equation – Properties of the gamma matrices – Traces – Relativistic invariance of Dirac equation – Probability Density – Current four vector – Bilinear covariant – Feynman’s theory of positron (Elementary ideas only without propagation formalism)
UNIT V: CLASSICAL FIELDS AND SECOND QUANTIZATION	Classical fields – Euler Lagrange equation – Hamiltonian formulation – Noether’s theorem – Quantization of real and complex scalar fields – Creation, Annihilation and Number operators – Fock states – Second Quantization of K-G field.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development		Entrepreneurial development
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	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213DSC35A	CHARACTERIZATION OF MATERIALS

UNITS	Course details
UNIT I THERMAL ANALYSIS	Introduction – thermogravimetric analysis (TGA) – instrumentation – determination of weight loss and decomposition products – differential thermal analysis (DTA)- cooling curves – differential scanning calorimetry (DSC) – instrumentation – specific heat capacity measurements – determination of thermomechanical parameters.
UNIT II MICROSCOPIC METHODS	Optical Microscopy: optical microscopy techniques – Bright field optical microscopy – Dark field optical microscopy – Dispersion staining microscopy - phase contrast microscopy –differential interference contrast microscopy - fluorescence microscopy - confocal microscopy - - digital holographic microscopy - oil immersion objectives - quantitative metallography - image analyzer.
UNIT III ELECTRON MICROSCOPY AND SCANNING PROBE MICROSCOPY	SEM, EDAX, EPMA, TEM: working principle and Instrumentation – sample preparation –Data collection, processing and analysis- Scanning tunneling microscopy (STEM) - Atomic force microscopy (AFM) - Scanning new field optical microscopy.
UNIT IV ELECTRICAL METHODS AND OPTICAL CHARACTERISATION	Two probe and four probe methods- van der Pauw method – Hall probe and measurement – scattering mechanism – C-V characteristics – Schottky barrier capacitance – impurity concentration – electrochemical C-V profiling – limitations. Photoluminescence – light – matter interaction – instrumentation – electroluminescence – instrumentation – Applications.
UNIT V X-RAY AND SPECTROSCOPIC METHODS	Principles and instrumentation for UV-Vis-IR, FTIR spectroscopy, Raman spectroscopy, ESR, NMR, NQR, XPS, AES and SIMS-proton induced X-ray Emission spectroscopy (PIXE) –Rutherford Back Scattering (RBS) analysis-application - Powder diffraction - Powder diffractometer -interpretation of diffraction patterns - indexing - phase identification - residual stress analysis - Particle size, texture studies - X-ray fluorescence spectroscopy - uses.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development		Entrepreneurial development
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	Gender Sensitization		Human Values
	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213SEC36	SEWAGE AND WASTE WATER TREATMENT AND REUSE

UNITS	Course Details
UNIT I: RECOVERY & REUSE OF WATER	Recovery & Reuse of water from Sewage and Waste water: Methods of recovery: Flocculation - Sedimentation - sedimentation with coagulation - Filtration - sand filters - pressure filters - horizontal filters - vector control measures in industries - chemical and biological methods of vector eradication
UNIT II: DISINFECTION	Disinfection: Introduction to disinfection and sterilization: Disinfectant - UV radiation - Chlorination - Antisepsis - Sterilant - Aseptic and sterile - Bacteriostatic and Bactericidal - factors affecting disinfection.
UNIT III: CHEMICAL DISINFECTION	Chemical Disinfection: Introduction - Theory of Chemical Disinfection - Chlorination Other Chemical Methods - Chemical Disinfection Treatments Requiring - Electricity - Coagulation/Flocculation Agents as Pretreatment - Disinfection By-Products(DBPs)
UNIT IV: PHYSICAL DISINFECTION	Physical Disinfection: Introduction - Ultraviolet Radiation - Solar Disinfection - Heat Treatment - Filtration Methods - Distillation - Electrochemical Oxidation Water Disinfection by Microwave Heating.
UNIT V: INDUSTRIAL VISIT	Industrial visit – data collection and analysis - presentation
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development	✓	Entrepreneurial development
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✓	Intellectual Property Rights		

Subject Code	Subject Name
23213AEC41	ADVANCED OPTICS

UNITS	Course Details
UNIT I: POLARIZATION AND DOUBLE REFRACTION	Classification of polarization – Transverse character of light waves – Polarizer and analyzer – Malu’s law – Production of polarized light – Wire grid polarizer and the polaroid – Polarization by reflection – Polarization by double refraction – Polarization by scattering – The phenomenon of double refraction – Normal and oblique incidence – Interference of polarized light: Quarter and half wave plates – Analysis of polarized light – Optical activity
UNIT II: LASERS	Basic principles – Spontaneous and stimulated emissions – Components of the laser – Resonator and lasing action – Types of lasers and its applications – Solid state lasers – Ruby laser – Nd:YAG laser – gas lasers – He-Ne laser – CO ₂ laser – Chemical lasers – HCl laser – Semiconductor laser
UNIT III: FIBER OPTICS	Introduction – Total internal reflection – The optical fiber – Glass fibers – The coherent bundle – The numerical aperture – Attenuation in optical fibers – Single and multi-mode fibers – Pulse dispersion in multimode optical fibers – Ray dispersion in multimode step index fibers – Parabolic-index fibers – Fiber-optic sensors: precision displacement sensor – Precision vibration sensor
UNIT IV: NON-LINEAR OPTICS	Basic principles – Harmonic generation – Second harmonic generation – Phase matching – Third harmonic generation – Optical mixing – Parametric generation of light – Self-focusing of light
UNIT V: MAGNETO- OPTICS AND ELECTRO-OPTICS	Magneto-optical effects – Zeeman effect – Inverse Zeeman effect – Faraday effect – Voigt effect – Cotton-mouton effect – Kerr magneto-optic effect – Electro-optical effects – Stark effect – Inverse stark effect – Electric double refraction – Kerr electro-optic effect – Pockels electro-optic effect
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

Course focuses on:

✓	Skill development		Entrepreneurial development
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	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

Subject Code	Subject Name
23213AEC42	SPECTROSCOPY

UNITS	Course Details
UNIT I: MICROWAVE SPECTROSCOPY	Rotational spectra of diatomic molecules - Rigid Rotor (Diatomic Molecules)- reduced mass – rotational constant - - Effect of isotopic substitution - Non rigid rotator – centrifugal distortion constant- Intensity of Spectral Lines- Polyatomic molecules – linear – symmetric asymmetric top molecules - Hyperfine structure and quadrupole moment of linear molecules - Instrumentation techniques – block diagram -Information Derived from Rotational Spectra- Stark effect- Problems.
UNIT II: INFRA-RED SPECTROSCOPY	Vibrations of simple harmonic oscillator – zero-point energy- Anharmonic oscillator – fundamentals, overtones and combinations- Diatomic Vibrating Rotator- PR branch – PQR branch- Fundamental modes of vibration of H ₂ O and CO ₂ -Introduction to application of vibrational spectra- IR Spectrophotometer Instrumentation (Double Beam Spectrometer) – Fourier Transform Infrared Spectroscopy - Interpretation of vibrational spectra– remote analysis of atmospheric gases like N ₂ O using FTIR by National Remote Sensing Centre (NRSC), India– other simple applications
UNIT III: RAMAN SPECTROSCOPY	Theory of Raman Scattering - Classical theory – molecular polarizability – polarizability ellipsoid - Quantum theory of Raman effect - rotational Raman spectra of linear molecule - symmetric top molecule – Stokes and anti-stokes line- SR branch -Raman activity of H ₂ O and CO ₂ .Mutual exclusion principle- determination of N ₂ O structure -Instrumentation technique and block diagram - structure determination of planar and non-planar molecules using IR and Raman techniques - FT Raman spectroscopy- SERS
UNIT IV: RESONANCE SPECTROSCOPY	Nuclear and Electron spin-Interaction with magnetic field - Population of Energy levels - Larmor precession- Relaxation times - Double resonance- Chemical shift and its measurement - NMR of Hydrogen nuclei - Indirect Spin -Spin Interaction – interpretation of simple organic molecules - Instrumentation techniques of NMR spectroscopy – NMR in Chemical industries- MRI Scan Electron Spin Resonance: Basic principle –Total Hamiltonian (Direct Dipole-Dipole interaction and Fermi Contact Interaction) – Hyperfine Structure (Hydrogen atom) – ESR Spectra of Free radicals –g-factors – Instrumentation - Medical applications of ESR

<p style="text-align: center;">UNIT V: UV SPECTROSCOPY</p>	<p>Origin of UV spectra - Laws of absorption – Lambert Bouguer law – Lambert Beer law - molar absorptivity – transmittance and absorbance - Color in organic compounds- Absorption by organic Molecule -Chromophores -Effect of conjugation on chromophores - Choice of Solvent and Solvent effect - Absorption by inorganic systems - Instrumentation - double beam UV-Spectrophotometer - Simple applications</p>
<p style="text-align: center;">UNIT VI: PROFESSIONAL COMPONENTS</p>	<p>Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism</p>

Course focuses on:

✓	Skill development		Entrepreneurial development
✓	Employability		Professional Ethics
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	Social Awareness/Environment	✓	Environment and Sustainability
✓	Intellectual Property Rights		

1.2.1 Number of new courses introduced of the total number of courses across all programs offered during the year

S.No	Course Code	Name of the Course	Year of introduction
1.	23114AEC13	General Chemistry –I	2023
2.	23112GEC14	Mathematics –I	2023
3.	23112GEC15	Mathematics –II	2023
4.	23114SEC16L	Quantitative Inorganic Estimation (Titimetry) and Inorganic Preparation lab	2023
5.	23114SEC16L	Quantitative Inorganic Estimation (Titimetry) and Inorganic Preparation lab	2023
6.	23114SEC17	Role of Chemistry in daily life (Non Major Elective)	2023
7.	23114AEC23	General Chemistry –II	2023
8.	23114GEC24	Mathematics –III	2023
9.	23114GEC25	Mathematics –IV	2023
10.	23114SEC26L	Quantitative Organic Analysis and Preparation of Organic Compounds lab	2023
11.	23114SEC27	Dairy Chemistry (Non Major Elective)	2023
12.	23114SEC28	Functional Cosmetics	2023
13.	23114AEC33	General Chemistry –III	2023
14.	23113GEC34	Physics-I	2023
15.	23114SEC35L	Qualitative Inorganic Analysis	2023
16.	23113GEC36L	Physics Lab-I	2023
17.	23114SEC37	Entrepreneurial Skills in Chemistry	2023
18.	23114SEC38	Pesticide Chemistry	2023
19.	23114AEC43	General Chemistry –IV	2023
20.	23116GEC44	Physics II	2023
21.	23114SEC45L	Physical Chemistry Practical I	2023
22.	23116GEC46L	Physics Lab-II	2023
23.	23114SEC47	Instrumental methods of chemical analysis	2023
24.	23114SEC48	Forensic science	2023
25.	23114AEC51	Organic Chemistry - I	2023
26.	23114AEC52	Inorganic Chemistry - I	2023
27.	231145AEC53	Physical Chemistry - I	2023

28.	23114DSC54	Discipline Specific Elective –I	2023
29.	23114SEC55L	Industrial Chemistry lab	2023
30.	23114SEC56L	Physical Chemistry Practical II	2023
31.	23114SEC57	Internship/Industrial Visit/Field Visit	2023
32.	23114AEC61	Organic Chemistry II	2023
33.	23114AEC62	Inorganic Chemistry II	2023
34.	23114DSC63A	Discipline Specific Elective Courses-II	2023
35.	23114PRW64	Project with Viva	2023
36.	23114SEC65	General awareness for competitive examination	2023
37.	23214AEC11	Organic Reaction Mechanism-I	2023
38.	23214AEC12	Structure and Bonding in Inorganic Compounds	2023
39.	23214SEC13L	Organic Chemistry lab	2023
40.	23214DSC14-	Discipline specific Elective Courses-I	2023
41.	23214DSC15-	Discipline specific Elective Courses-II	2023
42.	23214AEC21	Organic reaction mechanism-II	2023
43.	23214AEC22	Physical Chemistry-I	2023
44.	23214SEC23L	Inorganic Chemistry lab	2023
45.	23214DSC24-	Discipline specific Elective Courses-III	2023
46.	23214DSC25-	Discipline specific Elective Courses-IV	2023
47.	23214AECC26	Participation in bounded research (AECC 2) SoftSkill-2	2023
48.	23214GECC27	Industrial Chemistry /	2023
49.	23215SEC28	Internship-	2023

50.	23214AEC31	Organic synthesis and Photochemistry	2023
51.	23214AEC32	Coordination Chemistry-I	2023
52.	23214SEC33L	Physical Chemistry Practical	2023
53.	23214SEC34L	Analytical Instrumentation technique lab	2023
54.	23214DSC35	Discipline specific Elective Courses-V	2023
55.	23214GEC36B	Analytical chemistry	2023
56.	23215SEC37	Industrial Visit – fertilizer composition analysis	2023
57.	23214AEC41	Coordination Chemistry-II	2023
58.	23214AEC42	Physical Chemistry-II	2023
59.	23214SEC43L	Analytical Instrumentation lab	2023
60.	23214DSC44-	Discipline specific Elective Courses-VI	2023
61.	23214PRW45	Project with viva voce	2023
62.	23214SEC46	Industrial Visit – Pharmaceutical drug analysis	2023



PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

**SCHOOL OF ARTS AND SCIENCE
B.SC., CHEMISTRY
SYLLABUS
REGULATION 2023**

FROM THE ACADEMIC YEAR: 2023 – 2024



**PONNAIYAH RAMAJAYAM INSTITUTE OF
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SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF CHEMISTRY

B.Sc CURRICULUM – REGULATION 2023

B.Sc. Graduate Attributes

- Domain knowledge
- Critical thinking
- Effective Communication
- Reflective learning
- Critical thinking

B.Sc Programme Educational Objectives – PEO

- PE01- Acquired the knowledge with facts and figures related to various subjects in pure Sciences.
- PE02- Understood the basic concepts, fundamental principles, and the scientific theories Related to various scientific phenomena and their relevancies in the day-to-day life.
- PE03- Acquired the skills in handling scientific instruments, planning and performing in Laboratory experiments.
- PE04- The skills of observations and drawing logical inferences from the scientific Experiments.
- PE05- Analyzed the given scientific data critically and systematically and the ability to draw The objective conclusions.
- PE06- Been able to think creatively (divergently and convergent) to propose novel ideas in Explaining facts and figures or providing new solution to the problems.
- PE07- Realized how developments in any science subject helps in the development of other Science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.
- PE08- Developed scientific outlook not only with respect to science subjects but also in all Aspects related to life.
- PE09- Realized that knowledge of subjects in other faculties such as humanities, performing Arts, social sciences etc.
- PE10- Can have greatly and effectively influence which inspires in evolving new scientific Theories and inventions.
- PE11- Imbided ethical, moral and social values in personal and social life leading to highly Cultured and civilized personality.
- PE12- Developed various communication skills such as reading, listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively.
- PE13- Realized that pursuit of knowledge is a lifelong activity and in combination with Untiring efforts and positive attitude and other necessary qualities leads towards a successful Life.

B.Sc Programme Outcome – PO

- PO1- To understand basic facts and concepts in Chemistry while retaining the exciting aspects of Chemistry so as to develop interest in the study of chemistry as a discipline.
- PO2- To develop the ability to apply the principles of Chemistry.
- PO3- To appreciate the achievements in Chemistry and to know the role of Chemistry in nature and in society. To develop problem solving skills.
- PO4- To be familiarized with the emerging areas of Chemistry and their applications in various spheres of Chemical sciences and to apprise the students of its relevance in future studies.
- PO5- To develop skills in the proper handling of apparatus and chemicals.
- PO6- To be exposed to the different processes used in industries and their applications.

B.Sc. Course – C

- C1- General Chemistry – I
- C2- Quantitative Inorganic Estimation (Titrimetric) and Inorganic Preparation
- C3- Mathematics – I
- C4- Mathematics – II
- C5- Role of Chemistry in daily life
- C6- General Chemistry – II
- C7- Quantitative Organic Analysis and Preparation of Organic Compounds
- C8- Mathematics - III
- C9- Mathematics – IV
- C10- General Chemistry – III
- C11- Qualitative Inorganic Analysis
- C12- Physics - I & II
- C13- Physics Lab – I & II
- C14- Research Methodology
- C15- General Chemistry - IV
- C16- Physical Chemistry Practical I
- C17- Inorganic Chemistry – I
- C18- Organic Chemistry – I
- C19- Physical Chemistry – I
- C20- Physical Chemistry Practical II
- C21- Industrial Chemistry Practical
- C22- Participation in Bounded Research
- C23- Inorganic Chemistry – II
- C24- Organic Chemistry – II
- C25- Industrial chemistry
- C26- Project Work

B.Sc Curriculum Mapping

Programme Educational Objectives Vs Programme Outcome

Programme Outcome-PO Programme Educational Outcome - PEO	PO1	PO2	PO3	PO4	PO5	PO6
PE01	✓					
PE02						
PE03		✓				
PE04			✓			
PE05						
PE06					✓	
PE07				✓		
PE08						✓
PE09	✓			✓		
PE10		✓	✓			
PE11						
PE12				✓		
PE13	✓		✓		✓	

B.Sc Curriculum Mapping

Programme Outcome vs Courses Outcome

Programme Outcome-PO Courses Outcome-CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1			*	*		*
CO2		*		*	*	*
CO3	*	*			*	
CO4			*	*		*
CO5			*	*		*
CO6		*		*	*	*
CO7	*	*			*	
CO8		*	*		*	
CO9	*	*			*	*
CO10		*	*	*		*
CO11		*		*	*	
CO12	*	*		*	*	
CO13		*	*	*	*	
CO14		*	*	*	*	*
CO15	*		*		*	
CO16		*		*		*
CO17	*		*		*	
CO18		*		*	*	
CO19	*	*		*		*
CO20			*	*	*	
CO21	*		*	*		*
CO22	*	*		*		*

CO23			*	*	*	
CO24	*	*	*		*	*
CO25	*	*		*		*
CO26	*	*		*	*	



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**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF CHEMISTRY
B.Sc. CHEMISTRY – REGULATION 2023
COURSE STRUCTURE**

SEMESTER – I					
Course Code	Course Title	L	T	P	C
THEORY					
23110AEC11/ 23111AEC11/ 23132AEC11/ 23135AEC11	Tamil – I/ Advanced English-I/ Hindi-I/ French – I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23114AEC13	General Chemistry –I	4	1	0	3
23112GEC14	Mathematics –I	3	1	0	3
23112GEC15	Mathematics –II	3	1	0	3
PRACTICAL					
23114SEC16L	Quantitative Inorganic Estimation (Titimetry) and Inorganic Preparation lab	0	0	3	3
Skill Enhancement Course					
23114SEC17	Role of Chemistry in daily life (Non Major Elective)	2	0	0	2
23114SEC18	Foundation Course (FC)	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
231AECC01	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	-	-	-	1
	Total	2	5	3	25
		2			
SEMESTER – II					
Course Code	Course Title	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Tamil – II/ Advanced English-II/ Hindi-II/ French - II	3	1	0	3
23111AEC22	English-II	3	1	0	3
23114AEC23	General Chemistry –II	4	1	0	3
23114GEC24	Mathematics –III	3	1	0	3
23114GEC25	Mathematics –IV	3	1	0	3
PRACTICAL					
23114SEC26L	Quantitative Organic Analysis and Preparation of Organic Compounds lab	0	0	3	3
Skill Enhancement Course					
23114SEC27	Dairy Chemistry (Non Major Elective)	2	0	0	2
23114SEC28	Functional Cosmetics	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
231AECCCMS	Communication Skills	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioural Etiquette	-	-	-	1
	Total	2	5	3	25
		2			
SECOND YEAR					
SEMESTER – III					
23110AEC31/ 23132AEC31/ 23111AEC31/	Tamil – III/ Hindi-III/ Advanced English-III/	3	0	0	3

23135AEC31	French – III				
23111AEC32	English-III	3	1	0	3
23114AEC33	General Chemistry –III	4	1	0	3
23113GEC34	Physics-I	4	1	0	3
	PRACTICAL				
23114SEC35L	Qualitative Inorganic Analysis	0	0	3	3
23113GEC36L	Physics Lab-I	0	0	3	2
Skill Enhancement Course					
23114SEC37	Entrepreneurial Skills in Chemistry	2	0	0	2
23114SEC38	Pesticide Chemistry	2	0	0	2
Ability Enhancement Compulsory course					
23114RMC39	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	-	-	-	1
	Total	2	3	6	24
		1			
SEMESTER – IV					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tamil-IV/ Advanced English-IV / Hindi-IV/ French – IV	3	0	0	3
23111AEC42	English-IV	3	0	0	3
23114AEC43	General Chemistry –IV	4	1	0	3
23116GEC44	Physics II	4	1	0	3
23114SEC45L	Physical Chemistry Practical I	0	0	3	3
23116GEC46L	Physics Lab-II	0	0	3	2
Skill Enhancement Course					
23114SEC47	Instrumental methods of chemical analysis	2	0	0	2
23114SEC48	Forensic science	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
23114BRC49	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies-II	2	0	0	2
AUDIT COURSE					
231LSCLS	Leadership and Management Skills	-	-	-	1
	Total	22	2	6	27
SEMESTER – V					
23114AEC51	Organic Chemistry - I	4	1	0	4
23114AEC52	Inorganic Chemistry - I	4	1	0	4
231145AEC53	Physical Chemistry - I	4	1	0	4
23114DSC54	Discipline Specific Elective –I	3	0	0	3
23114SEC55L	Industrial Chemistry lab	0	0	5	3
23114SEC56L	Physical Chemistry Practical II	0	0	5	3
Skill Enhancement Course					
23114SEC57	Internship/Industrial Visit/Field Visit	-			2
231ACLSPSL	Professional Skills	-	-	-	1
231AECCEVED	Value Education	2	0	0	2
	Total	1	3	1	26

		7		0	
Third year					
SEMESTER – VI					
23114AEC61	Organic Chemistry II	5	0	0	4
23114AEC62	Inorganic Chemistry II	5	0	0	4
23114DSC63A	Discipline Specific Elective Courses-II	5	0	0	3
23114PRW64	Project with Viva	0	0	1 3	4
23114SEC65	General awareness for competitive examination	2	0	0	2
231EXACT	Extension activity	-	-	-	1
AUDIT COURSE					
231ACSIKWS	Indian Knowledge System	-	-	-	2
	Total	17	0	13	20
Total Credits -Programme					140
Total Credits - Audit Courses					07
Total Credits					147

Semester	Discipline Specific Elective Courses-I
V	a) 23114DSC54A – Green Chemistry b) 23114DSC54B – Industrial Chemistry c) 23114DSC54C - Disaster Management
	Discipline Specific Elective Courses-II
VI	a) 23114DSC63A- Polymer Chemistry b) 23114DSC63B –Chemi informatics c) 23114DSC63C- Entrepreneurship

Credit Distribution

SEM	AEC	SEC	GEC	DSC	AECC	Research	Others	Total
I	9	10	3	-	2	-	-	24
II	9	10	3	-	2	-	-	24
III	9	9	3	-	-	2	-	23
IV	12	10	-	-	2	2	-	26
V	12	8	-	3	2	-	-	25
VI	8	2	-	3	-	4	1	18
Total	59	49	9	6	8	8	1	140

AUDIT COURSE CREDIT DISTRIBUTION

Sem	Audit
I	1
II	1
III	1
IV	1
V	1
VI	2
Total	7

B.Sc CHEMISTRY Syllabus

Course Code	Course Title	L	T	P	C
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23110AEC11	Tamil-I	3	1	0	3
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1. இக்கால இலக்கியம்
பாடநோக்கங்கள்
1. இக்கால தமிழ் இலக்கிய வகைகளின் மாதிரிகளை கற்பித்தல்.
2. தமிழின் இனிமையை உணரச் செய்தல்
3. தமிழின் ஈடுபாட்டையும் சுவைக்கும் இறனையும் ஏற்படுத்துதல்.
4. கவிதை எழுதும் இறனை உருவாக்குதல்
5. படைப்பாளர்களாக உருவாக்கும் இறனை ஏற்படுத்துதல்.
பயன்கள்
மொழி ஆளுமைத் திறன் பெறுதல்.
சமூக சிந்தனையை வளர்த்துக் கொள்ளுதல்.
படைப்பாளர்களாக உருவாகும் இறனைப் பெறுதல்.
இலக்கியங்களின் அறிவை மேம்படுத்துதல்.
கவிதை எழுதும் முறையை புரிந்துக்கொள்ளுதல்
அலகு -1
மரபுக்கவிதை
1. பாரதியார்--விடுதலை, வந்தே மாதரம், காற்று
2. பாரதிதாசன் - அழகின் சிரிப்பு, தமிழனுக்கு வீழ்ச்சி இல்லை
3. கவிமணி தேசியவிநாயகம் பிள்ளை-- தொழிலாளியின் முறையீடு
4. நாமக்கல் கவிஞர்-- தருணம் இதுவே,
5. கண்ணதாசன்-- அனுபவம்
அலகு -2
புதுக்கவிதைகள்
1. அப்துல் ரகுமான் --வெற்றி,
2. அறிவுமதி--நட்புக் காலம்
3. வைரமுத்து-- ருசி, சிற்பி-- ஒடு ஒடு சங்கிலி
4. மு.மேத்தா--வெளிச்சம் வெளியே இல்லை
அலகு -3
நாட்டுப்புறப்பாடல்
1. தாலாட்டு பாடல்
2. தொழில் பாடல்
3. ஒப்பாரிப்பாடல்
அலகு-- 4
சிறுகதை
1. தடயம்-- மா. ஜெயபிரகாசம்,
2. எதார்த்தம் - ச. தமிழ்ச்செல்வி
3. நீதி-- பூமணி
அலகு-5
இலக்கியவரலாறு
கவிதை, சிறுகதை நாட்டுப்புறப்பாடல்
பொதுக்கட்டுரை - மனித நேயம், வாழ்வியல் அறங்கள்
மனப்பாடப் பகுதி : பாரதியார் கவிதை-- வேண்டும், பாரதிதாசன் கவிதை--
செந்தாமரை
பார்வை நூல்கள் :
1. பாரதியார் கவிதைகள் -மணிவாசகர் பதிப்பகம் சென்னை
2. பாரதிதாசன் கவிதைகள் பாரி நிலையம், சென்னை
4. நாட்டுப்புறவியல்
3. தமிழ் இலக்கிய வரலாறு மு. வரதராஜன் சாகித்திய அகாடெமி, சென்னை
முனைவர். ஆறு. ராமநாதன், மணிவாசகர் பதிப்பகம், சென்னை
5. தமிழ் சிறுகதையும் தேற்றம் வளர்ச்சி - தமிழ் புத்தக நிலையம், சென்னை
இணையதளம்

-www.tamilvu.org

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
23111AEC12	English-I	3	1	0	3

Learning Objectives	
LO1	To enable learners to acquire the linguistic competence necessarily required in various life situations.
LO2	To help them understand the written text and able to use skimming, scanning skills
LO3	To assist them in creative thinking abilities
LO4	To enable them become better readers and writers
LO5	To assist them in developing correct reading habits, silently, extensively and intensively

Unit No.	Unit Title & Text
I	Poetry 1.1 A Patch of Land - Subramania Bharati 1.3 A Nation's Strength – Ralph Waldo Emerson 1.4 Love Cycle - Chinua Achebe
II	Prose 2.1 JRD- Harish Bhat 2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim
III	Short Stories 3.1 The Faltering Pendulum- Bhabani Bhattacharya 3.2 How I Taught my Grandmother to Read- Sudha Murthy 3.3 The Gold Frame- R.K. Laxman
IV	Language Competency 4.1 Vocabulary: Synonyms, Antonyms, Word Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction
V	English for Workplace 5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	PO1
CO2	Understand the total content and underlying meaning in the context.	PO1,PO2
CO3	Form the habit of reading for pleasure and for information	PO4,PO6
CO4	Comprehend material other than the prescribed text	PO4,PO5,PO6
CO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	PO3,PO8

	Text books (Latest Editions)
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1	Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi: Sahitya Akademi, 1967
2	How I taught my Grandmother to Read and other Stories, Murthy, Sudha, Penguin Books, India, 2004

WebResources	
1	A patch of land by Subramania Bharati translated by Usha Rajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
2	The Sparrow by Paul Laurence Dunbar https://poets.org/poem/sparrow-0
3	A Nation's Strength by Emerson https://poets.org/poem/nations-strength
4	Love cycle by Chinua Achebe : https://www.best-poems.net/chinua-achebe/love-cycle.html
5	JRD by Harish Bhat https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories

Title of the Course	GENERAL CHEMISTRY-I						
Paper No.	Core III						
Category	Core	Year	I	Credits	5	Course Code	23114AEC13
		Semester	I				
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	4	1	-		5		
Prerequisites	General Chemistry I						
Objectives of the course	This course aims at providing an overall view of the <ul style="list-style-type: none"> • chemistry of acids, bases and ionic equilibrium • properties of s and p-block elements • chemistry of hydrocarbons • applications of acids and bases • compounds of main block elements and hydrocarbons 						
Course Outline	UNIT-I Acids, bases and Ionic equilibria Concepts of Acids and Bases - Arrhenius concept, Bronsted-Lowry concept,						

<p><i>Lewis concept; Relative strengths of acids, bases and dissociation constant; dissociation of poly basic acids, ionic product of water, pH scale, pH of solutions; Degree of dissociation, common ion effect, factors affecting degree of dissociation; acid base indicators, theory of acid base indicators – action of phenolphthalein and methyl orange, titration curves - use of acid base indicators;</i></p> <p><i>Buffer solutions – types, mechanism of buffer action in acid and basic buffer, Henderson-Hasselbalch equation;</i></p> <p><i>Salt hydrolysis - salts of weak acids and strong bases, weak bases and strong acids, weak acids and weak bases - hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant and degree of hydrolysis;</i></p> <p><i>Solubility product - determination and applications; numerical problems</i></p>
<p><i>involving the core concepts.</i></p>
<p>Unit-II</p>
<p>Chemistry of s - Block Elements</p> <p><i>Hydrogen: Position of hydrogen in the periodic table. Alkali metals: Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates. Diagonal relationship of Li with Mg. Preparation, properties and uses of NaOH, Na₂CO₃, KBr, KClO₃ alkaline earth metals. Anomalous behaviour of B</i></p>
<p>Chemistry of p- Block Elements (Group 13 & 14)</p> <p><i>preparation and structure of diborane and borazine. Chemistry of borax. Extraction of Al and its uses. Alloys of Al.</i></p> <p><i>comparison of carbon with silicon. Carbon-di-sulphide – Preparation, properties, structure and uses. Percarbonates, per monocarbonates and per dicarbonates.</i></p>
<p>UNIT-III</p>
<p>Chemistry of p- Block Elements (Group 15-18)</p> <p><i>General characteristics of elements of Group 15; chemistry of H₂N-NH₂, NH₂OH, HN₃ and HNO₃. Chemistry of PH₃, PCl₃, PCl₅, POCl₃, P₂O₅ and oxy acids of phosphorous (H₃PO₃ and H₃PO₄).</i></p>
<p><i>General properties of elements of group 16 - Structure and allotropy of elements - chemistry of ozone - Classification and properties of oxides - oxides of sulphur and selenium – Oxy acids of sulphur (Caro's and Marshall's acids).</i></p>
<p><i>Chemistry of Halogens: General characteristics of halogen with reference to electronegativity, electron affinity, oxidation states and oxidizing power. Peculiarities of fluorine. Halogen acids (HF, HCl, HBr and HI), oxides and oxy acids (HClO₄). Inter-halogen compounds (ICl, ClF₃, BrF₅ and IF₇), pseudo halogens [(CN)₂ and (SCN)₂] and basic nature of Iodine.</i></p>
<p><i>Noble gases: Position in the periodic table. Preparation, properties and structure of XeF₂, XeF₄, XeF₆ and XeOF₄; uses of noble gases - clathrate compounds.</i></p>

	<p>UNIT-IV</p> <p>Hydrocarbon Chemistry-I Petroproducts: Fractional distillation of petroleum; cracking, isomerisation, alkylation, reforming and uses</p> <p>Alkenes-Nomenclature, general methods of preparation – Mechanism of β-elimination reactions – E1 and E2 mechanism - factors influencing – stereochemistry – orientation – Hofmann and Saytzeff rules. Reactions of alkenes – addition reactions – mechanisms – Markownikoff's rule, Kharasch effect, oxidation reactions – hydroxylation, oxidative degradation, epoxidation, ozonolysis; polymerization.</p> <p>Alkadienes Nomenclature - classification – isolated, conjugated and cumulated dienes; stability of conjugated dienes; mechanism of electrophilic addition to conjugated dienes - 1, 2 and 1, 4 additions; free radical addition to conjugated dienes– Diels–Alder reactions – polymerisation – polybutadiene, polyisoprene (natural rubber), vulcanisation, polychloroprene.</p> <p>Alkynes Nomenclature; general methods of preparation, properties and reactions; acidic nature of terminal alkynes and acetylene, polymerisation and isomerisation.</p> <p>Cycloalkanes: Nomenclature, Relative stability of cycloalkanes, Bayer's strain theory and its limitations. Conformational analysis of cyclohexane, mono and di substituted cyclohexanes. Geometrical isomerism in cyclohexanes.</p>
	<p>UNIT-V</p> <p>Hydrocarbon Chemistry - II Benzene: Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, Huckel's (4n+2) rule and its applications. Electrophilic substitution reactions - General mechanism of aromatic electrophilic substitution - nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation. Mono substituted and disubstituted benzene - Effect of substituent – orientation and reactivity. Polynuclear Aromatic hydrocarbons: Naphthalene – nomenclature, Haworth synthesis; physical properties, reactions – electrophilic substitution reaction, nitration, sulphonation, halogenation, Friedel – Crafts acylation & alkylation, preferential substitution at β - position – reduction, oxidation – uses. Anthracene – synthesis by Elbs reaction, Diels – Alder reaction and Haworth synthesis; physical properties; reactions - Diels-Alder reaction, preferential substitution at C-9 and C-10; uses.</p>
<p>Extended Professional Component (is a part of internal</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>

component only, Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	<p>1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nded, S.Chand and Company, New Delhi.</p> <p>Sathya Prakash, Tuli G D, Basu S K and Madan R D, (2003), Advanced Inorganic Chemistry, 17th ed., S.Chand and Company, New Delhi.</p> <p>Bahl B S, Arul Bhal, (2003), Advanced Organic Chemistry, 3rd ed., S.Chand and Company, New Delhi.</p> <p>Tewari K S, Mehrothra S N and Vishnoi N K, (1998), Text book of Organic Chemistry, 2nd ed., Vikas Publishing House, New Delhi.</p> <p>Puri B R, Sharma L R, (2002), Principles of Physical Chemistry, 38th ed., Vishal Publishing Company, Jalandhar.</p>
Reference Books	<p>1. Maron S H and Prutton C P, (1972), Principles of Physical Chemistry, 4th ed., The Macmillan Company, Newyork.</p> <p>Barrow G M, (1992), Physical Chemistry, 5th ed., Tata McGraw Hill, New Delhi.</p> <p>Lee J D, (1991), Concise Inorganic Chemistry, 4thed., ELBS William Heinemann, London.</p> <p>Huheey J E, (1993), Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed., Addison Wesley Publishing Company, India.</p> <p>Gurudeep Raj, (2001), Advanced Inorganic Chemistry Vol – I, 26th ed., Goel Publishing House, Meerut.</p> <p>Agarwal O P, (1995), Reactions and Reagents in Organic Chemistry, 8thed., Goel Publishing House, Meerut.</p>
Website and e-learning source	<p>https://onlinecourses.nptel.ac.in/http://cactus.dixie.edu/smblack/chem1010/lecture notes/4B.html</p> <p>http://www.auburn.edu/~deruija/pdareson.pdfhttps://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding</p> <p>MOOC components</p> <p>http://nptel.ac.in/courses/104101090/</p> <p>Lecture 1: Classification of elements and periodic properties</p> <p>http://nptel.ac.in/courses/104101090/</p>

Course Learning Outcomes (for Mapping with POs and PSOs)**On completion of the course the students should be able to****CO1:** explain the concept of acids, bases and ionic equilibria; periodic properties of s and p block elements, preparation and properties of aliphatic and aromatic hydrocarbons**CO2:** discuss the periodic properties of s and p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids**CO3:** classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons**CO4:** explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements**CO5:** assess the application of hard and soft acids indicators, buffers, compounds of s and p-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Code	Course Title	L	T	P	C
23112GEC14	Allied Mathematics - I	3	1	0	3

Objectives of the Course	<ul style="list-style-type: none"> • The basic skills of differentiation, successive differentiation, and their applications. • Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.
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<p>Unit – I Leibnitz theorem (Proof not needed) and its applications – curvature and radius of curvature in Cartesian only (Proof not needed) – total differential coefficient (Proof not needed) – Jacobians of two & three variables – Simple problems in all these.</p>
<p>Unit – II Reduction formula (when n is a +ve integer) for (i)</p> <p>i. $\int_a^b e^{ax} x^n dx$</p> <p>ii. $\int_a^b \sin^n x dx$</p> <p>iii. $\int_a^b \cos^n x dx$</p> <p>iv. $\int_0^x e^{ax} x^n dx$</p> <p>v. $\int_0^x \sin^n x dx$</p> <p>vi. without proof $\int_0^x \sin^n x \cos^n x dx$ and illustrations</p>
<p>Unit – III Beta and Gamma functions</p>
<p>Unit – IV Evaluation of double and triple integrals in simple cases – changing the order and evaluating of the double integration (Cartesian only)</p>
<p>Unit – V Definition of Fourier series – Finding fourier coefficients for a given periodic function with period 2π and with period $2l$ – use of odd and even functions in evaluating fourier coefficients – half range sine and cosine series.</p>

Recommended Text	<ol style="list-style-type: none"> 1. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer- Verlag, New York, Inc., 1989. 2. Apostol, Calculus, Volumes I and II. 3. G oldberg, Calculus and mathematical analysis.
Reference Books	<ol style="list-style-type: none"> 1. Calculus – T.K.M. Pillai 2. Trigonometry & Fourier series – T.K.M. Pillai.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Determine Leibnitz theorem and its applications and Jacobians of two & three variables

CLO 2: Evaluate Reduction formula (when n is a +ve integer)

CLO 3: Solve Beta and Gamma functions

CLO 4: Evaluation of double and triple integrals in simple cases

CLO 5: Finding Fourier coefficients for a given periodic function

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1
CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1

Course Code	Course Title	L	T	P	C
23112GEC15	Allied Mathematics - II	3	1	0	3

Objectives of the Course	<ul style="list-style-type: none"> • Knowledge on Euler's formula and hyperbolic functions, and the Expansions of sines and cosines. • Knowledge about the Expansion of inverse hyperbolic function and Separation of real and imaginary parts.
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<p>Unit – I Binomial, Exponential & Logarithmic series (Formulae only) – Summation</p>
<p>Unit – II Nonsingular, symmetric, skew symmetric, orthogonal, Hermitian, skew Hermitian and unitary matrices – Characteristics equation, eigen values, eigen vector – Cayley Hamilton's theorem (proof not needed) Simple application only.</p>
<p>Unit – III Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ (n being a positive integer) – Expansion of $\sin^n \theta$, $\cos^n \theta$, $\sin^n \theta \cos^m \theta$ in a series of sines and cosines of multiples of θ (θ – given in radius) Expansion of $\sin \theta$, $\cos \theta$ and $\tan \theta$ in terms of powers of θ (only problems in all the above)</p>
<p>Unit – IV Euler's formula for $e^{i\theta}$ – definition of hyperbolic functions – formulae involving hyperbolic functions – relation between hyperbolic and circular function – expansion of $\sinh x$, $\cosh x$, $\tanh x$ in power of x.</p>
<p>Unit – V Expansion of inverse hyperbolic function – $\sinh^{-1}x$, $\cosh^{-1}x$ and $\tanh^{-1}x$ - Separation of real and imaginary parts of $\sin(x+iy)$, $\cos(x+iy)$, $\tan(x+iy)$, $\sinh(x+iy)$, $\cosh(x+iy)$, $\tanh(x+iy)$</p>

Recommended Text	<ol style="list-style-type: none"> 1. T.K.M. Pillai, T.Natarajan, K.S. Ganapathi, Algebra, Vol I. S.Viswanathan Pvt.Ltd., Chennai – 2004 2. S.Narayanan, T.K.M.Pillai, S.Viswanathan Pvt.Ltd. & Vijay Nicole imprint Pvt. Ltd. 2004
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Determine the Binomial, Exponential & Logarithmic series

CLO 2: Evaluate Nonsingular, symmetric, skew symmetric, orthogonal, Hermitian, skew Hermitian and unitary matrices and Hamilton's theorem

CLO 3: Solve Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ and the Expansion of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of powers of θ

CLO 4: Explain Euler's formula and relation between hyperbolic and circular function

CLO 5: Explain the inverse hyperbolic function and Separation of real and imaginary parts of sine, cosine and tan.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1
CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1

Title of the Course	QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS
Paper No.	Core IV

Instructional hours per week	Lecture	Tutorial	Lab Practice	Total
	-	-	3	3
Prerequisites				
Objectives of the course	This course aims at providing knowledge on laboratory safety handling glass wares analysis of organic compounds preparation of organic compounds			

Category	Core	Year	I	Credits	2	Course Code	23114GEC16
		Semester	II				

	<p>Separation and Purification Techniques (Not for Examination)</p> <p>1. Purification of organic compounds by crystallization (from water / alcohol) and distillation</p> <p>2. Basic ideas about Bunsen burner, its operation and parts of the flame. Chemistry laboratory glassware – basis, information and uses</p> <p>2. Determination of melting and boiling points of organic compounds.</p> <p>3. Steam distillation - Extraction of essential oil from citrus fruits/eucalyptus</p> <p>Unit II</p> <p>4. Chromatography (any one) (Group experiment)</p> <p>Qualitative Organic Analysis</p> <p>1. Preliminary examination, detection of special elements - nitrogen, sulphur and halogens</p> <p>2. Separation of amino acids by Paper Chromatography</p> <p>3. Aromatic and aliphatic nature, Test for saturation and unsaturation, identification of functional groups</p> <p>(i) Thin Layer Chromatography - mixture of sugars / plant pigments</p> <p>(ii) Column Chromatography - mixture of organic compounds</p> <p>4. Confirmation of functional groups</p> <p>(iii) Column Chromatography - extraction of carotene, chlorophyll and xanthophyll from leaves / separation of anthracene, phenol, naphthalene picrate.</p> <p>5. Electrophoresis - separation of amino acids and proteins.</p> <p>(Demonstration) - formation of osazone, mutarose, invertase, invertase hydrate (reducing and non-reducing sugars)</p> <p>6. Isolation of primary, secondary, tertiary amines</p> <p>7. Determination of saponification value of oil or fat</p> <p>8. Estimation of acetic acid from commercial vinegar. (Any one Group experiment) (4, 5 & 6 – not for ESE)</p> <ul style="list-style-type: none"> • anilide, nitro compound • Preparation of derivatives for functional groups 	
<p>Reference Books</p> <p>Venkateswaran, V.; Veeraswamy, R.; Kufandaivelu, A.R. <i>Basic Principles of Practical Chemistry</i>, 2nd ed.; Sultan Chand: New Delhi, 2012.</p> <p>Manna, A.K. <i>Practical Organic Chemistry</i>. Books and Allied: India, 2018.</p> <p>Gurtu, J. N.; Kapoor, R. <i>Advanced Experimental Chemistry (Organic)</i>, Sultan Chand: New Delhi, 1987.</p> <p>Furniss, B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. <i>Vogel's Textbook of Practical Organic Chemistry</i>, 5th ed.; Pearson: India, 1989.</p>	<p>UNIT III</p> <p>Preparation of Organic Compounds</p> <p>1. Reduction - picric acid from Phenol</p> <p>2. Halogenation - p-bromo acetamide from acetamide</p> <p>3. Oxidation - benzoic acid from Benzaldehyde</p> <p>4. Microwave assisted reactions in water:</p> <p>• Methyl benzoate to Benzoic acid</p> <p>• Salicylic acid from Methyl Salicylate</p> <p>• Rearrangement - Benzil to Benzilic Acid</p> <p>• Hydrolysis of benzamide to Benzoic Acid</p>	
<p>Website and e-learning source</p>	<p>https://www.vlab.co.in/broad-area-chemical-sciences</p>	
<p>Course Outline</p>		

Course Learning Outcomes (for Mapping with POs and**PSOs) On completion of the course the students should be****able to****CO1:** observe the physical state, odour, colour and solubility of the given organic compound.**CO2:** identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.**CO3:** compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non-reducing sugars and explain the reactions behind it.**CO4:** exhibit a solid derivative with respect to the identified functional group.

	PO 1	PO 2	PO3	PO4	PO 5	PO6	PO 7	PO 8	PO 9	PO1 0
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

UNITS	COURSE DETAILS
UNIT-I	vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants
UNIT-II	different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces
UNIT-III	different forms of energy– conservation laws of momentum, energy – types of collisions –angular momentum– alternate energy sources–real life examples
UNIT-IV	types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions

	– wave motion – comparison of light and sound waves – free, forced, damped oscillations
UNIT-V	surface tension – shape of liquid drop – angle of contact – viscosity – lubricants – capillary flow – diffusion – real life examples – properties and types of materials in daily use – conductors, insulators – thermal and electric
UNIT-VI	PROFESSIONAL COMPONENTS: expert lectures – seminars – webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. D.S. Mathur, 2010, Elements of Properties of Matter, S.Chand and Co 2. Brij Lal and N. Subrahmanyam, 2003, Properties of Matter, S.Chand and Co.
REFERENCE BOOKS	1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S.Chand and Co.
WEB RESOURCES	1. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html 2. https://science.nasa.gov/ems/ https://eesc.columbia.edu/courses/eesc/climate/lectures/radiation_hays/

COURSE OUTCOMES:

At the end of the course, the student will be able to:

COURSE OUTCOMES	CO1	Apply concept of vectors to understand concepts of Physics and solve problems
	CO2	Appreciate different forces present in Nature while learning about phenomena related to these different forces.
	CO3	Quantify energy in different process and relate momentum, velocity and energy
	CO4	Differentiate different types of motions they would encounter in various courses and understand their basis
	CO5	Relate various properties of matter with their behaviour and connect them with different physical parameters involved.

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (3), MEDIUM (2) and LOW (1).

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	3	3	3	3	3	3	2	3	2
CO 2	2	3	3	3	2	3	3	2	2	2
CO 3	3	3	3	2	3	3	3	2	3	2
CO 4	3	3	3	3	3	3	3	2	2	2
CO 5	3	2	3	3	3	3	3	2	2	3

23114SEC17	Role of Chemistry in daily life (Non Major Elective)	2	0	0	2
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Objectives of the course	<p>This course aims at providing an overall view of the</p> <ul style="list-style-type: none"> • importance of Chemistry in everyday life • chemistry of building materials and food • chemistry of Drugs and pharmaceuticals
Course Outline	<p>UNIT-I</p> <p>General survey of chemicals used in everyday life. Air - components and their importance; photosynthetic reaction, air pollution, green - house effect and the impact on our life style. Water - Sources of water, qualities of potable water, soft and hard water, methods of removal of hardness-water pollution</p> <p>Unit-II</p> <p>Building materials - cement, ceramics, glass and refractories - definition, composition and application only. Plastics - polythene, PVC, bakelite, polyesters, melamine-formaldehyde resins -preparation and uses only.</p> <p>UNIT-III</p> <p>Food and Nutrition - Carbohydrates, Proteins, Fats - definition and their importance as food constituents – balanced diet – Calories minerals and vitamins (sources and their physiological importance). Cosmetics – tooth paste, face powder, soaps and detergents, shampoos, nail polish, perfumes - general formulation and preparations - possible hazards of cosmetic use.</p>

UNIT-IV

Chemicals in food production – fertilizers - need, natural sources; urea, NPK fertilizers and super phosphate. Fuel – classification - solid, liquid and gaseous; nuclear fuel examples and uses.

UNIT-V

Pharmaceutical drugs - analgesics and antipyretics - paracetamol and aspirin. Colour chemicals - pigments and dyes - examples and applications. Explosives - classification and examples.

Recommended Text	<ol style="list-style-type: none"> 1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010. 2. A textbook of pharmaceutical chemistry by Jayashree Ghosh, S Chand publishing, 2012. 3. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006. 4. B. K. Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014. Introduction to forensic chemistry, Kelly M. Elkins, CRC Press Taylor & Francis Group, 2019. 5. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand & Co. Publishers, second edition, 2006.
Reference Books	<ol style="list-style-type: none"> 1. Randolph. Norris Shreve, Chemical Process Industries, McGraw-Hill, Texas, fourth edition, 1977. 2. W.A. Poucher, Joseph A. Brink, Jr. Perfumes, Cosmetics and Soaps, Springer, 2000. 3. A.K. De, Environmental Chemistry, New Age International Public Co., 1990.
Website and e-learning source	
<p>Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to</p> <p>CO1: learn about the chemicals used in everyday life as well as air pollution and water pollution.</p> <p>CO2: get knowledge on building materials cement, ceramics, glass and plastics, polythene, PVC bakelite, polyesters,</p> <p>CO3: acquire information about Food and Nutrition. Carbohydrates, Proteins, Fats Also have an awareness about Cosmetics Tooth pastes, face powder, soaps and detergents.</p> <p>CO4: discuss about the fertilizers like urea, NPK fertilizers and super phosphate. Fuel classification solid, liquid and gaseous; nuclear fuel - examples and uses</p> <p>CO5: have an idea about the pharmaceutical drugs analgesics and antipyretics like paracetamol and aspirin and also about pigments and dyes and its applications.</p>	

	PO 1	PO 2	PO 3	PO4	PO 5	PO6	PO 7	PO 8	PO 9	PO1 0
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Code	Course Title	L	T	P	C
231AECCICN	Indian Constitution	2	-	-	2

Aim:

The aim of the constitution is mentioned in the *preamble that is to constitute* India into a sovereign, socialist, democratic republic and it's the provision of the rights of citizens. it's primary objective is to provide economic, social & political justice.

Course Objectives:

- To make the students understand about the democratic rule and parliamentary administration
- To appreciate the salient features of the Indian constitution
- To know the fundamental rights and constitutional remedies
- To make familiar with powers and positions of the union executive, union parliament and the supreme court
- To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Course outcome:

Democratic values and citizenship training are gained
 Awareness on fundamental rights are established
 The function of union government and state government are learnt
 The power and functions of the judiciary are learnt thoroughly
 Appreciation of democratic parliamentary rule is learnt

Unit I: The making of Indian constitution

The constitution assembly organization - character - work salient features of the constitution- written and detailed constitution -socialism - secularism-democracy and republic.

Unit II: Fundamental rights and fundamental duties of the citizens

Right of equality -right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies -fundamental duties.

Unit III: Directive principles of state policy

Socialistic Principles-Gandhi a principles-liberal and general principles -differences between fundamental rights and directive principles

Unit IV: The union executive, union parliament and Supreme Court

Powers and positions of the president -qualification _method of election of president and vice president -prime minister -Rajya Sabah -Lok Sabah. The supreme court -high court -functions and position of supreme court and high court

Unit V: State council -election system and parliamentary democracy in India

State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.

References:

- 1) Palekar.S.A. Indian constitution government and politics, ABD publications, India
- 2) Aiyer, Alladi krishnaswami, Constitution and fundamental rights 1955.
- 3) Markandan. k.c.directive Principles in the Indian constitution 1966.
- 4) Kashyap. Subash C, Our parliament, National book trust, New Delhi 1989

Course Code	Course Title	L	T	P	C
231LSCUV	Universal Human Values	-	-	-	1

Aim:

This course aims at making learners conscious about universal human values in an integral manner, without ignoring other aspects that are needed for learner's personality development.

Course Objectives :

The present course deals with meaning, purpose and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials.

Course Outcomes :

By the end of the course the learners will be able to:

1. Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.
2. Learn from case studies of lives of great and successful people who followed and practiced human values and achieved self-actualisation.
3. Become conscious practitioners of human values.
4. Realize their potential as human beings and conduct themselves properly in the ways of the world.

Unit I

- Introduction: What is love? Forms of love for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living
- Love and compassion and inter-relatedness
- Love, compassion, empathy, sympathy and non-violence
- Individuals who are remembered in history for practicing compassion and love.
- Narratives and anecdotes from history, literature including local folklore
- Practicing love and compassion: What will learners learn/gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?
- Sharing learner's individual and/or group experience(s)
- Simulated Situations
- Case studies

Unit II

- Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others)
- Individuals who are remembered in history for practicing this value
- Narratives and anecdotes from history, literature including local folklore
- Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?
- Learners' individual and/or group experience(s)
- Simulated situations
- Case studies

Unit III

- Introduction: What is non-violence? Its need. Love, compassion, empathy, sympathy for others as pre-requisites for non-violence
- Ahimsa as non-violence and non-killing
- Individuals and organisations that are known for their commitment to non-violence
- Narratives and anecdotes about non-violence from history, and literature including local folklore

- Practicing non-violence: What will learners learn/gain if they practice non- violence? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about non-violence
- Simulated situations
- Case studies

Unit IV

- Introduction: What is righteousness?
- Righteousness and *dharma*, Righteousness and Propriety
- Individuals who are remembered in history for practicing righteousness
- Narratives and anecdotes from history, literature including local folklore
- Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Case studies

Unit V

- Introduction: What is peace? Its need, relation with harmony and balance
- Individuals and organisations that are known for their commitment to peace
- Narratives and Anecdotes about peace from history, and literature including local folklore
- Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about peace
- Simulated situations
- Case studies

Unit VI

- Introduction: What is service? Forms of service for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.
- Individuals who are remembered in history for practicing this value.
- Narratives and anecdotes dealing with instances of service from history, literature including local folklore
- Practicing service: What will learners learn/gain gain if they practice service? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s) regarding service
- Simulated situations
- Case studies

Unit VII

- Introduction: What is renunciation? Renunciation and sacrifice. Self-restrain and Ways of overcoming greed. Renunciation with action as true renunciation
- Individuals who are remembered in history for practicing this value.

- Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.
- Practicing renunciation and sacrifice: What will learners learn/gain if they practice Renunciation and sacrifice? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Case studies

**FIRST YEAR
SEMESTER – II**

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Tamil – II/ Advanced English-II/ Hindi-II/ French - II	3	1	0	3
23111AEC22	English-II	3	1	0	3
23114AEC23	General Chemistry –II	4	1	0	3
23114GEC24	Mathematics –III	4	1	0	3
23114GEC25	Mathematics –IV	4	1	0	3
PRACTICAL					
23114SEC26L	Quantitative Organic Analysis and Preparation of Organic Compounds	0	0	3	3
Skill Enhancement Course					
23114SEC27	Dairy Chemistry (Non Major Elective)	2	0	0	2
23114SEC28	Functional Cosmetics	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
231AECC02	Communication Skills	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioural Etiquette	-	-	-	1
Total		24	4	6	25

Course Code	Course Title	L	T	P	C
23110AEC21	Tamil-II	3	1	0	3

5. பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக.

பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக :

1. பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக
2. பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக - பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக
3. பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக - பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக, பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக
4. பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக - பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக, பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக
1. பின்வரும் வினாக்களுக்கு பதிலளிப்பதில் ஈடுபடுக www.tamilvu.org, www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
23111AEC22	English-II	3	1	0	3

Learning Objectives	
LO1	To introduce learners to the essential skills of communication in English
LO2	To enable them use these skills effectively in academic and non-academic contexts
LO3	To help them identify and eliminate common mistakes in writing and speaking
LO4	To enable them use various business communication strategies and to use advanced vocabulary
LO5	To familiarize them in writing descriptive essays and respond to arguments orally and in writing

Unit No.	Unit Title & Text
I	Poetry 1.1 Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3 On Killing a Tree - Gieve Patel
II	Prose 2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please - Shashi Tharoor 2.3 The Spoon-fed Age- W.R. Inge

III	Fiction Alchemist - Paulo Coelho
IV	Language Competency 4.1 Homonyms, Homophones, Homographs Portmanteau words 4.2 Subject Verb Agreement
V	English in the Workplace 5.1 Reading for General and Specific information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes

TextBooks(LatestEditions)	
1	The Alchemist - Paulo Coelho Harper - 2005
ReferencesBooks (Latest editions,and the style as given below must be strictly adhered to)	
1	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2	Descriptive English. <u>SP Bakshi</u> , <u>Richa Sharma</u> · 2019, Arihant Publications (India) Ltd.
3	The Reading Book: A Complete Guide to Teaching Reading. <u>Sheena Cameron</u> , <u>Louise Dempsey</u> , S & L. Publishing, 2019.
4	Skimming and Scanning Techniques, <u>Barbara Sherman</u> , Liberty University Press, 2014
5	Brilliant Speed Reading: Whatever you need to read, however ... <u>Phil Chambers</u> , Pearson, 2013.
6	The Archer, <u>Paulo Coelho</u> . Penguin Viking, 2020.
WebResources	
1	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40_%202020103001102714.pdf
2	Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise
3	The Flower by Tennyson: https://www.poemhunter.com/poem/the-flower-2/
4	On Killing a tree by Gieve Patel: https://www.poemhunter.com/poem/on-killing-a-tree/
5	If you are wrong, admit it: https://www.tbr.fun/if-youre-wrong-admit-it/

Course Outcomes	On completion of this course, students will;	
CO1	Learn to introduce themselves and talk about everyday activities confidently	PO1

CO2	Be able to write short paragraphs on people, places and events	PO1, PO2
CO3	Identify the purpose of using various tenses and effectively employ them in speaking and writing	PO4, PO6
CO4	Gain knowledge to write subjective and objective descriptions	PO4, PO5, PO6
CO5	Identify and use their skills effectively in formal contexts.	PO3, PO8

23114AEC23	General Chemistry –II	4	1	0	3
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Instructional hours per week	Lecture	Tutorial	Lab Practice	Total
	-	-	3	3
Prerequisites	General Chemistry II			
Objectives of the course	<p>This course aims at providing knowledge on</p> <ul style="list-style-type: none"> • laboratory safety • handling glass wares • analysis of organic compounds • preparation of organic compounds 			
Course Outline	<p>UNIT I</p> <p>Safety rules, symbols and first-aid in chemistry laboratory</p> <p>Basic ideas about Bunsen burner, its operation and parts of the flame. Chemistry laboratory glassware –basis information and uses</p>			

Unit II

Qualitative Organic Analysis

Preliminary examination, detection of special elements - nitrogen, sulphur and halogens Aromatic and aliphatic nature, Test for saturation and unsaturation, identification of functional groups using solubility tests Confirmation of functional groups

- monocarboxylic acid, dicarboxylic acid
- monohydric phenol, polyhydric phenol
- aldehyde, ketone, ester
- carbohydrate (reducing and non-reducing sugars)
- primary, secondary, tertiary amine
- monoamide, diamide, thioamide
- anilide, nitro compound
- Preparation of derivatives for functional groups

UNIT III

Preparation of Organic Compounds

- ix. Nitration - picric acid from Phenol
- x. Halogenation - p-bromo acetanilide from acetanilide
- xi. Oxidation - benzoic acid from Benzaldehyde
- xii. Microwave assisted reactions in water:
 - xiii. Methyl benzoate to Benzoic acid
 - xiv. Salicylic acid from Methyl Salicylate
- xv. Rearrangement - Benzil to Benzilic Acid
- xvi. Hydrolysis of benzamide to Benzoic Acid

	<p>Separation and Purification Techniques (Not for Examination)</p> <p>7. Purification of organic compounds by crystallization (from water / alcohol) and distillation</p> <p>8. Determination of melting and boiling points of organic compounds.</p> <p>9. Steam distillation - Extraction of essential oil from citrus fruits/eucalyptus leaves.</p> <p>10. Chromatography (any one) (Group experiment)</p> <p>(i) Separation of amino acids by Paper Chromatography</p> <p>(ii) Thin Layer Chromatography - mixture of sugars / plant pigments / permanganate dichromate.</p> <p>(iii) Column Chromatography - extraction of carotene, chlorophyll and xanthophyll from leaves / separation of anthracene - anthracene picrate.</p> <p>11. Electrophoresis – Separation of amino acids and proteins. (Demonstration)</p> <p>12. Isolation of casein from milk/Determination of saponification value of oil or fat/Estimation of acetic acid from commercial vinegar. (Any one Group experiment) (4,5 & 6 – not for ESE)</p>
<p>Reference Books</p>	<p>5. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. <i>Basic Principles of Practical Chemistry</i>, 2nd ed.; Sultan Chand: New Delhi, 2012.</p> <p>6. Manna, A.K. <i>Practical Organic Chemistry</i>, Books and Allied: India, 2018.</p> <p>7. Gurtu, J. N; Kapoor, R. <i>Advanced Experimental Chemistry (Organic)</i>, Sultan Chand: New Delhi, 1987.</p> <p>8. Furniss, B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. <i>Vogel's Textbook of Practical Organic Chemistry</i>, 5th ed.; Pearson: India, 1989.</p>
<p>Website and e-learning source</p>	<p>https://www.vlab.co.in/broad-area-chemical-sciences</p>

Course Learning Outcomes (for Mapping with POs and PSOs) On

completion of the course the students should be able to

CO1: observe the physical state, odour, colour and solubility of the given organic compound.

CO2: identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.

CO3: compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non-reducing sugars and explain the reactions behind it.

CO4: exhibit a solid derivative with respect to the identified functional group.

	PO 1	PO 2	PO3	PO4	PO 5	PO6	PO 7	PO 8	PO 9	PO1 0
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Code	Course Title	L	T	P	C
23114SEC27	DAIRY CHEMISTRY	2	0	0	2

Objectives of the course	<p>This course aims at providing an overall view of the</p> <ul style="list-style-type: none"> • chemistry of milk and milk products • processing of milk • Preservation and formation of milk products.
Course Outline	<p>UNIT I</p> <p>Composition of Milk</p> <p>Milk-definition-general composition of milk- constituents of milk - lipids, proteins, carbohydrates, vitamins and minerals - physical properties of milk - colour, odour, acidity, specific gravity, viscosity and conductivity -Factors affecting the composition of milk - adulterants, preservatives with neutralizer- examples and their detection- estimation of fat, acidity and total solids in milk.</p> <hr/> <p>Unit II</p> <p>Processing of Milk</p> <p>Microbiology of milk - destruction of micro - organisms in milk, physico – chemical changes taking place in milk due to processing - boiling, pasteurization – types of pasteurization -Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization.</p> <hr/> <p>UNIT III</p> <p>Major Milk Products</p> <p>Cream - definition - composition - chemistry of creaming process - gravitational and centrifugal methods of separation of cream - estimation of fat in cream. Butter - definition -composition - theory of churning – desi butter - salted butter, estimation of acidity and moisture content in butter. Ghee - major constituents - common adulterants added to ghee and their detection - rancidity</p>

- Definition - prevention - antioxidants and synergists - natural and synthetic.

UNIT IV:

Special Milk

Standardised milk - definition - merits - reconstituted milk - definition - flow diagram of manufacture - Homogenised milk - flavoured milk - vitaminised milk - toned milk - Incitation milk - Vegetable toned milk - humanized milk -

	<p>condensed milk - definition, composition and nutritive value.</p> <p>UNIT V</p> <p>Fermented and other Milk Products</p> <p>Fermented milk products – fermentation of milk - definition, conditions, cultured milk - definition of culture - example, conditions - cultured cream, butter milk - Bulgarian milk -acidophilous milk – Yoheer Indigeneous products- khoa and chhena definition - Ice cream -definition- percentage composition- types- ingredients- manufacture of ice</p>
Recommended Text	<ol style="list-style-type: none"> 1. K. Bagavathi Sundari, Applied Chemistry, MJP Publishers, first edition, 2006. 2. K. S. Rangappa and K.T. Acharya, Indian Dairy Products, Asia Publishing House New Delhi, 1974. 3. Text book of dairy chemistry, M.P. Mathur, D. Datta Roy, P. Dinakar, Indian Council of Agricultural Research, 1st edition, 2008. 4. A Text book of dairy chemistry, Saurav Singh, Daya Publishing house, 1st edition, 2013. 5. Text book of dairy chemistry, P. L. Choudhary, Bio-Green book publishers, 2021.
Reference Books	<ol style="list-style-type: none"> 1. Robert Jenness and S. Patom, Principles of Dairy Chemistry, S. Wiley, New York, 2005. 2. F.P. Wond, Fundamentals of Dairy Chemistry, Springer, Singapore, 2006. 3. Sukumar De, Outlines of Dairy Technology, Oxford University Press, New Delhi, 1980. 4. P.F. Fox and P.L.H. McSweeney, Dairy Chemistry and Biochemistry, Springer, Second edition, 2016. 5. Dairy chemistry and biochemistry, P. F. Fox, T. Uniacke-Lowe, P.L.H. McSweeney, J.A. O'Mahony, Springer, Second edition, 2015.
Website and e-learning source	

Course Learning Outcomes (for Mapping with POs and PSOs)On

completion of the course the students should be able to

CO 1: understand about general composition of milk – constituents and its physical properties.

CO 2: acquire knowledge about pasteurization of Milk and various types of pasteurization -Bottle, Batch and HTST Ultra High Temperature Pasteurization.

CO 3: learn about Cream and Butter their composition and how to estimate fat in cream andGhee

CO 4: explain about Homogenized milk, flavored milk, vitaminised milk and toned milk.

CO 5: have an idea about how to make milk powder and its drying process - types of

	P O 1	P O 2	P O 3	P O 4	PO 5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to P os	3.0	3.0	3.0	3.0	3.0

23114SEC28	FOUNDATION COURSE (FC)	2	0	0	2
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Level of Correlation between PSO's and CO's

COURSE	FIRST SEMESTER – FOUNDATION COURSE
COURSE TITLE	COSMETICS AND PERSONAL GROOMING
CREDITS	2
COURSE OBJECTIVES	To help students get an overview of Physics before learning their core courses. To serve as a bridge between the school curriculum and the degree programme.

Objectives of the course	<p>This course aims at familiarizing the students with</p> <ul style="list-style-type: none"> • formulations of various types of cosmetics and their significance • hair, skin and dental care • makeup preparations and personal grooming
Course Outline	<p>Unit I Skin care</p> <p>Nutrition of the skin, skin care and cleansing of the skin; face powder – ingredients; creams and lotions – cleansing, moisturizing all purpose, shaving and sunscreen (formulation only); Gels – formulation and advantages; astringent and skin tonics – key ingredients, skin lightness, depilatories.</p> <hr/> <p>Unit II Hair care</p> <p>Shampoos – types – powder, cream, liquid, gel – ingredients; conditioner – types – ingredients</p> <p>Dental care</p> <p>Tooth pastes – ingredients – mouth wash</p> <hr/> <p>Unit III Make up</p> <p>Base – foundation – types – ingredients; lipstick, eyeliner, mascara, eye shadow, concealers, rouge</p>

	<p>Unit IV Perfumes</p> <p>Classification - Natural – plant origin – parts of the plant used, chief constituents; animal origin – amber gries from whale, civetone from civet cat, musk from musk deer; synthetic – classification emphasizing characteristics –</p> <p>esters – alcohols – aldehydes – ketones</p>
	<p>Unit V</p> <p>Beauty treatments</p> <p>Facials - types – advantages – disadvantages; face masks – types; bleach -types – advantages– disadvantages; shaping the brows; eyelash tinting; perming</p> <p>– types; hair colouring and dyeing ; permanent waving – hair straightening; wax – types – waxing; pedicure, manicure - advantages – disadvantages</p>
<p>Recommended Text</p>	<p>1. Thankamma Jacob, (1997) Foods, drugs and cometics – A consumer guide, Macmillan publication, London.</p>
<p>ReferenceBooks</p>	<p>1. Wilkinson J B E and Moore R J, (1997) Harry’s cosmeticology, 7th ed., Chemical Publishers, London.</p> <p>2. George Howard, (1987) Principles and practiceof perfumes and cosmetics,</p>

	Stanley Therones, Chettenham
Website and e-learning source	<ol style="list-style-type: none"> 1. http://www.khake.com/page75.html 2. Net.foxsm/list/284
Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to <ul style="list-style-type: none"> • CO1: know about the composition of various cosmetic products • CO2 understand chemical aspects and applications of hair care and dental care and skincare products. • CO3 understand chemical aspects and applications of perfumes and skin care products. • CO4 to understand the methods of beauty treatments their advantages and disadvantage • CO5 understand the hazards of cosmetic products. 	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of	3.0	3.0	3.0	3.0	3.0

Course Contribution to Pos					
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Level of Correlation between PSO's and CO's

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME

Programme:	B.Sc. Chemistry
Programme Outcomes:	<p>PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study</p> <p>PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.</p> <p>PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p>PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real life situations.</p> <p>PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.</p> <p>PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation</p> <p>PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team</p> <p>PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.</p> <p>PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.</p> <p>PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.</p> <p>PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.</p> <p>PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple</p>

	<p>cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.</p> <p>PO 13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.</p> <p>PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.</p> <p>PO 15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.</p>
<p>Programme Specific Outcomes:</p>	<p>On successful completion of Bachelor of Physics with Computer Applications programme, the student should be able to:</p> <p>PSO1: Disciplinary Knowledge: Understand the fundamental principles, concepts, and theories related to physics and computer science. Also, exhibit proficiency in performing experiments in the laboratory.</p> <p>PSO2: Critical Thinking: Analyse complex problems, evaluate information, synthesize information, apply theoretical concepts to practical situations, identify assumptions and biases, make informed decisions and communicate effectively</p> <p>PSO3: Problem Solving: Employ theoretical concepts and critical reasoning ability with physical, mathematical and technical skills to solve problems, acquire data, analyze their physical significance and explore new design possibilities.</p> <p>PSO4: Analytical & Scientific Reasoning: Apply scientific methods, collect and analyse data, test hypotheses, evaluate evidence, apply statistical techniques and use computational models.</p> <p>PSO5: Research related skills: Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects.</p> <p>PSO6: Self-directed & Lifelong Learning: Set learning goals, manage their own learning, reflect on their learning, adapt to new contexts, seek out new knowledge, collaborate with others and to continuously improve their skills and knowledge, through ongoing learning and professional development, and contribute to the growth and development of their field.</p>

Course Code	Course Title	L	T	P	C	
23112GEC24	Allied Mathematics - III	3		1	0	3

Objectives of the Course	<ul style="list-style-type: none"> • Knowledge on Ordinary differential equations and Formation of partial differential equation • Knowledge about the Lagrange's method, Laplace Transforms and Inverse Laplace transform.
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<p>UNIT I:</p> <p>Ordinary differential equations of first order but of higher degree- Equations solvable for x and y – solvable for dy/dx, clairaut's form (simple case only)- homogeneous linear differential equation(Variable coefficients), variation of parameter.</p>
<p>UNIT II:</p> <p>Formation of partial differential equation by eliminating constants and by eliminating of arbitrary functions- definition of general, particular and complete solution – singular integral(Geometrical meaning not required) solution of first order equations in the slandered forms $f(p,q)=0$, $f(x,p,q)=0$, $f(z,p,q)=0$ $f_1(x,p)=f_2(y,p)$ $z=(x,p+yq)=f(p,q)$.</p>
<p>UNIT III:</p> <p>Lagrange's method for solving $P_p + Q_q = R$ where p,q,r functions of X, Y, Z- (geometrical meaning is not needed)- (only problem in all the above- No proof needed for any formula) Cherpit's method The four standard forms.</p>
<p>UNIT IV:</p> <p>Laplace Trnsforms- Definitions-</p> <p>$L(e^{at})$ $L(\cos at)$, $L(\sin at)$, $L(t^n)$ where n is a positive integer – Basic theorem in laplace (transform only) $L(e^{-st} \cos bt)$, $L(e^{-st} \sin bt)$, $L[e^{-st} f(t)]-L[F(t), L[f(t)], L[f'(t)]$</p>
<p>UNIT V:</p> <p>Inverse Laplace transform related to the above standard forms- solving second order ODE with constant coefficients using laplace transforms and simultaneous equation, variable coeffiecients. Fourier series: Periodic functions — Dirichlet conditions (Without Proof) Odd and Even functions change of interval — Half range series.</p>

Recommended Text	<ol style="list-style-type: none"> 1. S. Narayanan – differential equations 2. T.K.M Pillai & S.Narayanan- calculus 3. M.L.Khanna- differential calculus
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Determine Ordinary differential equations of first order but of higher degree and homogeneous linear differential equation

CLO 2: Evaluate Formation of partial differential equation by eliminating constants and by eliminating of arbitrary functions and singular integral

CLO 3: Solve the Expansion of $\sin\theta$, $\cos\theta$, $\tan\theta$ and the Expansion of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of powers of θ

CLO 4: Explain Laplace Transforms and Basic theorem Inlaplace transforms

CLO 5: Explain Inverse Laplace transform and solving second order ODE with constant coefficients

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1
CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1

Course Code	Course Title	L	T	P	C
23112GEC25	Allied Mathematics - IV	3	1	0	3

Objectives of the Course	<ul style="list-style-type: none"> Knowledge on Vector differentiation, Divergence and Double operators. Knowledge about Vector integration, Gauss divergence theorem and Equation of sphere.
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UNIT – I Vector differentiation – velocity & acceleration vectors- Gradient of a vector directional derivative - Init normal vector- tangent plane.
Unit- II Divergence- Curl – Solenoidal & Irrotational vector- Double operators – Properties connecting grad, div & curl of a vector.
Unit –III Vector integration –Line integrals – Conservative force field – Scalar field- Scalar potential- work done by d Force- Surface integrals – Volume integrals.
Unit –IV Gauss divergence theorem , Stoke’s theorem (statement, application & verification only)
Unit –V Equation of sphere – Target plane – plane section of a sphere – Finding the centre & radius of the circle of integration – sphere through the circle of integration (only problem in all above)

Recommended Text	T.K. Manickavasagem Pillai, Analytical Geometry (3D) & Vector calculus, Neq Gamma Publishing House, 1991.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Determine Vector differentiation, velocity & acceleration vectors and tangent plane.

CLO 2: Evaluate Divergence, Solenoidal & Irrotational vector and Properties connecting grad, div & curl of a vector.

CLO 3: Explain the Vector integration, Line integrals Scalar field, Scalar potential and Volume integrals.

CLO 4: Explain the Gauss divergence theorem, Stoke’s theorem

CLO 5: Explain Equation of sphere, Target plane, Finding the centre and radius of the circle of integration.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1
CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1

SECOND YEAR

SEMESTER – III

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC31/ 23132AEC31/ 23111AEC31/ 23135AEC31	Tamil – III/ Hindi-III/ Advanced English-III/ French – III	3	0	0	3
23111AEC32	English-III	3	1	0	3
23114AEC33	General Chemistry –III	4	1	0	3
23113GEC34	Physics-I	4	1	0	3
PRACTICAL					
23114SEC35L	Qualitative Inorganic Analysis	0	0	3	3
23113GEC36L	Physics Lab-I	0	0	3	2
Skill Enhancement Course					
23114SEC37	Entrepreneurial Skills in Chemistry	2	0	0	1
23114SEC38	Pesticide Chemistry	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
23114RMC039	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	-	-	-	1
Total		21	3	6	23

பொருள் பொருள்
 பொருள்பொருள், பொருள்பொருள்
 பொருள் பொருள்

பொருள் பொருள் :

1. பொருள்பொருள் - பொருள்பொருள், பொருள்பொருள்.
2. பொருள் பொருள்பொருள் - பொ. பொ. பொருள் பொருள்பொருள், பொருள் பொருள்பொருள், பொருள்பொருள் .
3. பொருள் பொருள் பொருள்பொருள் - பொ பொருள், பொருள் பொருள்பொருள்பொருள், பொருள்பொருள்.
4. பொருள்பொருள் - www.tamilvu.org, www.noolulagam.com
5. பொருள்? பொருள்பொருள்

பொ. பொருள்பொருள்,
 பொருள்பொருள் பொருள்பொருள்,
 பொருள் பொருள்பொருள், பொருள்பொருள் பொருள்,
 பொருள்பொருள்-14

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
23111AEC32	English-III	3	1	0	3

Learning Objectives	
LO1	To enhance the level of literary and aesthetic experience of students and to help them respond creatively.
LO2	To sensitize them to the major issues in the society and the world.
LO3	To provide them with an ability to build and enrich their communication skills
LO4	To equip them to utilize the digital knowledge resources effectively for their chosen fields of study
LO5	To help them think and write imaginatively and critically.

Unit No.	Unit Title & Text
I	Poetry: 1.1 The Voice of the Mountains - Mamang Dai 1.2 A Song of Hope - Oodgeroo Noonuccal 1.3 In an Artist's Studio - Christina Rossetti

II	Scenes From Shakespeare: 2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene
III	Speeches of Famous personalities 3.1 Yes, We Can-Barack Obama 3.2 You’ve Got to Find What You Love-Steve Jobs
IV	Language Competency 4.1 Writing letters and emails 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram.facebook] 4.3 Learning netiquette, email etiquette
V	English for Workplace 5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used 5.4 Conducting and participating in a meeting

Text Books (Latest Editions)	
1	Arden Shakespeare Complete works by <u>Shakespeare</u> (Author), <u>William</u> (Author), Bloomsbury, 2011)
References Books (Latest Editions and the style as given below must be strictly adhered to)	
1	<u>The Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015</u>
3	Famous Speeches by Mahatma Gandhi, Createspace Independent Publishing Platform, 2016
4	How to Build a Professional Digital Profile Kindle Edition by <u>Jeanne Kelly Bernish</u> , Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by <u>Keith S Folse</u> , Michigan Teacher Training, 2016.
6	Role Play-Theory and Practice. <u>Kryisia M Yardley-Matwiejczuk</u> , SAGE publications ltd, 1997

Web Resources

1	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3	In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4	Sita by Toru Dutt: https://www.poetrynook.com/poem/s%E2%94%9C%C2%ABta

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	PO1
CO2	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society	PO1,PO2
CO3	Produce grammatically and idiomatically correct language.	PO4,PO6
CO4	Gain knowledge in writing techniques to meet academic and professional needs.	PO4,PO5, PO6
CO5	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	PO3,PO8

23114AEC33	General Chemistry –III	4	1	0	3
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Title of the Course	GENERAL CHEMISTRY -III					
Paper No.	Core V					
Category	Core	Year	II	Credits	5	Course Code
	Semester		I I I			
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total	
		4	1	-		5

Prerequisites	General Chemistry – I and II
Objectives of the course	<p>This course aims to provide a comprehensive knowledge on</p> <ul style="list-style-type: none"> • the physical properties of gases, liquids, solids and X-ray diffraction of solids. • fundamentals of nuclear chemistry and nuclear waste management. • applications of nuclear energy • basic chemistry of halo-organic compounds, phenol and other aromatic alcohols. • preparation and properties of phenols and alcohols.
Course Outline	<p>UNIT I Gaseous state. Kinetic molecular model of a gas: postulates and derivation from the kinetic gas equation; The Maxwell –Boltzmann distribution of speed of molecules- average, root mean square and most probable velocity and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Collision frequency; collision diameter; mean free path and viscosity of gases.</p> <p>Real gases: Deviations from ideal gas behaviour, (Andrew’s and Amagat’s plots); compressibility factor, Z, and its variation with pressure for different gases. equations of states for real gases-van der Waal’s equation; Virial equation; Boyle temperature; Numerical problems based on equations of states for real gases, isotherms of real gases – critical phenomena – isotherms of CO₂</p> <p>- continuity of state–Van der waal’s equation and the critical state; law of corresponding states-liquefaction of gases; numerical problems involving the core concepts.</p> <hr/> <p>Unit-II</p> <p>Liquid and Solid State</p> <p>Properties of Liquids- Surface tension, viscosity and their applications. Crystalline and amorphous – differences - geometry, isotropy and anisotropy, melting point; isomorphism, polymorphism.</p> <p>Crystals –size and shape; laws of crystallography; symmetry elements – plane,</p>

centre and axis; Miller indices, unit cells and space lattices; classification of crystal systems; Bravais lattices; X – ray diffraction – Bragg's equation

Packing in atomic solids – simple cubic, body centered cubic, face centered and hexagonal close packing; Co-ordination number in typical structures - NaCl, CsCl, ZnS, TiO₂; comparison of structure and properties of diamond and graphite;.numerical problems involving core concepts

Defects in solids - stoichiometric and nonstoichiometric defects.

Liquid crystals – classification and applications.

UNIT-III

Nuclear Chemistry

Natural radioactivity - α , β and γ rays; half-life period; Fajan–Soddy group displacement law; Geiger–Nattal rule; isotopes, isobars, isotones, mirror nuclei, iso diaphers; nuclear isomerism; radioactive decay series; magic numbers; units – Curie, Rutherford, Roentgen; nuclear stability - neutron-proton ratio; binding energy; packing fraction; mass defect. Simple calculations involving mass defect and B.E., decay constant and $t_{1/2}$ and radioactive series.

Isotopes – uses – tracers – determination of age of rocks by radiocarbon dating. (Problems to be worked out)

Nuclear energy; nuclear fission and fusion – major nuclear reactors in India; radiation hazards, disposal of radioactive waste and safety measures.

UNIT-IV

Halogen derivatives Aliphatic halogen derivatives

Nomenclature and classes of alkyl halides – isomerism, physical properties, Chemical reactions. Nucleophilic substitution reactions – SN₁, SN₂ and SN_i mechanisms with stereochemical aspects and effect of solvent.

Di, Tri & Tetra Halogen derivatives: Nomenclature, classification, preparation, properties and applications.

Aromatic halogen compounds

Nomenclature, preparation, properties and uses

Mechanism of nucleophilic aromatic substitution – benzyne intermediate.

Aryl alkyl halides

Nomenclature, benzyl chloride – preparation – preparation properties and uses

Alcohols: Nomenclature, classification, preparation, properties, use; conversions – ascent and descent of series; test for hydroxyl groups. Oxidation of diols by periodic acid and lead tetraacetate.

	<p>UNIT-V</p> <p>Phenols</p> <p>Nomenclature; classification, Preparation from diazonium salts, cumene, Dow's process, Raching process; properties – acidic character and effect of substitution on acidity. Reactions – Fries, claisen rearrangement, Electrophilic substitution reactions, Reimer - Teimen, Kolbe, Schmidt, Gatermann synthesis, Libermann, nitro reaction, phthalein reaction.</p> <p>Resorcinol, quinol, picric acid – preparation, properties and uses.</p> <p>Aromatic alcohols</p> <p>Nomenclature, benzyl alcohol – methods of preparation – hydrolysis, reduction of benzaldehyde, Cannizzaro reaction, Grignard synthesis, physical properties, reactions – reaction with sodium, phosphorus pentachloride, thionyl chloride, acetic anhydride, hydrogen iodide, oxidation – substitution on the benzene nucleus, uses.</p> <p>Thiols: Nomenclature, structure, preparation and properties.</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>

Recommended Text	<ol style="list-style-type: none"> 1. B.R. Puri, L.R. Sharma, M.S. Pathania; <i>Principles of Physical Chemistry</i>, 46th edition, Vishal Publishing, 2020. 2. B.R. Puri, L.R. Sharma and K.C. Kalia, <i>Principles of Inorganic Chemistry</i>, Milestone Publishers and Distributors, New Delhi, thirtieth edition, 2009. 3. P.L. Soni and Mohan Katyal, <i>Textbook of Inorganic Chemistry</i>, SultanChand & Sons, twentieth edition, 2006. 4. M. K. Jain, S. C. Sharma, <i>Modern Organic Chemistry</i>, Vishal Publishing, fourth reprint, 2003. 5. S.M. Mukherji, and S.P. Singh, <i>Reaction Mechanism in Organic Chemistry</i>, Macmillan India Ltd., third edition, 1994.
Reference Books	<ol style="list-style-type: none"> 1. T. W. Graham Solomons, <i>Organic Chemistry</i>, John Wiley & Sons, fifth edition, 1992. 2. A. Carey Francis, <i>Organic Chemistry</i>, Tata McGraw-Hill Education Pvt., Ltd., New Delhi, seventh edition, 2009. 3. I. L. Finar, <i>Organic Chemistry</i>, Wesley Longman Ltd, England, sixth edition, 1996.

	4. P. L. Soni, and H. M.Chawla - <i>Text Book of Organic Chemistry</i> , New Delhi, Sultan Chand & Sons, twenty ninth edition, 2007. 5. J.D. Lee, <i>Concise Inorganic Chemistry</i> , Blackwell Science, fifth edition, 2005.
Website and e-learning source	MOOC components https://nptel.ac.in/courses/104104101 Solid state chemistry https://nptel.ac.in/courses/103106071 Nuclear industries and safety https://nptel.ac.in/courses/104106119 s Introduction to organic chemistry
Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to	
CO1: explain the kinetic properties of gases by using mathematical concepts.	
CO2: describe the physical properties of liquid and solids; identify various types of crystals with respect to its packing and apply the XRD method for crystal structure determinations.	
CO3: investigate the radioactivity, nuclear energy and its production, also the nuclear wastemanagement.	
CO4: write the nomenclature, physical & chemical properties and basic mechanisms of halo organic compounds and alcohols.	
CO5: investigate the named organic reactions related to phenol; explain the preparation and properties of aromatic alcohol including thiol.	

	P O 1	PO2	PO 3	PO4	PO5	PO 6	PO7	PO 8	PO 9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3

CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0
Weightage	15	15	15	15	15

Level of Correlation between PSO's and CO's

COURSE	THIRD SEMESTER - ALLIED PAPER
COURSE TITLE	ALLIED PHYSICS – I
COURSE CODE	23113GEC34
CREDITS	
COURSE OBJECTIVES	To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.

UNITS	COURSE DETAILS
UNIT-I	PROPERTIES OF MATTER: Stress – Strain – Hooke's law – bending of beams – depression of cantilever- Determination of Y by uniform and non- uniform bending method- Torsion in a wire- Determination of rigidity modulus by torsional pendulum – Newton's law of Gravitation – Determination of G by Boy's method – mass and density of earth – acceleration due to gravity – Determination of g by compound pendulum.
UNIT-II	HEAT AND THERMODYNAMICS: Zeroth law of thermodynamics – First law of thermodynamics – Reversible and irreversible process – Carnot's theorem – Second law of thermodynamics – Entropy – Change of entropy in reversible and irreversible processes – Third law of thermodynamics – Joule-Thomson effect – Porous plug experiment – liquefaction of gases: liquefaction of helium – Refrigerating mechanism – Air conditioning machines.
UNIT-III	ATOMIC SPECTROSCOPY: Pauli's exclusion principle – Optical spectra – Fine structure of sodium D line – Zeeman effect – Photo electric emission – laws – Lenard's experiment – Richardson and Compton experiments – Einstein's photoelectric equation – Experimental verification of Einstein's photoelectric equation by Millikan's experiment – X-Rays: Introduction – Production – Coolidge tube – Bragg's law – derivation – X-Ray spectra – Continues – Characteristic – Moseley law and its importance.
UNIT-IV	ELECTRICITY: Ohm's law – Kirchoff's law – Application to Wheatstone's Bridge – Carey Foster Bridge – Potentiometer – Measurement of current and resistance – Calibration of low and high range voltmeter – Conversion of galvanometer into ammeter and voltmeter – Fleming's left and right hand rule – Electromagnetic induction – Eddy current – Transformers: Theory, energy loss and applications
UNIT-V	MAGNETISM: Magnetic properties of materials: Magnetic induction B – Magnetisation M – Magnetising field H – Relation between – B, H and M – Magnetic susceptibility – Magnetic permeability – Properties of dia, para and ferro magnetic materials – Curie temperature – Energy loss due to hysteresis – importance of hysteresis curves – magnetic circuit.
TEXT BOOKS	<ol style="list-style-type: none"> 1. Properties of Matter and Acoustics, R. Murugesan, 2nd Edition, S.Chand & Co. Ltd. Reprint (2017). 2. Modern Physics, R.Murugesan, Kiruthiga Sivaprasath, Twelfth Revised Edition, S.Chand & Co. Ltd. Reprint (2006). 3. Heat and Thermodynamics, Brijlal N.subramaniyam, S.Chand & Co. Ltd.Reprint(2006). 4. Electricity and magnetism , R. Murugesan ,Revised edition , S.Chand & Co Reprint (2014)
REFEREN CEBOOK S	<ol style="list-style-type: none"> 1. Heat Thermodynamics and Satistical Physics, Brijlal N.subramaniyam,P.S.Hemme, S.Chand & Co,Revised edition (2007). 2. Thermodynamics and Statistical Physics, Agrawal Prakash, Pragati Prakashan, 27th edition (2015)

WEBLIN KS	<ol style="list-style-type: none"> https://youtu.be/M_5KyncYNyc https://youtu.be/ljJLJgIvaHY https://youtu.be/7mGqd9HQ_AU https://youtu.be/h5jOAw57OXM
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COURSE OUT COMES:

At the end of the course, the student will be able to:

COURSE OUTCOMES	CO1	understand and define the laws involved in gravitation and elasticity.
	CO2	develop the knowledge about heat and thermodynamics, sound and spectroscopy.
	CO3	understand the concept of properties of matter and to recognize their applications in various real problems.
	CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field
	CO5	Understand the magnetic properties

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG(S), MEDIUM (M) and LOW(L).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S	M
CO3	M	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	M	S	S	S	S	S	S	S	S	S

23114SEC35L	Qualitative Inorganic Analysis	0	0	3	3
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Title of the Course	QUALITATIVE INORGANIC ANALYSIS					
Paper No.	Core VI					
Category	Core	Year	II	Credits	2	Course Code
		Semeste	I			
						23114SEC35L

		r	I I			
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total	
	1	-	3		4	
Prerequisites	General chemistry					
Objectives of the course	To develop the skill on systematic analysis of simple inorganic salts and mixture of salts.					
Course Outline	<p>Semi - Micro Qualitative Analysis</p> <ol style="list-style-type: none"> 1. Analysis of simple acid radicals: Carbonate, sulphide, sulphate, thiosulphite, chloride, bromide, iodide, nitrate 2. Analysis of interfering acid radicals: Fluoride, oxalate, borate, phosphate, arsenate, arsenite. 3. Elimination of interfering acid radicals and Identifying the group of basic radicals 4. Analysis of basic radicals (group wise): Lead, copper, bismuth, cadmium, tin, antimony, iron, aluminium, arsenic, zinc, manganese, nickel, cobalt, calcium, strontium, barium, magnesium, ammonium 5. Analysis of a mixture - I to VIII containing two cations and two anions (of which one is interfering type) 					
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.					
Recommended Text	<p>Reference Books:</p> <p>V. Venkateswaran, R. Veeraswamy and A. R. Kulandivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, second edition, 1997.</p>					
Website and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences					
Course Learning Outcomes (for Mapping with POs and PSOs)						

On successful completion of the course the students should be able to **CO 1:** acquire knowledge on the systematic analysis of Mixture of salts. **CO 2:** identify the cations and anions in the unknown substance. **CO 3:** identify the cations and anions in the soil and water and to test the quality of water. **CO4:** assess the role of common ion effect and solubility product

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

COURSE	THIRD SEMESTER - CORE
COURSE TITLE	ALLIED PRACTICAL- I
COURSE CODE	23113SEC36L
CREDITS	

COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results
Minimum of Eight Experiments from the list: <ol style="list-style-type: none"> 1. Young's modulus by non-uniform bending using pin and microscope 2. Young's modulus by non-uniform bending using optic lever, scale and telescope 3. Rigidity modulus by static torsion method. 4. Rigidity modulus by torsional oscillations without mass 2. Surface tension and interfacial Surface tension – drop weight method 3. Comparison of viscosities of two liquids – burette method 4. Specific heat capacity of a liquid – half time correction 5. Verification of laws of transverse vibrations using sonometer 6. Calibration of low range voltmeter using potentiometer 7. Determination of thermo emf using potentiometer 8. Verification of truth tables of basic logic gates using ICs 9. Verification of De Morgan's theorems using logic gate ICs. 10. Use of NAND as universal building block. <p><i>Note</i> : Use of digital balance permitted</p>	

Course Code	Course Title	L	T	P	C
23113SEC37	Energy Physics	2	0	0	2

Learning Objective:

To get the understanding of the conventional and non-conventional energy sources, their conservation and storage systems.

UNITS	COURSE DETAILS
UNIT-I	INTRODUCTION TO ENERGY SOURCES: energy consumption as a measure of prosperity – world energy future – energy sources and their availability – conventional energy sources – non-conventional and renewable energy sources – comparison – merits and demerits.
UNIT-II	SOLAR ENERGY: solar energy Introduction – solar constant – solar radiation at the Earth's surface – solar radiation geometry – Solar radiation measurements – solar radiation data –solar energy storage and storage systems – solar pond – solar cooker – solar water heater – solar greenhouse – types of greenhouses – solar cells.
UNIT-III	WIND ENERGY: introduction –nature of the wind – basic principle of wind energy conversion – wind energy data and energy estimation – basic components of Wind Energy Conversion Systems (WECS) – advantages and disadvantages of WECS – applications – tidal energy
UNIT-IV	BIOMASS ENERGY: introduction – classification – biomass conversion technologies – photosynthesis – fermentation - biogas generation –classification of biogas plants – anaerobic digestion for biogas – wood gasification – advantages & disadvantages.
UNIT-V	ENERGY STORAGE: Energy storage systems – Mechanical Energy storage – Compressed Air storage – Electrical storage – Thermal energy storage - importance of energy storage- batteries - lead acid battery -nickel-cadmium battery – fuel cells – types of fuel cells – advantages and disadvantages of fuel cells – applications of fuel cells - hydrogen storage.
TEXT BOOKS	<ol style="list-style-type: none"> 1. G.D.Rai, Non-Conventional Sources of Energy, Khanna Publishers, 2009, 4thEdn. 2. S P Sukhstme, J K Nayak, Solar Energy, Principles of Thermal Collection and Storage, McGraw Hill, 2008, 3rdEdn.

REFERENCE BOOKS	<ol style="list-style-type: none"> 1. John Twidell & Tony Weir, Renewable Energy Resources, Taylor & Francis, 2005, 2nd Edn. 2. S.A. Abbasi and Nasema Abbasi, Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd, 2008.
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Course Code	Course Title	L	T	P	C
23113SEC38	Mathematical Physics	2	0	0	2

Learning Objective:

To understand higher mathematical concepts which are applied to solve problems in Physics and similar situations

UNITS	COURSE DETAILS
UNIT-I	MATRICES: types of matrices – symmetric, Hermitian, unitary and orthogonal matrices – characteristic equation of a matrix – Eigen values and Eigen vectors of a matrix – Cayley-Hamilton theorem – inverse of matrix by Cayley-Hamilton theorem – similarity transformations – diagonalization of 2x2 real symmetric matrices.
UNIT-II	VECTOR CALCULUS: vector differentiation – directional derivatives – definitions and Physical significance of gradient, divergence, curl – Laplace operators – vector identities – line, surface and volume integrals – statement, proof and simple problems for Gauss’s divergence theorem, Stoke’s theorem, Green’s theorem.
UNIT-III	ORTHOGONAL CURVILINEAR COORDINATES: tangent basis vectors – scale factors – unit vectors in cylindrical and spherical coordinate systems – gradient of a scalar – divergence and curl of a vector – Laplacian in these coordinate systems.
UNIT-IV	FOURIER SERIES: periodic functions – Dirichlet’s conditions – general Fourier series – even and odd functions and their Fourier expansions – Fourier cosine and sine – half range series – change of length of interval. Fourier analysis of square wave, saw-tooth wave, half wave/full wave rectifier wave forms. FOURIER TRANSFORMS: Fourier Integral theorem (Statement only) – Fourier, Fourier sine and Fourier cosine transforms, – Fourier transform of single pulse – trigonometric, exponential and Gaussian functions – inverse Fourier transform – convolution theorem.
UNIT-V	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (PDE): PDE for transverse vibrations in elastic strings (one dimensional wave equation) – one dimensional heat flow equation – solutions to these PDE’s by method of separation of variables – problems based on boundary conditions and initial conditions.
TEXT BOOKS	<ol style="list-style-type: none"> 1. Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India. 2. Mathematical Physics – P. K. Chattopadhyay, New Age International Publishers. 3. Mathematical Physics – B. D. Gupta. 4. Mathematical Physics – H. K. Das, S. Chand and Co, New Delhi.

REFERE NCE BOOKS	<ol style="list-style-type: none"> 1. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill. 2. Engineering Mathematics III- B, M. K. Venkataraman, 3. Applied Mathematics for Scientists and Engineers, Bruce R. Kusseand Erik A. Westwig, 2nd Ed, WILEY-VCH Verlag, 2006. 4. Vector space and Matrices – J. C. Jain, Narosa Publishing House Pvt. Ltd.
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23114SEC37	Entrepreneurial Skills in Chemistry	2	0	0	1
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Objectives of the course	<p>The course aims at providing training to</p> <ul style="list-style-type: none"> • develop entrepreneur skills in students • to provide hands on experience to prepare and develop products • develop start ups
Course Outline	<p>UNIT -I</p> <p>Food Chemistry</p> <p>Food adulteration-contamination of food items with clay stones, water and toxic chemicals -Common adulterants. Food additives, Natural and synthetic anti-oxidants, glazing agents (hazardous effect), food colourants, Preservatives, leavening agents, Baking powder and baking soda, yeast, MSG, vinegar.</p> <p>Dyes</p> <p>Classification – Natural, synthetic dyes and their characteristics – basic methods and principles of dyeing</p>

UNIT II

Hands on Experience (Students can choose any four)

Detection of adulterants in food items like coffee, tea, pepper, chilli powder, turmeric powder, butter, ghee, milk, honey etc., by simple techniques. Preparation of Jam, squash and Jelly, Gulkand, cottage cheese.

Preparation of products like candles, soap, detergents, cleaning powder, shampoos, pain balm, tooth paste/powder and disinfectants in small scale.

Extraction of oils from spices and flowers. Testing of water samples using testing kit.

Dyeing – cotton fabrics with natural and synthetic dyes Printing – tie and dye, batik.

Skills acquired from this course	Entrepreneurial skills.
Recommended Text	1. George S & Muralidharan V, (2007) Fibre to Finished Fabric – A Simple Approach, Publication Division, University of Madras, Chennai. 2. Appaswamy G P, A Handbook on Printing and Dyeing of Textiles.
Reference Books	Shyam Jha, Rapid detection of food adulterants and contaminants (Theory and Practice), Elsevier, e Book ISBN 9087128004289, 1 st Edition, 2015
Website and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences
Course Learning Outcomes (for Mapping with POs and PSOs)	
On completion of the course the students should be able to	
CO 1: identify adulterated food items by doing simple chemical tests.	
CO 2: prepare cleaning products and become entrepreneurs	
CO 3: educate others about adulteration and motivate them to become entrepreneurs.	

	PO 1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	S	S	S	M	S	M
CO 2	M	S	S	S	M	S	S	M	M	M
CO 3	S	S	S	M	S	S	S	M	S	M

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3

CO2	3	3	3	3	3
Weightage	6	6	6	6	6
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

23114SEC38	Pesticide Chemistry	2	0	0	2
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Objectives of the course	<p>This course aims to providing the students</p> <ul style="list-style-type: none"> • knowledge about the various types of pesticides and their toxicity. • to understand the accumulation of pesticides in in the form of residues and its analysis. • knowledge on choice of alternate and eco-friendly pesticides.
Course Outline	<p>Unit I</p> <p>Introduction: History of pesticides. Chemistry of Pesticides: Brief introduction to classes of pesticides (Chemical class, targets), structures, chemical names, physical and chemical properties.</p> <p>Toxicity of pesticides: Acute and chronic toxicity in mammals, birds, aquatic species etc. Methods of analysis of pesticides.</p> <p>Insecticides: Classification and study of following insecticides with respect to structure, chemical name, physical properties, chemical properties, synthesis, degradation, metabolism, formulations, Mode of action, uses, toxicity.</p> <p>Organophosphates and Phosphothionates: Acephate, Chlorpyrifos, Monocrotophos, and parathion-methyl. Organochlorine – Endosulfan, heptachlor; Carbamate: Cartap hydrochloride, Methomyl, Propoxur.</p> <p>Unit II</p> <p>Pesticides residues: Introduction- application of agrochemicals, dissemination pathways of pesticides, causes of pesticide residues, remedies. Pesticides residues in atmosphere- entry into atmosphere, action of pesticides, effects on environments. Pesticides residues in water</p> <p>- entry into water systems, action and effect in aquatic environment. Pesticides residues in soil. entry into soil, absorption, retention and transport in soil, effects on microorganism, soil condition and fertility, decomposition and degradation by climatic factors and microorganism.</p> <p>Pesticide Residues effect and analysis: Effects of pesticides residue on human life, birds and animals- routes for exposure to pesticides, action of pesticides on living system. Analysis of pesticides residues- sample preparation, extraction of pesticides residues (soil, water and vegetables/fruits) simple methods and schemes of analysis, multi-residue analysis.</p>

	<p>Unit III</p> <p>Biopesticides: Pheromones, attractants, repellents – Introduction, types and application (8- Dodecen-1-ol, 10-cis-12-hexadecadienoic, Trimedlure, Cue-lure, methyl eugenol, N,N- Diethyl-m-toluamide, Dimethyl phthalate, Icaridin). Baits- Metaldehyde, Iron (II) phosphate,</p> <p>Indoxacarb, Zinc Phosphide, Bromadiolone.</p>
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
Skills acquired from this course	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
Recommended Text	<ol style="list-style-type: none"> 1. Handa SK. Principles of pesticide chemistry. Agrobios (India); 2012. 2. Matolcsy G, Nádas M, Andriska V. Pesticide chemistry. Elsevier; 1989. 3. J. Miyamoto and P. C. Kearney Pesticide Chemistry Human Welfare and the Environment vol. IV Pesticide Residue and Formulation Chemistry, Pergamon press, 1985. 4. R. Cremllyn: Pesticides, John Wiley.
Reference Books	<ol style="list-style-type: none"> 1. Roy N. K., Chemistry of Pesticides. CBS Publisher & Distributors PLtd; 1st Ed. (2010). 2. Nollet L.M., Rathore H.S., Handbook of pesticides: methods of pesticide residues analysis. CRC press; 2016. 3. Ellerbrock R.H., Pesticide Residues: Significance, Management and Analysis, 2005
<p>Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to</p> <p>CO 1: teach about the pesticides and their toxicity with respect to structure and category.</p> <p>CO 2: explain the preparation and property of pesticides</p> <p>CO 3: investigate the pesticide residues, prevention and care</p> <p>CO 4: demonstrate the extraction and analytical methods of pesticide residues</p> <p>CO 5: make awareness to the public on bio-pesticides</p>	

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

Course Code	Course Title	L	T	P	C
23114RMC039	Research Methodology	2	0	0	2

UNIT I: Introduction to Research Methodology

Meaning of research – Objectives of research – Types of research – Significance of research – Research approaches

UNIT II: Research Methods

Research methods versus methodology – Research and scientific method – Criteria of good research – Problems encountered by researchers in India.

UNIT III: Literature Survey

Articles – Thesis – Journals – Patents – Primary sources of journals and patents – Secondary sources – Listing of titles – Abstracts – Reviews – General treatises – Monographs.

UNIT IV: Database Survey

Database search – NIST – MSDS – PubMed – Scopus – Science citation index – Information about a specific search.

UNIT V: Laboratory Safety

General guidelines. Hygiene – Eye, foot, skin and hand protection – Safety rules -Equipment protection – Respiratory protective equipment – safety equipment – Leaking compressed gas cylinders – electrical safety. Fire – fire extinguishers.

References:

1. C. R. Kothari, Research Methodology, New Age International Publishers. New Delhi, 2004.
2. R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 2099.
3. D.G Peters, J.M. Hayes and G.M. Hefige, A brief introduction to Modern chemical analysis.
4. R. Gopalan, Thesis writing, Vijay Nicole Imprints Private Ltd., 2005.
5. R.Gopalan, P. S. Subramanian and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand and Sons, New Delhi, 2005.
6. E. Balagurusamy, Numerical methods, Tata McGraw-Hill
7. S.S. Sastry, Introductory Methods of Numerical analysis, PHI, N.Delhi

Course Code	Course Title	L	T	P	C
231ACLSOAN	Office Automation	0	0	0	1

Aim and Course Objectives:

To provide an in-depth training in use of office automation, internet and internet tools. The course also helps the candidates to get acquainted with IT.

Course Outcomes:

After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with internet.

UNIT I

Knowing the basics of Computers

UNIT II

Word Processing (MS word)

UNIT III

Spread Sheet (MS XL)

UNIT IV

Presentation (MS Power Point)

UNIT V

Communicating with Internet

Reference:

1. Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
2. Microsoft Office 2007 Bible – John Walkenbach, HerbTyson, FaitheWempen, cary N.Prague, Michael R.groh, Peter G.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
3. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
4. Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
5. <https://en.wikipedia.org>
6. <https://wiki.openoffice.org/wiki/Documentation>
7. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

SEMESTER – IV

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tamil-IV/ Advanced English-IV / Hindi-IV/ French – IV	3	0	0	3
23111AEC42	English-IV	3	0	0	3
23114AEC43	General Chemistry –IV	4	1	0	3
23116GEC44	Physics II	4	1	0	3
PRACTICAL					
23114SEC45L	Physical Chemistry Practical I	0	0	3	3
23116GEC46L	Physics Lab-II	0	0	3	2
Skill Enhancement Course					
23114SEC47	Instrumental methods of chemical analysis	2	0	0	2
23114SEC48	Forensic science	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
23114BRC49	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies-II	2	0	0	2
AUDIT COURSE					
231LCSCLS	Leadership and Management Skills	-	-	-	1
	Total	22	2	6	26

Course Code	Course Title	L	T	P	C
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
23111AEC42	English-IV	3	1	0	3

Learning Objectives	
LO1	To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.
LO2	To enable them use receptive skills through reading and listening to acquire good exposure to language and literature.
LO3	To help them develop style in speech and writing and manipulate the tools of language for effective communication.
LO4	To provide exposure to plays, autobiographies and expose them to value based ideas.
LO5	To enhance their language skills especially in the areas of grammar and pronunciation.

Unit No.	Unit Title & Text
I	Life Writing 1.1 I am Malala-Malala Yousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2
II	One Act Plays 2.1 The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov
III	Interviews 3.1 Nelson Mandela's Interview with Larry King. 3.2 Rakesh Sharma's Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)
IV	Language Competency 4.1 Refuting, Arguing & Debating 4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help 4.3 Interviews (face to face, telephone and video conferencing)

V	<p>English for Workplace</p> <p>5.1 Job Applications: Covering letters, CV and Resume</p> <p>5.2 Creating a digital profile - LinkedIn</p> <p>5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card</p> <p>5.4 Body Language -Practical Skills for Interviews</p>
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TextBooks(LatestEditions)	
1.	I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by <u>Malala Yousafzai</u> , <u>Christina Lamb</u> , Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition
ReferencesBooks (Latest editions,and the style as given below must be strictly adhered to)	
1	<u>Writing Your Life: A Guide to Writing Autobiographies</u> , <u>Mary Borg</u> , Taylor & Francis, 2021
2	One-act Plays for Acting Students: An Anthology of Short <u>Norman A. Bert</u> · 1987 ·
3	<u>The One-Act Play Companion: A Guide to plays, playwrights ...</u> <u>Colin Dolley</u> , <u>Rex Walford</u> · 2015
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Role Play-Theory and Practice.Krysia M Yardley-Matwiejczuk, SAGE publications ltd, 1997

Web Resources	
1	For Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s (the link to the performance; refer scripts by Aaron Sheperd)
2	http://BBC learn English.com
3	http://onestopenglish.com
4	http://hearn-english-today.com
5	http://talkenglish.com

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Learn to communicate effectively and appropriately in real life situation.	PO1
CO2	Use English effectively for study purpose across the curriculum	PO1,PO2
CO3	Develop interest in and appreciation of Literature	PO4,PO6

CO4	Develop and integrate the use of the four language skills	PO4,PO5,PO6
CO5	Enhance their language skills especially in the areas of grammar and pronunciation.	PO3,PO8

COURSE OBJECTIVES	<ol style="list-style-type: none"> 1. To provide an in-depth understanding of the basics of various phenomena in geometrical and wave optics; 2. To explain the behaviour of light in different mediums; To understand the differences in the important phenomena namely interference, diffraction and Polarization and apply the knowledge in day to day life; 3. To understand the design of optical systems and methods to minimise aberrations; 4. To solve problems in optics by selecting the appropriate equations and performing numerical or analytical calculations.
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Title of the Course	GENERAL CHEMISTRY-IV						
Paper No.	Core VII						
Category	Core	Year	II	Credits	4	Course Code	23114AEC43
		Semester	I V				
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	4	-	-		4		
Prerequisites	General Chemistry III						
Objectives of the course	<p>This course aims to provide a comprehensive knowledge on</p> <ul style="list-style-type: none"> • thermodynamic concepts on chemical processes and applied aspects. • thermo chemical calculations • transition elements with reference to periodic properties and group study of transition metals. • the organic chemistry of ethers, aldehydes and ketones • the organic chemistry of carboxylic acids 						

Course Outline	UNIT I Thermodynamics I Terminology – Intensive, extensive variables, state, path functions; isolated, closed and open systems; isothermal, adiabatic, isobaric, isochoric, cyclic, reversible and irreversible processes; First law of thermodynamics – Concept and significance of heat (q), work (w), internal energy (E), enthalpy (H); calculations of q, w, E and H for reversible, irreversible
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	<p>expansion of ideal and real gases under isothermal and adiabatic conditions; relation between heat capacities (C_p & C_v); Joule Thomson effect- inversion temperature.</p> <p>Thermochemistry - heats of reactions, standard states; types of heats of reactions and their applications; effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions; Hess's law and its applications; determination of bond energy; Measurement of heat of reaction – determination of calorific value of food and fuels</p> <p>Zeroth law of thermodynamics-Absolute Temperature scale.</p>
	<p>Unit II</p> <p>Thermodynamics II</p> <p>Second Law of thermodynamics - Limitations of first law, spontaneity and randomness; Carnot's cycle; Concept of entropy, entropy change for reversible and irreversible processes, entropy of mixing, calculation of entropy changes of an ideal gas and a van der Waals gas with changes in temperature, volume and pressure, entropy and disorder.</p> <p>Free energy and work functions - Need for free energy functions, Gibbs free energy, Helmholtz free energy - their variation with temperature, pressure and volume, criteria for spontaneity; Gibbs-Helmholtz equation – derivations and applications; Maxwell relationships, thermodynamic equations of state; Thermodynamics of mixing of ideal gases, Ellingham Diagram-application.</p> <p>Third law of thermodynamics - Nernst heat theorem; Applications of third law - evaluation of absolute entropies from heat capacity measurements, exceptions to third law.</p>
	<p>UNIT III</p> <p>General Characteristics of d-block elements</p> <p>Transition Elements- Electronic configuration - General periodic trend variable valency, oxidation states, stability of oxidation states, colour, magnetic properties, catalytic properties and tendency to form complexes. Comparative study of transition elements and non transition elements – comparison of II and III transition series with I transition series. Group study of Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel and Zinc groups</p>
	<p>UNIT IV</p> <p>Ethers, Thio ethers and Epoxides</p>

Nomenclature, isomerism, general methods of preparations, reactions involving cleavage of C-O linkages, alkyl group and ethereal oxygen. Zeisel's method of estimation of methoxy group.

	<p>Reactions of epoxides with alcohols, ammonia derivatives and LiAlH_4 Thioethers - nomenclature, structure, preparation, properties and uses.</p> <p>Aldehydes and Ketones</p> <p>Nomenclature, structure and reactivity of aliphatic and aromatic aldehydes and ketones; general methods of preparation and physical properties. Nucleophilic addition reactions, base catalysed reactions with mechanism- Aldol, Cannizzaro's reaction, Perkin reaction, Benzoin condensation, Haloform reaction, Knoevenagel reaction. Oxidation of aldehydes. Baeyer - Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf - Kishner reduction, Meerwein - Ponnordorf Verley reduction, reduction with LiAlH_4 and NaBH_4.</p> <p>Addition reactions of unsaturated carbonyl compounds: Michael addition.</p> <p>UNIT V</p> <p>Carboxylic Acids: Nomenclature, structure, preparation and reactions of aliphatic and aromatic monocarboxylic acids. Physical properties, acidic nature, effect of substituent on acidic strength. HVZ reaction, Claisen ester condensation, Bouveault Blanc reduction, decarboxylation, Hunsdiecker reaction. Formic acid-reducing property.</p> <p>Reactions of dicarboxylic acids, hydroxy acids and unsaturated acids.</p> <p>Carboxylic acid Derivatives: Preparations of aliphatic and aromatic acid chlorides, esters, amides and anhydrides. Nucleophilic substitution reaction at the acyl carbon of acyl halide, anhydride, ester, amide. Schotten-Baumann reaction. Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann bromamide degradation and Curtius rearrangement.</p> <p>Active methylene compounds: Keto - enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate</p> <p>Halogen substituted acids - nomenclature; preparation by direct halogenation, iodination from unsaturated acids, alkyl malonic acids</p> <p>Hydroxy acids - nomenclature; preparation from halo, amino, aldehydic and ketonic acids, ethylene glycol, aldol acetaldehyde; reactions - action of heat on α, β and γ hydroxy acids.</p>
<p>Extended Professional Component (is a</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>

part of internal component only, Not to be included in the external	
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examination question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	<ol style="list-style-type: none"> 1. B.R. Puri and L.R. Sharma, <i>Principles of Physical Chemistry</i>, Shoban Lal Nagin Chand and Co., thirty three edition, 1992. 2. K. L. Kapoor, <i>A Textbook of Physical chemistry</i>, (volume-2 and 3), Macmillan, India Ltd, third edition, 2009. 3. P.L. Soni and Mohan Katyal, <i>Textbook of Inorganic Chemistry</i>, Sultan Chand & Sons, twentieth edition, 2006. 4. M. K. Jain, S. C. Sharma, <i>Modern Organic Chemistry</i>, Vishal Publishing, fourth reprint, 2003. 5. S.M. Mukherji, and S.P. Singh, <i>Reaction Mechanism in Organic Chemistry</i>, Macmillan India Ltd., third edition, 1994.
ReferenceBooks	<ol style="list-style-type: none"> 1. Maron, S. H. and Prutton C. P. <i>Principles of Physical Chemistry</i>, 4thed.; The Macmillan Company: Newyork, 1972. 2. Lee, J. D. <i>Concise Inorganic Chemistry</i>, 4th ed.; ELBS William Heinemann: London, 1991. 3. Gurudeep Raj, <i>Advanced Inorganic Chemistry</i>, 26thed.; Goel Publishing House: Meerut, 2001. 4. Atkins, P.W. & Paula, J. <i>Physical Chemistry</i>, 10th ed.; Oxford University Press: New York, 2014. 5. Huheey, J. E. <i>Inorganic Chemistry: Principles of Structure and Reactivity</i>, 4th ed; Addison Wesley Publishing Company: India, 1993.
Website and e-learning source	MOOC components https://nptel.ac.in/courses/112102255 Thermodynamics https://nptel.ac.in/courses/104101136 Advanced transition metal chemistry

Course Learning Outcomes (for Mapping with POs and PSOs)On

completion of the course the students should be able to

CO1: explain the terms and processes in thermodynamics; discuss the various laws of thermodynamics and thermo chemical calculations.

CO2: discuss the second law of thermodynamics and its application to heat engine; discuss third law and its application on heat capacity measurement.

CO3: investigate the chemistry of transition elements with respect to various periodic properties and group wise discussions.

CO4: discuss the fundamental organic chemistry of ethers, epoxides and carbonyl compounds including named organic reactions.

CO5: discuss the chemistry and named reactions related to carboxylic acids and their

derivatives; discuss chemistry of active methylene compounds, halogen substituted acids and hydroxyl acids.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Code	Course Title	L	T	P	C
23113GEC44	Optics and Spectroscopy	4	1	0	3

COURSE OBJECTIVES	5. To provide an in-depth understanding of the basics of various phenomena in geometrical and wave optics; 6. To explain the behaviour of light in different mediums; To understand the differences in the important phenomena namely interference, diffraction and Polarization and apply the knowledge in day to day life; 7. To understand the design of optical systems and methods to minimize aberrations; 8. To solve problems in optics by selecting the appropriate
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	equations and performing numerical or analytical calculations.
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UNITS	COURSE DETAILS
UNIT-I	<p>INTRODUCTION TO OPTICS: postulates of geometrical optics <i>Lens:</i> thick and thin lenses – focal length, critical thickness, power and cardinal points of a thick lens – lens makers formula (no derivation) – aberrations: spherical aberration, chromatic aberrations, coma, and astigmatism – curvature of the field – distortion – chromatic aberrations methods.</p> <p><i>Prism:</i> narrow angled prisms - dispersion, deviation, aberrations - applications rainbows and halos, constant deviation spectroscopy.</p> <p><i>Eyepieces:</i> advantage of an eyepiece over a simple lens – Huygen’s and Ramsden’s eyepieces, construction and working – merits and demerits of the eyepiece.</p> <p><i>Resolving power:</i> Rayleigh’s criterion for resolution – limit of resolution for the eye – resolving power of, (i) Prism (ii) grating (iii) telescope</p> <p><i>Fiber Optics:</i> Basic ideas of optical fibre – Numerical aperture – Stepped and graded index fibres – Fibre optic communication (Block diagram only).</p>
UNIT-II	<p>INTERFERENCE: division of wave front, Fresnel’s biprism – fringes with white light – division of amplitude: interference in thin films due to, (i) reflected light, (ii) transmitted light – colours of thin films applications – air wedge – Newton’s rings.</p> <p><i>Interferometers :</i> Michelson’s interferometer – applications, (i) determination of the wavelength of a monochromatic source of light, (ii) determination of the wavelength and separation D_1 and D_2 lines of sodium light, (iii) determination of a thickness of a mica sheet.</p>
UNIT-III	<p>DIFFRACTION: Fresnel’s assumptions – zone plate – action of zone plate for an incident spherical wave front – differences between a zone plate and a convex lens – Fresnel type of diffraction – diffraction pattern due to a straight edge – positions of maximum and minimum intensities – diffraction due to a narrow slit – Fraunhofer type of diffraction – Fraunhofer diffraction at a single slit – plane diffraction grating – experiment to determine wavelengths – width of principal maxima.</p>

UNIT-IV	POLARISATION: optical activity – optically active crystals –polarizer and analyser–double refraction – optic axis, principal plane – Huygens’s explanation of double refraction in uniaxial crystals – polaroids and applications – circularly and elliptically polarized light –quarter wave plate – half wave plate – production and detection of circularly and elliptically polarized lights – Fresnel’s explanation – specific rotation – Laurent half shade polarimeter – experiment to determine specific rotatory power.
UNIT-V	SPECTROSCOPY: infra-red spectroscopy near infra-red and far infra-red – properties –origin of IR spectra – IR spectrophotometer – applications interpretation of IR spectra – CH, CO, CN bending and stretching vibrational modes only – scattering of light – Raman effect –classical theory –quantum theory –mutual exclusion principle – Raman spectrometer- characteristics of Raman lines –applications – ultraviolet and visible spectroscopy –properties – spectrophotometer.
TEXT BOOKS	1. Subramaniam. N&Brijlal, 2014,Optics, 25 th edition,S.Chand &Co. 2. S.L.Gupta,V.Kumar & R.C.Sharma,1997,Elements of Spectroscopy, 13 th Edition, Pragati Prakashan, Meerut. 3. G.Aruldhass,2000,Molecular Structure and Spectroscopy,II edition.PHIPvt Ltd, New Delhi.
REFER ENCEB OOKS	1. Agarwal B.S, 2011,Optics, KedernathRamnath Publishers, Meerut. 2. Sathyaprakash, 1990,Optics,VII edition, RatanPrakashanMandhir, New Delhi. 3. C.N.Banewell, 2006, Introduction to Molecular Spectroscopy,IV edition,TMH Publishing Co,New Delhi.
WEBLIN KS	1. https://science.nasa.gov/ems/ 2. https://www.youtube.com/watch?v=tL3rNc1G0qQ&list=RDCMUCzwo7UIGkb-8Pr6svxWo-LA&start_radio=1&t=2472 1. https://science.nasa.gov/ems/

COURSE OUTCOMES:

At the end of the course, the student will be able to:

COURSE OUTCOMES	CO1	Outline basic knowledge of methods of rectifying different defects in lenses
	CO2	Discuss the principle of superposition of wave, use these ideas to understand the wave nature of light
	CO3	Extend the knowledge about nature of light through diffraction techniques

CO4	Interpret basic formulation of polarization
CO5	Relate the principles of optics to various fields of IR, Raman

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	M	M	S	S	M	M
CO2	M	S	M	S	M	S	M	M	S	S
CO3	S	M	S	S	S	M	S	S	M	M
CO4	S	M	S	M	M	S	M	M	S	M
CO5	S	M	S	M	S	S	M	S	S	S

Title of the Course	PHYSICAL CHEMISTRY PRACTICAL – I									
Paper No.	Core VIII									
Category	Core	Year	II	Credits	2	Course Code	23114SEC45L			
		Semester	IV							
Instructional	Lecture	Tutorial	Lab Practice			Total				

hours per week	-	-	3	3
Prerequisites	General Chemistry			
Objectives of the course	<p>The course aims at providing an understanding of</p> <ul style="list-style-type: none"> • the laboratory experiments in order to understand the concepts of physical changes in chemistry • the rates of chemical reactions • colligative properties and adsorption isotherm 			
Course Outline	<p>UNIT-I</p> <p>Chemical kinetics</p> <p>1. Determination of rate constant of acid catalysed hydrolysis of an ester</p>			

	<p>(methyl acetate).</p> <p>2. Determination of order of reaction between iodide and persulphate (initial rate method).</p> <p>3. Polarimetry: Determination of rate constant of acid catalysed inversion of cane sugar</p> <p>Thermochemistry</p> <p>4. Determination of heat of neutralisation of a strong acid by a strong base.</p> <p>5. Determination of heat of hydration of copper sulphate.</p>
	<p>UNIT II</p> <p>Electrochemistry – Conductance measurements</p> <p>6. Determination of cell constant</p> <p>7. Determination of molar conductance of strong electrolyte</p> <p>8. Determination of dissociation constant of acetic acid</p> <p>Colorimetry</p> <p>9. Determination of concentration of copper sulphate solution</p>
	<p>UNIT III</p> <p>Colligative property</p> <p>10. Determination of molecular weight of an organic compound by Rast method using naphthalene or diphenyl as solvent</p> <p>Adsorption</p> <p>11. Construction of Freundlich isotherm for the adsorption of acetic acid on activated charcoal</p>
Skills acquired from this course	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>

Reference Books	<ol style="list-style-type: none"><li>1. Sindhu, P.S. <i>Practicals in Physical Chemistry</i>, Macmillan India : New Delhi, 2005.<li>2. Khosla, B. D. Garg, V. C.; Gulati, A.; <i>Senior Practical Physical Chemistry</i>, R. Chand : New Delhi, 2011.<li>3. Gupta, Renu, <i>Practical Physical Chemistry</i>, 1st Ed.; New Age International: New Delhi, 2017.
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Website and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences
Course Learning Outcomes (for Mapping with POs and PSOs)	
On completion of the course the students should be able to	
CO1: describe the principles and methodology for the practical work	
CO2: explain the procedure, data and methodology for the practical work.	
CO3: apply the principles of electrochemistry, kinetics for carrying out the practical work.	
CO4: demonstrate laboratory skills for safe handling of the equipment and chemicals	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Code	Course Title	L	T	P	C
23114GEC44	Allied Chemistry - II	4	1	0	3

COURSE OBJECTIVES:

1. To learn the basics of nuclear chemistry and metallic bond.
2. To understand the properties and applications of carbohydrates, amino acids and proteins.
3. To study the basic concepts of polymers, heterocyclic compounds and stereoisomerism.

UNIT – I Nuclear Chemistry and Metallic bond:

1.1 Nuclear Chemistry: Fundamental particles of nucleus- isotopes, isobars, isotones and isomers – differences between chemical reactions and nuclear reactions, nuclear fusion and fission- radioactive series.

1.2 Metallic bond: Electron gas, Pauling and band theories, semiconductors – intrinsic, extrinsic – type and p – type semiconductors.

1.3 Compounds of sulphur and sodiumthiosulphate

UNIT – II Carbohydrates, Amino Acids and Proteins:

2.1 Carbohydrates: classification –glucose and fructose–preparation and properties – structure of glucose – Fischer and Haworth cyclic structures.

2.2 Amino acids and proteins: Amino acids – Classification based on structure. Essential and non – essentials amino acids – preparation, properties and uses – peptides (elementary treatment only) – proteins – Classification based on physical properties and biological functions. Structure of proteins–primary and secondary (elementary treatment).

UNIT – III Polymers, Heterocyclic Compound and Stereoisomerism:

3.1 Synthetic polymers: preparation, properties and uses of Teflon, epoxy resins, polyester resin.

3.2 Heterocyclic compounds: Furan, pyrrole and pyridine –preparation, properties and uses – basic properties of pyridine and pyrrole.

3.3 Stereoisomerism: Optical isomerism – Lactic and tartaric acid – racemic mixture and resolution. Geometrical isomerism–maleic and fumaricacids.

Unit – IV Surface and photochemistry:

4.1 Surface Chemistry: Emulsions, gels–preparation, properties - Electrophoresis and applications, chromatography – Column, paper and thin layer Chromatography.

4.2 Photochemistry: Laws of photochemistry and applications.

Unit – V Electrochemistry, pH and Buffer

5.1 Electrochemistry: Specific and equivalent conductivity–their determination – effect of dilution on conductivity. Ostwald's Dilution law, Kohlrausch law, conductivity measurements, and conduct metric titrations.

5.2 pH and buffer: Importance of Ph and buffers –pH determination by colorimetric and electrometric methods.

UNIT – VI Current Contours (For Continuous Internal Assessment Only):

Assignments and seminar on nuclear radiation, nuclear reactors, structure of carbohydrates and proteins, aromaticity of heterocyclic compounds. Hands on training to determine dissociation constant of acetic acid using conduct meter and to determination of pH of acetic acid sodium acetate buffer by conductivity measurements.

REFERENCES:

1. B.R. Puri, L.R. Sharma, K.C. Kalia, 'Principles of Inorganic Chemistry', 21st edition, Vallabh Publications, 2004-2005.
2. Bahl, B.S. and Bahl, A., Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (2010).
3. Puri B.R., Sharma L.R. and Pathania M.S. (2013), Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin Chand and Co.
4. <https://oms.bdu.ac.in/ec/browse.php?type=UG>

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

1. To explain theory of nuclear chemistry and chemical bonding.
2. To classify carbohydrates and proteins.
3. To synthesise polymers and hetero cyclic compounds.
4. To apply conductivity measurements to determine degree of dissociation of weak electrolyte and pH of buffer solution.
5. To explain preparation and applications of emulsion and gels in chromatography.

Course Code	Course Title	L	T	P	C
23113SEC45L	Physics Practical - II	0	0	3	3
COURSE OBJECTIVES:	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.				

OPTICS (any eight experiments)

1. Determination of refractive index of prism using spectrometer.
2. Determination of refractive index of liquid using hollow prism and spectrometer
3. Determination of dispersive power of a prism.
4. Determination of radius of curvature of lens by forming Newton's rings.
5. Determination of thickness of a wire using air wedge.
6. Determination of Cauchy's Constants.
7. Determination of resolving power of grating
8. Determination of resolving power of telescope
9. Comparison of intensities using Lummer Brodhum Photometer.
10. Determination of range of motion using Searlesgoniometer.
11. Verification of Newton's formula for a lens separated by a distance.
12. Determination of refractive index of a given liquid by forming liquid lens
13. Determination of refractive index using Laser.
14. Determination of wavelengths, particle size using Laser/Monochromatic source.
15. Determination of resolving power of Diffraction grating using Laser
16. Determination of wire using Laser.

Course Code	Course Title	L	T	P	C
23114SEC46L	Allied Chemistry Practical - II	0	0	3	3

COURSE OBJECTIVES:

1. To learn the techniques of titrimetric analyses.
2. To know the estimation of several cations and anions.
3. To learn the techniques of qualitative analysis of organic compounds

Organic Analysis:

Analyse the following organic Compounds.

1. Carbohydrate
2. Amide

3. Aldehyde
4. Ketone
5. Acid
6. Amine

The students may be trained to perform the specific reactions like tests for aliphatic or aromatic, saturated or unsaturated and functional group present and record their observations.

REFERENCES:

1. R.Gopalan, Elements of analytical chemistry, S.Chand, New Delhi, 2000.
2. N.S.Gnanapragasam and G.Ramamurthy, Organic Chemistry lab manual, S.Viswanathan and Co. Pvt. Ltd. Chennai-1998

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

1. To understand the use of volumetric pipette, burette and analytical balance.
2. To explain the principles of volumetric analysis,

Course Code	Course Title	L	T	P	C
23113SEC47	Advanced Mathematical Physics	2	0	0	2

Learning Objective:

The fundamentals of matrices and vector calculus learnt in earlier course will enable students to learn advanced topics and theorems. The special functions and applications of partial differential equations will be of use in research at a later stage.

UNITS	COURSE DETAILS
UNIT-I	MATRICES: introduction – special types of matrices – transpose – conjugate– conjugate transpose– symmetric and anti symmetric – Hermitian and skew Hermitian – orthogonal and unitary – properties – characteristic equation – roots and characteristic vectors – diagonalization– Cayley–Hamilton theorem –simple problems
UNIT-II	VECTOR CALCULUS: Operator – divergence – second derivative of vector functions or fields – Laplacian operator – curl of a vector – line integral – line Integral of a vector field around an infinitesimal rectangle – curl of conservative field – surface integral – volume integral (without problem) – Gauss’s divergence theorem and proof – Stroke’s theorem and proof –simple problems.
UNIT-III	SPECIAL FUNCTIONS: definition –Beta function – Gamma function – evaluation of Beta function – other forms of Beta function – evaluation of Gamma function – other forms of Gamma function – relation between Beta and Gamma functions – simple problems.
UNIT-IV	FROBENIUS METHOD AND SPECIAL FUNCTIONS: singular points of second order linear differential equations and importance –singularities of Bessels and Laguerre equations, Frobenius method and applications to differential equations: Legendre and Hermite differential equations – Legendre and Hermite polynomials – Rodrigues formula –generating function – orthogonality
UNIT-V	PARTIAL DIFFERENTIAL EQUATIONS: solutions to partial differential equations using separation of variables - Laplace’s equation in problems of rectangular – cylindrical and spherical symmetry – conducting and dielectric sphere in an external uniform electric field – wave equation and its solution for vibrational modes of a stretched string
TEXT BOOKS	1. Mathematical Physics, B.D. Gupta-Vikas Publishing House, 4 th Edition (2006) 2. Mathematical Physics, SatyaPrakash (Sultan Chand)

REFEREN CE BOOKS	<ol style="list-style-type: none"> 1. Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris (2013, 7th Edn., Elsevier) 2. Mathematical Physics – H. K. Dass, Dr. Rama Verma (S. Chand Publishing) 3. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley India) 4. Mathematical Physics and Special Relativity, M. Das, P.K. Jena and B.K. Dash (Srikrishna Prakashan)
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Course Code	Course Title	L	T	P	C
23113SEC48	Numerical Methods and C programming	2	0	0	2

Learning Objective:

To understand the methods in numerical differentiation and integration and to develop the problem solving skills of the student. To introduce and explain the basic structure, rules of compiling and execution of C programming.

UNITS	COURSE DETAILS
UNIT-I	NUMERICAL SOLUTIONS: determination of zeros of polynomials – roots of linear and nonlinear algebraic and transcendental equations – bisection and Newton-Raphson methods – convergence and divergence of solutions
UNIT-II	NUMERICAL DIFFERENTIATION, INTEGRATION AND CURVE FITTING: Newton's forward and backward interpolation – Lagrange's interpolation – Newton-Raphson method to find square root and cube roots – principle of least squares – fitting a straight line and exponential curve – trapezoidal rule – Simpson's 1/3 and 1/8 rule
UNIT-III	ALGORITHM, FLOW CHART AND PROGRAM: development of algorithm – flow chart for solving simple problems – average of set of numbers – greatest, smallest – conversion of Fahrenheit to Celsius and Celsius to Kelvin, miles to kilometer – sorting set of numbers in ascending and descending order – square matrix, addition, subtraction and multiplication of order (2x2) using arrays.
UNIT-IV	INTRODUCTION TO C: importance of C – basic structure of C programming – constants, variables and data types – character set, key words and identifiers – declaration of variables and data types – operators – expressions: arithmetic, relational, logical, assignment – increment and decrement – conditional – comma operators
UNIT-V	CONTROL STRUCTURE: decision making with if, if-else, nested if – switch – go to – break – continue – while, do while, for statements – arrays, one dimensional and two dimensional – declaring arrays – storing arrays in memory – initializing arrays – simple programs
TEXT BOOKS	<ol style="list-style-type: none"> 1. Numerical methods, Singaravelu, Meenakshi publication, 4th Edn., 1999. 2. Numerical methods P. Kandasamy, K. Thilagavathy, K. Gunavathi, S. Chand, 2016 3. Programming in C, Balagurusamy, TMG, ND, 2012 4. Numerical Analysis, M.K. Venkatraman, NPH, 2013 5. Numerical Analysis, B.D. Gupta, Konark Publishers, New Delhi, 2013

REFER ENCE BOOKS	1. Schaum's outline series, Theory and Problems of programming in C, C.Byronand S. Gottfried, Tata McGraw Hill 2003 3. Numerical methods and C Programming, Veerarajan, 2015.
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23114SEC47	Instrumental methods of chemical analysis	2	0	0	2
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	<ul style="list-style-type: none"> theory of thermo / electro analytical techniques stoichiometry and the related concentration terms
Course Outline	<p>UNIT-I</p> <p>Qualitative and Quantitative Aspects of Analysis</p> <p>S.I Units, Distinction between Mass and Weight. Moles, Millimoles, Milli equivalence, Molality, Molarity, Normality, Percentage by Weight and Volume, ppm, ppb. Density and Specific Gravity of Liquids. Stoichiometry Calculations</p> <p>Sampling, evaluation of analytical data, Errors – Types of Errors, Accuracy, Precision, Minimization of Errors. Significant Figures. Methods of Expressing Precision: Mean, Median, Average Deviation, Standard Deviation, Coefficient of Variation, Confidence Limits, Q- test, F-test, T-test. The Least Square Method for Deriving Calibration plots.</p> <hr/> <p>UNIT II</p> <p>Atomic Absorption Spectroscopy: Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.</p> <hr/> <p>UNIT III</p> <p>UV-Visible and IR Spectroscopy</p> <p>Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.</p> <p>UV-Visible Spectrometry: Basic principles, instrumentation (choice of source, monochromator and detector) for single and double beam instrument; Basic principles of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers. Infrared Spectroscopy: Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques.</p>

UNIT IV**Thermal and Electro-analytical Methods of Analysis**

TGA and DTA- Principle, Instrumentation, methods of obtaining Thermograms, factors affecting TGA/DTA, Thermal analysis of silver nitrate, calcium oxalate and calcium acetate

DSC- Principle, Instrumentation and applications.

Electroanalytical methods: polarography - principle, instrumentation and applications.

Derivative polarography- Cyclic Voltammetry - principle.

UNIT V**Separation and purification techniques**

	<p>Classification, principle, Factors affecting - Solvent Extraction – Liquid - Liquid Extraction,</p> <p>Chromatography: Column, TLC, Paper, Gas, HPLC and Electrophoresis, Principle, Classification, Choice of Adsorbents, Solvents, Preparation of Column, Elution Mechanism of separation: adsorption, partition & ion exchange. Development of chromatograms and Rf value.</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
<p>Recommended Text</p>	<ol style="list-style-type: none"> 1. Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed., The English Language Book Society of Longman. 2. R. Gopalan, P. S. Subramanian and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand, New Delhi, 2007 3. Skoog, Holler and Crouch, Principles of Instrumental Analysis, Cengage Learning, 6th Indian Reprint (2017). 4. R. Speyer, Thermal Analysis of Materials, CRC Press, 1993. 5. R.A. Day and A.L. Underwood, Quantitative Analysis, 6th edn., Prentice Hall of India Private Ltd., New Delhi, 1993
<p>Reference Books</p>	<ol style="list-style-type: none"> 1. D. A. Skoog, D. M. West and F. J. Holler, Analytical Chemistry: An Introduction, 5th edn., Saunders college publishing, Philadelphia, 1998. 2. Dash U N, Analytical Chemistry; Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 2011. 3. Christian, Gary D; Analytical Chemistry, 6th Ed., John Wiley & Sons, New York, 2004. 4. Mikes, O. & Chalmes, R.A. Laboratory Handbook of Chromatographic & Allied Methods, Elles Harwood Ltd. London 5. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, Vogel's Textbook of Quantitative Chemical Analysis, sixth edition Pearson Education, 2000

Website and e-learning sources	<ol style="list-style-type: none">1. http://www.epa.gov/rpdweb00/docs/marlap/402-b-04-001b-14-final.pdf2. http://eric.ed.gov/?id=EJ3862873. http://www.sjsu.edu/faculty/watkins/diamag.htm4. http://www.britannica.com/EBchecked/topic/108875/separation-
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	and-purification 5. http://www.chemistry.co.nz/stoichiometry.htm
Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to	
CO1: apply error analysis in the calibration and use of analytical instruments, explain theory, instrumentation and application of flame photometry and Atomic Absorption spectrometry	
CO2: explain theory, instrumentation and application of UV visible and Infrared spectroscopy.	
CO3: able to discuss instrumentation, theory and applications of thermal and electrochemical techniques	
CO4: explain the use of chromatographic techniques in the separation and identification of mixtures	
CO5: explain preparation of solutions, stoichiometric calculations	

	PO 1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0
CO 1	S	S	S	S	S	S	S	M	S	M
CO 2	M	S	S	S	M	S	S	M	M	M
CO 3	S	S	S	M	S	S	S	M	S	M
CO 4	S	S	S	S	S	S	S	M	M	M
CO 5	S	M	S	S	S	S	S	M	M	S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

23114SEC48	Forensic science	2	0	0	2
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Objectives of the course	<p>This course aims at giving an overall view of</p> <ul style="list-style-type: none"> • crime detection through analytical instruments • forgery and its detection • medical aspects involved
Course Outline	<p>UNIT I Poisons</p> <p>Poisons - types and classification - diagnosis of poisons in the living and the dead -clinical symptoms - postmortem appearances. Heavy metal contamination (Hg, Pb, Cd) of seafoods - use of neutron activation analysis in detecting arsenic in human hair. Treatment in cases of poisoning – use of antidotes for common poisons.</p> <p>Unit-II</p> <p>Crime Detection</p> <p>Accidental explosion during manufacture of matches and fireworks (as in Sivakasi). Human bombs - possible explosives (gelatin sticks and RDX) - metal detector devices and other security measures for VVIP-composition of bullets and detecting powder burns.</p>

UNIT-III

Forgery and Counterfeiting

Documents - different types of forged signatures - simulated and traced forgeries -inherent signs of forgery methods - writing deliberately modified

- uses of ultraviolet rays -comparison of type written letters – checking silver line water mark in currency notes – alloy analysis using AAS to detect counterfeit coins – detection of gold purity in 22 carat ornaments – detecting gold plated jewels -authenticity of diamond.

UNIT-IV

Tracks and Traces

Tracks and traces - small tracks and police dogs - foot prints - costing of

	<p>foot prints -residue prints, walking pattern or tyre marks – miscellaneous traces and tracks – glass fracture - tool marks - paints - fibres - Analysis of biological substances - blood, semen, saliva, urine and hair - Cranial analysis (head and teeth) DNA Finger printing for tissue identification in dismembered bodies - detecting steroid consumption in athletes and racehorses.</p>
	<p>UNIT-V</p> <p>Medical Aspects</p> <p>Aids - causes and prevention - misuse of scheduled drugs - burns and their treatment by plastic surgery. Metabolite analysis using mass spectrum - Gas chromatography-Arson - natural fires and arson - burning characteristics and chemistry of combustible materials -nature of combustion. Ballistics - classification - internal and terminal ballistics - small arms -laboratory examination of barrel washing and detection of powder residue by chemical tests.</p>
Recommended Text	<ol style="list-style-type: none"> 1. SA Iqbal, M Liviu, Textbook of forensic chemistry, Discovery publishing house private limited, 2011. 2. Kelly M. Elkins, Introduction to Forensic Chemistry, CRC Press, Taylor & Francis Group, 2019. 3. Javed I. Khan, Thomas J. Kennedy, Donnell R. Christian, Jr., Basic principles of Forensic chemistry, Humana Press, first edition, 2012. 4. Bapuly AK, (2006) Forensic Science – Its application in crime investigation, Paras Medical Publisher, Hyderabad. 5. Sharma B.R., (2006) Scientific Criminal Investigation, Universal Law Publishing Co. Pvt. Ltd, New Delhi.
Reference Books	<ol style="list-style-type: none"> 1. Richard Saferst in and Criminalistics-An Introduction to Forensic Science (College Version), Sopfstein, Printice hall, eighth edition, 2003 2. Suzanne Bell, Forensic Chemistry, Pearson, second international edition, 2014. 3. Jay Siegel, Forensic chemistry: Fundamentals and applications, Wiley-Blackwell, first edition, 2015. 4. Max M. Houck & Jay A. Segal, (2006) Fundamentals of Forensic Science, Elsevier Academic press. 5. Henry C. Lee, Timothy Palmbach, Marilyn T. Miller, (2006) Henry Lee’s Crime Scene Book Elsevier Academic press.
Website and e-learning source	<ol style="list-style-type: none"> 1. http://www.library.ucsb.edu/ist/03-spring/internet.html 2. http://www.wonder_howto.com/topic/forensic-science/

Course Learning Outcomes (for Mapping with POs and PSOs)On

completion of the course the students should be able to

CO 1: learn about the Poisons - types and classification of poisons in the living and the deadorganisms and also get information about Postmortem.

CO 2: get awareness on Human bombs, possible explosives (gelatin sticks and RDX) and metal defector devices and other security measures for VVIP - composition of bulletsand detecting powder burns

CO 3: detect the forgery documents, different types of forged signatures

CO4: have an idea about how to tracks and trace using police dogs, foot prints identificationand gain the knowledge in analyzing biological substances - blood, semen, saliva, urine and hair - DNA Finger printing for tissue identification in dismembered bodies

	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

231AECCEVS	Environmental Studies-II	2	0	0	2
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ENVIRONMENTAL SCIENCE

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Definition, scope, and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – the concept of anecosystem – structure, and function of an ecosystem – producers, consumers, and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes

UNIT II ENVIRONMENTAL POLLUTION

Definition - causes, effects, and control measures of (a) Air pollution (Atmospheric chemistry - Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen, and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission,

UNIT III NATURAL RESOURCES

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people –Water resources: Use and overutilization of surface and groundwater, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development – urban problems related to energy – water conservation, rainwater harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – the role of non-governmental organization environmental ethics:

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – population explosion –family welfare program – environment and human health – human rights –value education – HIV / AIDS – women and child welfare.

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2006).

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press

(2005)

THIRD YEAR

SEMESTER – V

Course Code	Course Title	L	T	P	C
THEORY					
23114AEC51	Organic Chemistry - I	5	1	0	4
23114AEC52	Inorganic Chemistry - I	5	1	0	4
231145AEC53	Physical Chemistry - I	5	1	0	4
23114DSC54A 23114DSC54B 23114DSC54C	Discipline Specific Elective –I A) Green Chemistry (OR) B) Industrial Chemistry (OR) C) Disaster Management	4	1	0	3
PRACTICAL					
23114SEC55L	Industrial Chemistry Practical	0	0	5	3
23114SEC56L	Physical Chemistry Practical II	0	0	5	3
Skill Enhancement Course					
231IIVFV5	Internship/Industrial Visit/Field Visit	-			2
AUDIT COURSE					
231ACLSPSL	Professional Skills	-	-	-	1
231AECCVED	Value Education	2	0	0	2
	Total	22	3	5	26

23114AEC51	Organic Chemistry - I	5	1	0	4
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Title of the Course	ORGANIC CHEMISTRY - I						
Paper No.	Core IX						
Category	Core	Year	II I	Credits	4	Course Code	23114AEC51
		Semester	V				
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	4	1	-		5		
Prerequisites	General Chemistry I, II, III and IV						

Objectives of the course	<p>This course aims to provide an understanding of</p> <ul style="list-style-type: none"> • stereoisomerism in chirals and geometric isomerism in olefins, conformations of ethane and butane • preparation and properties of aromatic and aliphatic nitrocompounds and amines • preparation of different dyes, food colour and additives • preparation and properties of five membered heterocycles like pyrrole, furan and thiophene • preparation and properties of six membered heterocycles like pyridine, quinoline and isoquinoline.
Course Outline	<p>UNIT I</p> <p>Stereochemistry</p> <p>Fischer Projection, Newmann and Sawhorse Projection formulae and their interconversions;</p> <p>Geometrical isomerism: cis–trans, syn-anti isomerism, E/Z notations.</p> <p>Optical Isomerism: Optical activity, specific rotation, asymmetry, enantiomers, distereoisomers, meso structures - molecules with one and two chiral centres, racemisation- methods of racemisation; resolution- methods of resolution. C.I.P rules. R and S notations for one and two chirality (stereogenic) centres.</p> <p>Molecules with no asymmetric carbon atoms – allenes and biphenyls. Conformational analysis of ethane and butane.</p> <hr/> <p>UNIT II</p> <p>Chemistry of Nitrogen Compounds – I</p> <p>Nitroalkanes</p> <p>Nomenclature, isomerism, preparation from alkyl halides, halo acids, alkanes; physical properties; reactions – reduction, halogenations, Grignard reagent, Pseudo acid character.</p> <p>Nitro - aci nitro tautomerism.</p>

Aromatic nitro compounds

Nomenclature, preparation – nitration, from diazonium salts, physical properties; reactions - reduction of nitrobenzene in different medium,

Electrophilic substitution reactions, TNT.

	<p>Amines: Aliphatic amines</p> <p>Nomenclature, isomerism, preparation – Hofmanns’ degradation reaction, Gabriel’s phthalimide synthesis, Curtius Schmidt rearrangement.</p> <p>Physical properties, reactions – alkylation, acylation, carbylamine reaction, Mannich reaction, oxidation, basicity of amines.</p>
	<p>UNIT III</p> <p>Chemistry of Nitrogen Compounds – II</p> <p>Aromatic amines – Nomenclature, preparation – from nitro compounds, Hofmann’s method; Schmidt reaction, properties - basic nature, ortho effect; reactions – alkylation, acylation, carbylamine reaction, reaction with nitrous acid, aldehydes, oxidation, Electrophilic substitution reactions, diazotization and coupling reactions; sulphanilic acid - zwitter ion formation.</p> <p>Distinction between primary, secondary and tertiary amines - aliphatic and aromatic</p> <p>Diazonium compounds</p> <p>Diazomethane, Benzene diazonium chloride - preparations and synthetic applications.</p> <p>Dyes</p> <p>Theory of colour and constitution; classification based on structure and application; preparation – Martius yellow, aniline yellow, methyl orange, alizarin, indigo, malachite green.</p> <p>Industry oriented content</p> <p>Dyes Industry, Food colour and additives</p>

UNIT IV

Heterocyclic compounds

Nomenclature and classification. General characteristics - aromatic character and reactivity.

Five-membered heterocyclic compounds

Pyrrole – preparation - from succinimide, Paal Knorr synthesis; reactions – reduction, basic character, acidic character, electrophilic substitution reactions, ring opening.

Furan – preparation from mucic acid and pentosan; reactions – hydrogenation, reaction with oxygen, Diels Alder reactions, formation of thiophene and pyrrole; Electrophilic substitution reaction.

Thiophene synthesis - from acetylene; reactions –reduction; oxidation;

	<p>electrophilic substitution reactions.</p> <hr/> <p>UNIT V</p> <p>Six-membered heterocyclic compounds</p> <p>Pyridine – synthesis - from acetylene, Physical properties; reactions - basic character, oxidation, reduction, electrophilic substitution reactions; nucleophilic substitution- uses</p> <p>Condensed ring systems</p> <p>Quinoline – preparation - Skraup synthesis and Friedlander’s synthesis; reactions – basic nature, reduction, oxidation; electrophilic substitutions; nucleophilic substitutions – Chichibabin reaction</p> <p>Isoquinoline – preparation by the Bischler – Napieralski reaction, reduction, oxidation; electrophilic substitution.</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
<p>Recommended Text</p>	<p>1.M.K. Jain, S.C.Sharma, Modern Organic Chemistry, Vishal Publishing, fourth reprint, 2009.</p> <p>2.S.M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan India Ltd., third edition, 2009.</p> <p>3. ArunBahl and B.S. Bahl, Advanced organic chemistry, New Delhi, S.Chand& Company Pvt. Ltd., Multicolour edition, 2012.</p> <p>4.P. L.Soni and H. M. Chawla, Text Book of Organic Chemistry, Sultan Chand & Sons, New Delhi, twenty ninth edition, 2007.</p> <p>5.C.N.Pillai, Text Book of Organic Chemistry, Universities Press</p>

	(India) Private Ltd., 2009.
Reference Books	1.R. T. Morrison and R. N. Boyd, Organic Chemistry, Pearson Education, Asia, sixth edition, 2012. 2. T.W.Graham Solomons, Organic Chemistry, John Wiley & Sons, eleventh edition, 2012.

	<p>3. A. Carey Francis, Organic Chemistry, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, seventh edition, 2009.</p> <p>4. I. L. Finar, Organic Chemistry, Vol. (1& 2), England, Wesley Longman Ltd, sixth edition, 2006.</p> <p>5. J. A. Joule, and G. F. Smith, Heterocyclic Chemistry, Wiley, Fifth Edition, 2010.</p>
Website and e-learning sources	<p>1. www.epgpathshala.nic.in</p> <p>2. www.nptel.ac.in</p> <p>3. http://swayam.gov.in</p> <p>4. Virtual Textbook of Organic Chemistry</p>
Course Learning Outcomes (for Mapping with POs and PSOs)	
On completion of the course the students should be able to	
CO1: assign RS notations to chirals and EZ notations to olefins and explain conformations of ethane and butane.	
CO2: explain preparation and properties of aromatic and aliphatic nitro compounds and amines	
CO3: explain colour and constitution of dyes and food additives	
CO4: discuss preparation and properties of five membered heterocycles like pyrrole, furan and thiophene	
CO5: discuss preparation and properties of six membered heterocycles like pyridine, quinoline and isoquinoline	

	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO /PSO	PSO1	PSO2	PSO3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

23114AEC52	Inorganic Chemistry - I	5	1	0	4
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Title of the Course	INORGANIC CHEMISTRY -I						
Paper No.	Core X						
Category	Core	Year	I I I	Credits	4	Course Code	23114AEC52
		Semester	V				
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	4	-	-		4		
Prerequisites	General Chemistry I , II, III and IV						
Objectives of the course	<p>The course aims to provide knowledge on</p> <ul style="list-style-type: none"> • nomenclature, isomerism and theory of coordination compounds, and chelate complexes • crystal field theory, magnetic properties, stability of complexes and Jahn Teller effect • preparation and properties of metal carbonyls • Lanthanoids and actinoids • preparation and properties of inorganic polymers 						
Course Outline	<p>UNIT I</p> <p>Co-ordination Chemistry - I</p> <p>IUPAC Nomenclature of coordination compounds, Isomerism in coordination compounds.</p> <p>Werner's coordination theory – effective atomic number –interpretation of geometry and magnetic properties by Pauling's theory – geometry of co-ordination compounds with co-ordination number</p> <p>4 &6.</p> <p>58</p> <p>Chelates – types of ligands forming chelates – stability of chelates, applications of chelates in qualitative and quantitative analysis–application of DMG and oxine in gravimetric analysis –estimation of hardness of water using EDTA, metal ion</p>						

indicators.

Role of metal chelates in living systems – haemoglobin and chlorophyll

Unit II

Co-ordination Chemistry - II

Crystal field theory –Crystal field splitting of energy levels in octahedral and tetrahedral complexes, Crystal field stabilization energy (CFSE), spectrochemical series - calculation of CFSE in octahedral and tetrahedral complexes - factors influencing the magnitude of crystal field splitting, crystal field effect on ionic radii, lattice energies, heats of ligation with water as a ligand (heat of hydration), interpretation of magnetic properties, spectra of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ - Jahn – Teller effect. Stability of complexes in aqueous solution, stability constants- factors affecting the stability of a complex ion, thermodynamic and kinetic

stability (elementary idea). Comparison of VBT and CFT.

	<p>UNIT III</p> <p>Organometallic compounds</p> <p>Metal Carbonyls</p> <p>Mono and polynuclear carbonyls, General methods of preparation of carbonyls – general properties of binary carbonyls – bonding in carbonyls – structure and bonding in carbonyls of Ni, Fe, Cr, Co, Mn, Ru and Os. EAN rule as applied to metal carbonyls.</p> <p>Ferrocene-Methods of preparation, physical and chemical properties</p> <hr/> <p>UNIT IV</p> <p>Inner transition elements (Lanthanoids and Actinoids)</p> <p>General characteristics of f-block elements - Comparative account of lanthanoids and actinoids - Occurrence, Oxidation states, Magnetic properties, Colour and spectra - Lanthanoids and Actinoids, Separation by ion-Exchange and Solvent extraction methods - Lanthanoids contraction- Chemistry of thorium and Uranium-Occurrence, Ores, Extraction, properties and uses - Preparation, Properties and uses of ceric ammonium sulphate, thorium dioxide and uranyl acetate.</p> <hr/> <p>UNIT V</p> <p>Inorganic polymers</p> <p>General properties – classification of inorganic polymers based on element in the backbone (Si, S, B and P) - preparation and properties of silicones (polydimethylsiloxane and polymethylhydrosiloxane) phosphorous based polymer (polyphosphazines and polyphosphonitrilic chloride), sulphur based polymer (polysulfide and polymeric sulphur nitride), boron based polymers (borazine polymers) – industrial applications of inorganic polymers.</p>
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<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
<p>Recommended Text</p>	<ol style="list-style-type: none"> 1. Puri B R, Sharma L R, Kalia K C (2011), Principles of Inorganic Chemistry, 31th Edition, Milestone Publishers & Distributors, Delhi. 2. Satya Prakash, Tuli G. D., Basu S. K., Madan R. D. (2009),

	<p>Advanced Inorganic Chemistry, 18th Edition, S. Chand & Co., New Delhi</p> <p>3. Lee J D, (1991), Concise Inorganic Chemistry, 4th Edition, ELBS William Heinemann, London.</p> <p>4. W V Malik, G D Tuli, R D Madan, (2000), Selected Topics in Inorganic Chemistry, S. Chand and Company Ltd.</p> <p>5. A. K. De, Text book of Inorganic Chemistry, Wiley East Ltd, seventh edition, 1992.</p>
Reference Books	<p>1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nd ed., S.Chand and Company, New Delhi.</p> <p>2. Gopalan R, (2009) <u>Inorganic Chemistry for Undergraduates</u>, 1st Edition, University Press (India) Private Limited, Hyderabad</p> <p>3. Sivasankar B, (2013) <u>Inorganic Chemistry</u>. 1st Edition, Pearson, Chennai</p> <p>4. Alan G. Sharp (1992), <u>Inorganic Chemistry</u>, 3rd Edition, Addison-Wesley, England</p> <p>5. Peter Atkins, Tina Overton, Jonathan Rourke and Mark Weller, Inorganic Chemistry, Oxford University Press, sixth edition, 2014.</p>
Website and e-learning source	<p>1. www.epgpathshala.nic.in</p> <p>2. www.nptel.ac.in</p> <p>3. http://swayam.gov.in</p>
<p>Course Learning Outcomes (for Mapping with POs and PSOs)</p> <p>On completion of the course the students should be able to</p> <p>CO1: explain isomerism, Werner's Theory and stability of chelate complexes</p> <p>CO2: discuss crystal field theory, magnetic properties and spectral properties of complexes.</p> <p>CO3: explain preparation and properties of metal carbonyls</p> <p>CO4: give a comparative account of the characteristics of lanthanoids and actinoids</p> <p>CO5: explain properties and uses of inorganic polymers of silicon, sulphur, boron and phosphorous</p>	

	PO 1	PO2	PO 3	PO4	PO 5	PO6	PO7	PO8	PO9	PO1 0
CO1	S	S	S	S	S	S	S	M	S	M

CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

231145AEC53	Physical Chemistry - I	5	1	0	4
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Title of the Course	PHYSICAL CHEMISTRY -I						
Paper No.	Core XI						
Category	Core	Year	I I I	Credits	4	Course Code	23114AEC53
		Semester	V				
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	4	1	-		5		
Prerequisites	General Chemistry I,II,III and IV						

Objectives of the course	<p>The course aims at providing an overall view of</p> <ul style="list-style-type: none"> • Gibbs free energy, Helmholtz free energy, Ellingham's diagram and partial molar properties • chemical kinetics and different types of chemical reactions • adsorption, homogeneous and heterogeneous catalysis • colloids and macromolecules • photochemistry, fluorescence and phosphorescence
Course Outline	<p>UNIT I</p> <p>Thermodynamics - III</p> <p>Free energy and work functions - Need for free energy functions, Gibbs free energy, Helmholtz free energy - their variation with temperature, pressure and volume, criteria for spontaneity; Gibbs-Helmholtz equation – derivations and applications; Maxwell relationships, thermodynamic equations of state; Thermodynamics of mixing of ideal gases, Ellingham Diagram-application.</p> <p>Partial molar properties – chemical potential, Gibbs Duhem equation, variation of chemical potential with temperature and pressure, chemical potential of a system of ideal gases, Gibbs- Duhem-Margules equation.</p>

	<p>Macromolecules: Molecular weight of Macromolecules-Number average molecular weight- average molecular weight, Determination of Molecular weight of molecules</p>
	<p>UNIT V</p> <p>Photochemistry</p> <p>Laws of photo chemistry – Lambert – Beer, Grotthus – Draper and Stark – Einstein. Quantum efficiency. Photochemical reactions – rate law – Kinetics of H₂-Cl₂, H₂-Br₂ and H₂-I₂ reactions, comparison between thermal and photochemical reactions.</p> <p>Fluorescence – applications including fluorimetry – sensitised fluorescence, phosphorescence – applications - chemiluminescence and photosensitisation – examples Chemistry of Vision – 11 cis retinal – vitamin A as a precursor - colour perception of vision</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
<p>Recommended Text</p>	<ol style="list-style-type: none"> 1. B.R. Puri and L.R. Sharma, Principles of Physical Chemistry, Shoban Lal Nagin Chand and Co., forty eighth edition, 2021. 2. Peter Atkins, and Julio de Paula, James Keeler, Physical Chemistry, Oxford University press, International eleventh edition, 2018. 3. ArunBahl, B.S. Bahl, G. D. Tuli Essentials of physical chemistry, 28th edition 2019, S, Chand & Co. 4. S. K. Dogra and S. Dogra, Physical Chemistry through Problems: New Age International, fourth edition, 1996. 5. J. Rajaram and J.C. Kuriacose, Thermodynamics, ShobanLalNagin Chand and CO., 1986.

Reference Books	<ol style="list-style-type: none">1. J. Rajaram and J.C. Kuriacose, Chemical Thermodynamics, Pearson, 1st edition, 2013.2. Keith J. Laidler, Chemical kinetics, third edition, Pearson, 2003.3. P. W. Atkins, and Julio de Paula, Physical Chemistry, Oxford University press, seventh edition, 2002.4. K. L. Kapoor, A Textbook of Physical Chemistry, Macmillan
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	India Ltd, third edition, 2009. 5. B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, Shobanlal Nagin Chand and Co. Jalendhar, forty first, edition, 2001
Website and e-learning source	1. https://nptel.ac.in 2. https://swayam.gov.in 3. www.epgpathshala.nic.in
Course Learning Outcomes (for Mapping with POs and PSOs)	
On completion of the course the students should be able to	
CO1: explain Gibbs and Helmholtz free energy functions, partial molar quantities and Ellingham's diagrams	
CO2: apply the concepts of chemical kinetics to predict the rate of the reaction and order of the reaction, demonstrate the effect of temperature on reaction rate, and the significance of free energy and entropy of activation.	
CO3: compare chemical and physical adsorption, Freundlich and Langmuir adsorption isotherms, and differentiate between homogeneous and heterogeneous catalysis.	
CO4: demonstrate the types and characteristics of colloids, preparation of sols and emulsions, and determine the molecular weights of macromolecules.	
CO5: utilize the concepts of photochemistry in fluorescence, phosphorescence, chemiluminescence and color perception of vision.	

	PO 1	PO2	PO 3	PO4	PO 5	PO6	PO7	PO8	PO9	PO1 0
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO /PSO	PSO1	PSO2	PSO3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

23114DSC54A	Discipline Specific Elective –I A) Green Chemistry (OR)	4	1	0	3
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Title of the Course	Green Chemistry						
Paper No.	EC V						
Category	Elective	Year	II	Credits	4	Course Code	23114DSC54A
		Semester	V				
Instructional hours per week	Lecture	Tutorial	Lab Practice			Total	
	4	1	-			5	
Prerequisites	Green Chemistry						
Objectives of the	The course aims at providing knowledge on						

course	<ul style="list-style-type: none"> • relationship between biochemistry and medicine, composition of blood • structure and properties of amino acids, peptides, enzyme, vitamins and proteins • biological functions of proteins, enzymes, vitamins and hormones • biochemistry of nucleic acids and lipids • metabolism of lipids
Course Outline	<p>UNIT I</p> <p>Logic of Living Organisms</p> <p>Relationship of Biochemistry and Medicine</p> <p>Blood - Composition of Blood, Blood Coagulation – Mechanism. Hemophilia and Sickle Cell Anaemia</p> <p>Maintenance of pH of Blood – Bicarbonate Buffer, Acidosis, Alkalosis.</p> <hr/> <p>UNIT II</p> <p>Peptides and Proteins</p> <p>Amino acids – nomenclature, classification – essential and Non-essential; Synthesis - Gabriel Phthalimide, Strecker; properties – zwitterion and isoelectric point, electrophoresis and reactions.</p> <p>Peptides – peptide bond – nomenclature – synthesis of simple peptides – solution and solid phase. Determination of structure of peptides, N-terminal analysis – Sanger’s & Edmann method; C terminal analysis - Enzymic method.</p> <p>Proteins – classification based on composition, functions and structure; properties and reactions – colloidal nature, coagulation, hydrolysis, oxidation, denaturation, renaturation; colour tests for proteins; structure of proteins – primary, secondary, tertiary and quaternary.</p> <p>Metabolism of Amino acids – general aspects of metabolism (a brief outline); urea cycle.</p> <hr/> <p>UNIT III</p>

Enzymes and Vitamins

Nomenclature and classification, characteristics, factors influencing enzyme activity – mechanism of enzyme action – Lock and key hypothesis, Koshland's induced fit model.

Proenzymes, antienzymes, coenzymes and isoenzymes; allosteric enzyme regulation.

Vitamins as coenzymes – functions of TPP, lipoic acid, NAD, NADP, FMN, FAD, pyridoxal phosphate, CoA, folic acid, biotin, cyanocobalamin.

UNIT IV**Amino acids**

Components of nucleic acids - nitrogenous bases and pentose sugars, structure of nucleosides and nucleotides, DNA- structure & functions;

	<p>RNA –types– structure - functions; biosynthesis of proteins</p> <p>Hormones</p> <p>Adrenalin and thyroxine — chemistry, structure and functions (No structure elucidation).</p> <hr/> <p>UNIT V</p> <p>Lipids</p> <p>Occurrence, biological significance of fats, classification of lipids.</p> <p>Simple lipids – Oils and fats, chemical composition, properties, reactions – hydrolysis, hydrogenation, trans-esterification, saponification, rancidity; analysis of oils and fats – saponification number, iodine number, acid value, R.M. value. Distinction between animal and vegetable fats.</p> <p>Compound lipids – Lipoproteins - VLDL, LDL, HDL, chylomicrons – biological significance.</p> <p>Cholesterol – occurrence, structure, test, physiological activity.</p> <p>Metabolism of lipids: β-oxidation of fatty acids.</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>

Recommended Text	<ol style="list-style-type: none"> 1. Bahl, B. S.; Bhal, A. <i>Advanced Organic Chemistry</i>, 3rd ed.; S. Chand: New Delhi, 2003. 2. Jain, M.K.; Sharma, S.C. <i>Modern Organic Chemistry</i>, Vishal Publications: New Delhi, 2017. 3. Shanmugam, A. <i>Fundamentals of Biochemistry for Medical Students</i>, 6th ed.; Published by the author, 1999. 4. Veerakumari, L. <i>Biochemistry</i>, 1st ed.; MJP Publications: Chennai, 2004. 5. Jain, J. L.; <i>Fundamentals of Biochemistry</i>, 2nd ed.; S.Chand: New Delhi, 1983.
Reference Books	<ol style="list-style-type: none"> 1. Conn, E. E.; Stumpf, P. K. <i>Outline of Biochemistry</i>, 5th ed.; Wiley Eastern: New Delhi, 2002. 2. West, E. S.; Todd, W. R.; Mason, H. S.; Van Bruggen, J. T. <i>Text Book of Biochemistry</i>, 4th ed.; Macmillan: New York, 1970. 3. Lehninger, A. L. <i>Principles of Biochemistry</i>, 2nd ed.; CBS Publisher: Delhi, 1993. 4. Rastogi, S. C. <i>Biochemistry</i>, 2nd ed.; Tata McGraw-Hill: New Delhi,

	2003. 5. Chatterjea, M. N.; Shinde, R. <i>Textbook of Medical Biochemistry</i> , 5 th ed.; Jaypee Brothers: New Delhi, 2002.
Website and e-learning source	1) http://library.med.utah.edu/NetBiochem/nucacids.html 2) http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/E/EnzymeKinetics.html 3) https://swayam.gov.in/courses/4384-biochemistry Biochemistry 4) https://onlinecourses.nptel.ac.in/noc19_cy07/preview Experimental Biochemistry
Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to	
CO1: explain molecular logic of living organisms, composition of blood and blood coagulation	
CO2: explain synthesis and properties of amino acids, determination of structure of peptides and proteins	
CO3: explain factors influencing enzyme activity and vitamins as coenzymes	
CO4: explain RNA and DNA structure and functions	
CO5: explain biological significance of simple and compound lipids	

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

23114DSC54B	Industrial Chemistry	4	1	0	3
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Title of theCourse	INDUSTRIAL CHEMISTRY						
Paper No.	EC VI						
Category	Elective	Year	I I I	Credits	3	Course Code	23114DSC54B
		Semester	V				
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	4	-	-		4		
Prerequisites	General Chemistry I,II, III and IV						
Objectives of the course	This course is designed to provide knowledge on <ul style="list-style-type: none"> • classifications and characteristics of fuels • preparation of cosmetics • manufacture of sugar, paper, cement and leather and foodprocessing 						

	<ul style="list-style-type: none"> • applications of abrasives, lubricants and other industrial products • intellectual property rights
Course Outline	<p>UNIT I</p> <p>Survey of Indian Industries and mineral resources in India</p> <p>Fuels: Classification, characteristics of fuels. Solid fuels: coal - classification; analysis of coal- proximate analysis and ultimate analysis; calorific value-determination, carbonisation of coal.</p> <p>Liquid fuels: Petroleum - characteristics; Gasoline aviation petrol- knocking in internal combustion engines, antiknock agents; unleaded petrol-octane number, cetane number.</p> <p>Gaseous fuel: advantages over solid and liquid fuels; water gas, producer gas, carburetted water gas - preparations - uses.</p> <p>Natural gas: LPG-composition, advantages, application; gobar gas- production, composition, advantages, application. Propellants – rocket fuels (basic idea)</p> <hr/> <p>UNIT II</p> <p>Cosmetics</p> <p>Skin care: powders, ingredients; creams and lotion-cleansing, moisturising, all purpose shaving cream, sunscreen; make up preparations.</p> <p>Dental care: tooth pastes – ingredients.</p> <p>Hair care: shampoos-types, ingredients; conditioners-types, ingredients. Perfumes: natural-plant origin-parts of the plant used, chief constituents;</p>

	<p>animal origin-amber gries, civetone and musk; synthetic-classification-esters-amylsalicylate alcohols-citronellol; terpeneols-geraniol and nerol; ketones-muskone, coumarin; aldehydes-vanilin.</p> <p>Soaps and Detergents</p> <p>Soaps-properties, manufacture of soap-batch process; types-transparent soap, toilet soap, powder soap and liquid soap – ingredients.</p> <p>Detergents-definition, properties-cleansing action; soapless detergents-anionic, cationic and non-ionic (general idea only); uses of detergents as surfactants. Biodegradability of soaps and detergents.</p> <hr/> <p>UNIT III</p> <p>Sugar Industry</p> <p>Manufacture from sugar cane; recovery of sugar from molasses; testing and estimation of sugar.</p> <p>Food Preservation and processing</p> <p>Food spoilage – causes; Food preservation - methods – high temperature, low temperature, drying, radiation; Food additives – preservatives, flavours, colours, anti-oxidants, sweetening agents; hazards of using food additives; Food standards – Agmark and Codex alimentarius.</p>
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UNIT IV

Abrasives

Definition, characteristics, types-natural and synthetic; natural abrasives – diamond, corundum, emery, garnet, quartz – composition, uses; synthetic abrasives – carborundum, aluminium carbide, boron carbide, boron nitride, synthetic graphite – composition and uses.

Leather Industry

Structure and composition of skin, hide; Manufacture of leather – pre-tanning process – curing, liming, beating, pickling; methods of tanning-vegetable, chrome – one bath, two bath process; finishing.

Paper Industry

Manufacture of pulp - mechanical, chemical processes; sulphate pulp, rag pulp; manufacture of paper- beating, refining, filling, sizing, colouring, calendaring; cardboard.

UNIT V

Lubricants Definition, classification-liquid, semi-solid, solid and synthetic; properties-viscosity index, flash point, cloud point, pour point, aniline point and drop point; greases-properties, types; cutting fluids,

	<p>selection of lubricants.</p> <p>Cement Industry</p> <p>Cement – types, raw materials; manufacture-wet process, constituent of cement, setting of cement; properties of cement-quality, setting time, soundness, strength; mortar, concrete, RCC; curing and decay of concrete.</p> <p>Intellectual Property Rights</p> <p>Introduction to Intellectual Property Rights – Patents - Factors for patentability - Novelty, Non obviousness, Industrial applications - Patent offices in India: Trademark - Types of trademarks- Certification marks, logos, brand names, signatures, symbols and service marks</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
<p>Recommended Text</p>	<ol style="list-style-type: none"> 1. Sharma, B.K. <i>Industrial Chemistry</i>, 9th ed.; Goel Publishing House:Meerut, 1998. 2. Wilkinson, J.B.E. Moore, R.J. <i>Harry's Cosmeticology</i>, 7th ed.; Chemical Publishers : New York, 1982. 3. Alex V. Ramani, <i>Food Chemistry</i>, MJP publishers: Chennai, 2009. 4. Jayashree Ghosh, <i>Applied Chemsitry</i>, S. Chand : New Delhi, 2006. 5. Srilakshmi, B. <i>Food Science</i>, 4th ed.; New Age International Publication, 2005.

Reference Books	<ol style="list-style-type: none"> 1. Jain, P.C.; Jain, M. <i>Engineering Chemistry</i>, 16th ed.; Dhanapet Rai: Delhi, 1992 2. George Howard, <i>Principles and Practice of Perfumes and Cosmetics</i>, Stanley Therones, Cheltenham: UK, 1987. 3. Thankamma Jacob, <i>Foods, Drugs and Cosmetics - A Consumer Guide</i>, Macmillan : London, 1997. 4. ShankuntalaManay, N.; Shadaksharaswamy, M. <i>Food Facts and Principles</i>, 3rd ed.; New Age Publication, 2008. 5. Neeraj Pandey, KhushdeepDharni, <i>Intellectual Property Rights</i>, PHI Learning, 2014.
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Website and e-learning source	1. http://www.sciencecases.org/irradiation/irradiation_notes.asp 2. http://discovery.kcpc.usyd.edu.au/9.5.5/ 3. https://www.wipo.int/about-ip/en/ 4. www.nptel.ac.in 5. http://swayam.gov.in
Course Learning Outcomes (for Mapping with POs and PSOs)	
On completion of the course the students should be able to	
CO1: summarize the properties of fuels which include petroleum, water gas, natural gas and propellents	
CO2: evaluate cosmetic products, soaps, detergents.	
CO3: explain manufacture of sugar, food spoilages and food additives	
CO4: explain properties of abrasives, manufacture of leather and paper	
CO5: explain properties and manufacture of lubricants and cement, and intellectual property rights	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3

CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Code	Course Title	L	T	P	C
23113DSC54C	Disaster Management	4	1	0	3

COURSE CODE	COURSE TITLE	L	T	P	C
23114SEC55L	Industrial Chemistry Practical	0	0	3	2

1. Estimation of glucose in food samples.
2. Determination of dissolved oxygen in water.
3. Determination of Chemical Oxygen Demand (COD)
4. Determination of Biological Oxygen Demand (BOD)
5. Estimation of phosphoric acid in superphosphate fertilizer.
6. Determination of alkali content in antacid tablet using Hcl.
7. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
8. Testing of turmeric powder, milk and mustard oil for adulterants.
9. Determination of total permanent and temporary hardness of water using EDTA.
10. Measurement of chloride, sulphate and salinity of water samples by simple titration method. (AgNO₃ and potassium chromate)

Suggested Readings

1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
3. B. K. Sharma: Engineering Chemistry, Goel Publishing House, Meerut

4. A. K. De, Environmental Chemistry: New Age International Pvt, Ltd, New Delhi.
5. S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New Delhi.
6. S. C. Bhatia: Chemical Process Industries, Vol. I & II, CBS Publishers, New Delhi.
7. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
8. S. S. Dara: A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
9. O. P. Vermani, A. K. Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., New Delhi.
10. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
11. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: Introduction to Ceramics, Wiley Publishers, New Delhi.
12. R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.

COURSE CODE	COURSE TITLE	L	T	P	C
23114SEC56L	Physical Chemistry Practical II	0	0	3	2

Conductometric Experiments

1. Cell constant
2. Equivalent conductance
3. Verification of on- Sager equation
4. Acid- base titrations
5. Precipitation titrations

Potentiometric Experiments:

1. FAS vs KMnO_4
2. KI Vs KMnO_4
3. FAS VS $\text{K}_2\text{Cr}_2\text{O}_7$
4. KI Vs $\text{K}_2\text{Cr}_2\text{O}_7$
5. Determination of solubility of silver salts.

**THIRD YEAR
SEMESTER – VI**

Course Code	Course Title	L	T	P	C
THEORY					
23114AEC61	Organic Chemistry II	5	0	0	4
23114AEC62	Inorganic Chemistry II	5	0	0	4
23114AEC63	Physical Chemistry II	5	0	0	4
23114PRW64	Project - Viva	0	0	13	4
23114SEC65	Professional Competency Skill- General awareness for competitive examination	2	0	0	2
231EXACT	Extension activity	-	-	-	1
AUDIT COURSE					
231ACSIKWS	Indian Knowledge System	-	-	-	2
	Total	30	0	0	21
Total Credits -Programme					137
Total Credits - Audit Courses					09
Total Credits					146

23114AEC61	Organic Chemistry II	5	0	0	4
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Title of the Course	ORGANIC CHEMISTRY - II					
Paper No.	Core XIII					
Category	Core	Year	III	Credits	3	Course Code 23114AEC61
		Semester	V I			
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total	
	1	4	-		5	
Prerequisites	Organic Chemistry – I					
Objectives of the course	<p>This course aims at providing knowledge on</p> <ul style="list-style-type: none"> • classification, isolation and discussing the properties of alkaloids and terpenes • preparation and properties of saccharides • biomolecules • different molecular rearrangement • preparation and properties of organometallic compounds 					

Course Outline	<p style="text-align: center;">UNIT I</p> <p>Alkaloids</p> <p>Classification, isolation, general properties- Hofmann Exhaustive Methylation; Structure elucidation – Coniine, piperine, nicotine.</p> <p>Terpenes: Classification, Isoprene rule, isolation and structural elucidation of Citral, alpha terpineol, Menthol, Geraniol and Camphor.</p>
	<p style="text-align: center;">UNIT II</p> <p>Carbohydrates</p> <p>Definition and Classification of Carbohydrates with examples. Relative configuration of sugars. Determination of configuration (Fischer's Proof). Definition of enantiomers, diastereomers, epimers and anomers with suitable examples.</p> <p>Monosaccharides– configuration – D and L hexoses – aldohexoses and ketohexoses.</p> <p>Glucose, Fructose – Occurrence, preparation, properties, reactions, structural elucidation, uses.</p> <p>Interconversions of sugar series – ascending, descending, aldose to ketose and ketose to aldose.</p> <p>Disaccharides – sucrose, lactose, maltose - preparation, properties and uses (no structural elucidation).</p> <p>Polysaccharides – Source, constituents and biological importance of homopolysaccharides- starch and cellulose, heteropolysaccharides – hyaluronic acid, heparin.</p>

	<p>UNIT III</p> <p>Molecular rearrangements:</p> <p>Molecular Rearrangement: Type of rearrangements, Mechanism for Benzidine, Favorskii, Claisen, Fries, Hofmann, Curtius, Schmidt and Beckmann, Pinacol-pinacolone rearrangement</p>
	<p>UNIT IV</p> <p>Special reagents in organic synthesis</p> <p>AIBN, 9BBN, BINAP/BINOL, BOC, DABCO, DCC, DIBAL, DMAP, NBS/NCS, NMP, PCC,</p> <p>TBHP, TEMPO</p> <p>Organometallic compounds in Organic Synthesis</p> <p>Preparation, Properties and applications:</p> <p>Grignard Reagents, Organo Lithium Compounds, Ziegler – Natta, Wilkinson, Metal Carbonyl, Zeiss's Salt</p>
	<p>UNIT V</p> <p>Green Chemistry: Principles, chemistry behind each principle and applications in chemical synthesis. Green reaction media – green solvents, green reagents and catalysts; tools used like microwave and ultra-sound in chemical synthesis.</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
Skills acquired	Knowledge, Problem solving, Analytical ability, Professional

from this course	Competency, Professional Communication and Transferable skills.
Recommended Text	<ol style="list-style-type: none"> 1 M.K.Jain, S. C.Sharma, Modern Organic Chemistry, VishalPublishing, 4th reprint,2009. 2 S.M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan IndiaLtd., 3rd edition,2009 3 Arun Bahl and B.S. Bahl, Advanced organic chemistry, New Delhi, S.Chand& Company Pvt. Ltd., Multicolour edition,2012. 4 P. L.Soni and H. M. Chawla, Text Book of Organic Chemistry, Sultan Chand & Sons, New Delhi, 29th edition, 2007.

	5. C Bandyopadhyaya; An Insight into Green Chemistry; Published on 2020
Reference Books	<ol style="list-style-type: none"> 1. R. T. Morrison and R. N. Boyd, Organic Chemistry, Pearson Education, Asia, 6th edition, 2012. 2. T.W.Graham Solomons, Organic Chemistry, John Wiley & Sons, 11th edition, 2012. 3. A. Carey Francis, Organic Chemistry, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 7th edition, 2009. 4. I. L. Finar, Organic Chemistry, Vol. (1 & 2), England, Wesley Longman Ltd, 6th edition, 2006. 5. J. A. Joule, and G. F. Smith, Heterocyclic Chemistry, Wiley, 5th Edition, 2010.
Website and e-learning source	<ol style="list-style-type: none"> 1. www.epgpathshala.nic.in 2. www.nptel.ac.in 3. http://swayam.gov.in 4. Virtual Textbook of Organic Chemistry 5. https://vlab.amrita.edu/
<p>Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to</p> <p>CO1: explain isolation and properties of alkaloids and terpenes</p> <p>CO2: explain preparation and reactions of mono and disachharides</p> <p>CO3: classify biomolecules and natural products based on their structure, properties, reactions and uses.</p> <p>CO4: explain molecular rearrangements like benzidine, Hoffmann etc.,</p> <p>CO5: preparation and properties of organolithium compounds</p>	

	PO 1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0
CO	S	S	S	S	S	S	S	M	S	M

1										
CO 2	M	S	S	S	M	S	S	M	M	M
CO 3	S	S	S	M	S	S	S	M	S	M
CO 4	S	S	S	S	S	S	S	M	M	M
CO 5	S	M	S	S	S	S	S	M	M	S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

23114AEC62	Inorganic Chemistry II	5	0	0	4
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Title of the Course	INORGANIC CHEMISTRY –II					
Paper No.	Core XIV					
Category	Core	Year	III	Credits	3	Course Code
		Semester	V I			23114AEC62
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total	
	4		-		4	
Prerequisites	Inorganic Chemistry – I					
Objectives of the course	<p>The course aims to provide knowledge on</p> <ul style="list-style-type: none"> • tracer elements and their role in the biological system. • iron transport and storage • metallo enzymes, oxygen transport. • silicates and their applications • industrial applications of refractories, alloys, paints and pigments 					
Course Outline	<p>UNIT I</p> <p>Bioinorganic Chemistry</p> <p>Essential and trace elements: Role of Na⁺, K⁺, Mg²⁺, Ca²⁺, Fe³⁺, Cu²⁺ and Zn²⁺ in biological systems. Effect of excess intake (Toxicity) of Metal ions – trace elements - As, Cd, Pb, Hg.</p>					

UNIT II

Metal ion transport and storage

Iron – storage, transport - Transferrin and Ferritin; Iron-porphyrins – myoglobin, haemoglobin – oxygen transport - Bohr effect; Sodium/potassium pump, calcium pump; transport and storage - copper

and zinc.

	<p>UNIT III</p> <p>Metallo enzymes</p> <p>Isomerase and synthetases, structure of cyanocobalamin (Vitamin B12), nature of Co-C bond; Metalloenzymes - functions of carboxy peptidase A, zinc metalloenzyme – mechanism and uses, Zn-Cu enzyme - structure and function, carbonic anhydrase, Vitamin B-12 as transferase and isomerase - Iron-sulphur proteins - 2Fe-2S – rubredoxin, 4Fe-2S – ferridoxin, Iron sulphur cluster enzymes.</p> <p>Invivo and Invitro nitrogen fixation – biological functions of nitrogenase and molybdo enzymes.</p> <hr/> <p>UNIT IV</p> <p>Silicates</p> <p>Introduction – general properties of silicates, structure – types of silicates</p> <p>– ortho silicates(zircon), pyrosilicates (thortveitite), chain silicates(pyroxenes), ring silicates(beryl), sheet silicates(talc, mica, asbestos), silicates having three dimensional structure (feldspars, zeolites, ultramarines)</p> <hr/> <p>UNIT V</p> <p>Industrial Applications of Inorganic Compounds</p> <p>Refractories, pyrochemical, explosives. Alloys, Paints and pigments - requirements of a good paint; classification, constituents of paints – pigments, vehicles, thinners, driers, extenders, anti-knocking agents, anti-skinning agents, plasticizers, binders-application; varnishes- oils, spirit; enamels.</p> <p>Nanocomposite Hydrogels: synthesis, characterization and uses.</p> <p>Industrial visits and internship mandatory.</p>
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Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Puri B R, Sharma L R, Kalia K C (2011), Principles of Inorganic Chemistry, 31 th ed., Milestone Publishers & Distributors, Delhi.

	<ol style="list-style-type: none"> 2. Satya Prakash, Tuli G. D., Basu S. K., Madan R. D. (2009), Advanced Inorganic Chemistry, 18th Edition, S. Chand & Co., New Delhi 3. Lee J D, (1991), Concise Inorganic Chemistry, 4th ed., ELBS William Heinemann, London. 4. W V Malik, G D Tuli, R D Madan, (2000), Selected Topics in Inorganic Chemistry, Schand and Company Ltd. 5. A. K. De, Text book of Inorganic Chemistry, Wiley East Ltd, seventh edition, 1992
Reference Books	<ol style="list-style-type: none"> 1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nded., S.Chand and Company, New Delhi. 2. Gopalan R, (2009) <u>Inorganic Chemistry for Undergraduates</u>, Ist Edition, University Press (India) Private Limited, Hyderabad 3. Sivasankar B, (2013) <u>Inorganic Chemistry</u>. Ist Edition, Pearson, Chennai 4. Alan G. Sharp (1992), <u>Inorganic Chemistry</u>, 3rd Edition, Addition-Wesley, England 5. Peter Atkins, Tina Overton, Jonathan Rourke and Mark Weller, Inorganic Chemistry, Oxford University Press, sixth edition, 2014.
Website and e-learning source	<ol style="list-style-type: none"> 1. www.epgpathshala.nic.in 2. www.nptel.ac.in 3. http://swayam.gov.in
<p>Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to</p> <p>CO1: ability to explain the importance of tracer elements on biological system.</p> <p>CO2: explain the metal ion transport, Bohr effect, Na, K, Ca pump.</p> <p>CO3: explain the function of Vitamin B12, Zn-Cu enzyme, ferredoxin, cluster enzymes.</p> <p>CO4: classification and structure of silicates.</p> <p>CO5: explain the manufacture of refractories, explosives, paints and pigments</p>	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

23114AEC63	Physical Chemistry II	5	0	0	4
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Title of the Course	PHYSICAL CHEMISTRY-II						
Paper No.	Core - XV						
Category	Core	Year	III	Credits	3	Course Code	23114AEC63
		Semester	V I				
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	4	1	-		5		
Prerequisites	Physical Chemistry - I						
Objectives of the course	<p>The course aims at providing an overall view of the</p> <ul style="list-style-type: none"> • phase diagram of one and two component systems • chemical equilibrium, • separation techniques for binary liquid mixtures. • electrical conductance and transport number. • galvanic cells, EMF and significance of electrochemical series. 						
Course Outline	<p>UNIT-I</p> <p>Phase rule</p> <p>Definition of terms; derivation of phase rule ; application to one component systems – water and sulphur - super cooling, sublimation ; two component systems – solid liquid equilibria- simple eutectic (lead - silver and bismuth - cadmium), freezing mixtures (potassium iodide-water), compound formation with- congruent melting points</p>						

	(magnesium – zinc and ferric chloride – water system), peritectic
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	<p>change (sodium – potassium), solid solution (gold-silver); copper sulphate – water system.</p>
	<p>UNIT II</p> <p>Chemical equilibrium</p> <p>Law of mass action – thermodynamic derivation – relationship between K_p and K_c – application to the homogeneous equilibria – dissociation of PCl_5 gas, N_2O_4 gas – equilibrium constant and degree of dissociation - formation of HI, NH_3, and SO_3 – heterogeneous equilibrium – decomposition of solid calcium carbonate – Lechatelier principle – van't Hoff reaction isotherm – temperature dependence of equilibrium constant – van't Hoff reaction isochore – Clayperon equation – ClausiusClayperon equation and its applications</p>
	<p>UNIT III</p> <p>Binary liquid mixtures</p> <p>Ideal liquid mixtures – non ideal solutions – azeotropic mixtures – fractional distillation – partially miscible mixtures – phenol-water, triethylamine-water, nicotine-water – effect of impurities on critical solution temperature; immiscible liquids- steam distillation; Nernst distribution law – applications.</p>
	<p>UNIT IV</p> <p>Electrical Conductance and Transference</p> <p>Arrhenius theory of electrolytic dissociation – Ostwald's dilution law, limitations of Arrhenius theory; behavior of strong electrolytes – interionic effects – Debye Huckel theory – Onsager equation (noderivation), significance of Onsager equation, Debye Falkenhagen effect, Wien effect. Ionic mobility – Discharge of ions on electrolysis (Hittorf's theoretical device), transport number –determination – Hittorf's method, moving boundary method – factors affecting transport number – determination of ionic mobility; Kohlrausch's law- applications; molar ionic conductance and viscosity (Walden's rule); applications of conductance measurements – determination of - degree of dissociation of weak electrolyte, dissociation constant of weak acid and weak base, ionic product of water, solubility and solubility product of sparingly soluble salts - conductometric titrations – acid base titrations.</p>

UNIT V

Galvanic Cells and Applications

Galvanic cell, representation, reversible and irreversible cells, EMF and its measurement – standard cell; relationship between electrical energy and chemical energy; sign of EMF and spontaneity of a reaction,

thermodynamics and EMF – calculation of ΔG , ΔH , and ΔS from EMF

data; reversible electrodes, electrode potential, standard electrode potential, primary and secondary reference electrodes, Nernst equation for electrode potential and cell EMF; types of electrodes – metal/metal ion, metal amalgam/metal ion, metal, insoluble salt/anion, gas electrode, redox electrode; electrochemical series – applications of electrochemical series. Chemical cells with and without transport,

concentration cells with and without transport;

Applications of EMF measurements

applications of EMF measurements – determination of activity

	<p>coefficient of electrolytes, transport number, valency of ions, solubility product, pH using hydrogen gas electrode, quinhydrone electrode and glass electrode, potentiometric titrations – acid base titrations, redox titrations, precipitation titrations, ionic product of water and degree of hydrolysis; redox indicators - use of diphenylamine indicator in the titration of ferrous iron against dichromate.</p> <p>Industrial component</p> <p>Galvanic cells- lead storage, Ni-Cd, Li and Zn-air, Al-air batteries Fuel cells – H₂-O₂ cell – efficiency of fuel cells.</p> <p>corrosion –mechanism, types and methods of prevention.</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
<p>Recommended Text</p>	<ol style="list-style-type: none"> 1. B.R. Puri and L.R. Sharma, Principles of Physical Chemistry, ShobanLalNagin Chand and Co., forty eighth edition, 2021. 2. Peter Atkins, and Julio de Paula, James Keeler, Physical Chemistry, Oxford University press, International eleventh edition, 2018. 3. ArunBahl, B.S. Bahl, G. D. Tuli Essentials of physical chemistry, 28th edition 2019, S, Chand & Co. 4. S. K. Dogra and S. Dogra, Physical Chemistry through Problems: New Age International, fourth edition, 1996. 5. J. Rajaram and J.C. Kuriacose, Thermodynamics, ShobanLalNagin Chand and CO., 1986.

Reference Books	<ol style="list-style-type: none">1. K. L. Kapoor, A Textbook of Physical Chemistry, MacmillanIndia Ltd, third edition,2009.2. Gilbert. W. Castellen, Physical Chemistry, Narosa Publishing House, third edition, 1985.3. P. W. Atkins, and Julio de Paula, Physical Chemistry, OxfordUniversity press, seventh edition, 2002.4. B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, Shobanlal Nagin Chand and Co. Jalendhar, forty first, edition, 20015. D.N.Bajpai, Advanced Physical Chemistry, S.Chand&Co.,2001
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Website and e-learning source	https://nptel.ac.in https://swayam.gov.in https://archive.nptel.ac.in/content/storage2/courses/112108150/pdf/PPTs/MTS_07_m.pdf Thermodynamics - NPTEL https://www.youtube.com/watch?v=f0udxGcoztE Introduction to chemical equilibrium – MIT opencourse ware
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Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to

CO1: construct the phase diagram for one component and two component systems, explain the properties of freezing mixture, component with congruent melting points and solid solutions.

CO2: apply the concepts of chemical equilibrium in dissociation of PCl_5 , N_2O_4 and formation of HI , NH_3 , SO_3 and decomposition of calcium carbonate. Demonstrate important principles such as Le chatelier principle, van't Hoff reaction isotherm and Clausius-Clayperon equation.

CO3: Identify an appropriate distillation method for the separation of binary liquid mixtures such as azeotropic mixtures, partially miscible mixtures and immiscible liquids.

CO4: Explain the significance of Arrhenius theory, Debye-Huckel theory, Onsager equation and Kohlrausch's law in conductance.

CO5: Construct electrochemical cell with the help of electrochemical series and calculate cell EMF. Demonstrate the applications of EMF and significance of potentiometric titrations.

	PO 1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0
CO 1	S	S	S	S	S	S	S	M	S	M
CO 2	M	S	S	S	M	S	S	M	M	M
CO 3	S	S	S	M	S	S	S	M	S	M

CO 4	S	S	S	S	S	S	S	M	M	M
CO 5	S	M	S	S	S	S	S	M	M	S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC63L	Industrial Chemistry Practical	0	0	3	2

1. Estimation of glucose in food samples.
2. Determination of dissolved oxygen in water.
3. Determination of Chemical Oxygen Demand (COD)
4. Determination of Biological Oxygen Demand (BOD)
5. Estimation of phosphoric acid in superphosphate fertilizer.
6. Determination of alkali content in antacid tablet using Hcl.
7. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
8. Testing of turmeric powder, milk and mustard oil for adulterants.
9. Determination of total permanent and temporary hardness of water using EDTA.
10. Measurement of chloride, sulphate and salinity of water samples by simple titration method. (AgNO₃ and potassium chromate)

Suggested Readings

1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
3. B. K. Sharma: Engineering Chemistry, Goel Publishing House, Meerut
4. A. K. De, Environmental Chemistry: New Age International Pvt, Ltd, New Delhi.
5. S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New Delhi.
6. S. C. Bhatia: Chemical Process Industries, Vol. I & II, CBS Publishers, New Delhi.
7. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
8. S. S. Dara: A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
9. O. P. Vermani, A. K. Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., New Delhi.
10. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
11. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: Introduction to Ceramics, Wiley Publishers, New Delhi.
12. R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

SCHOOL OF ARTS OF SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc CHEMISTRY CURRICULUM

REGULATION 2023

M.Sc. CHEMISTRY SYLLABUS – REGULATION 2023



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SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc CHEMISTRY – REGULATION 2023

COURSE STRUCTURE

M.Sc. Graduate Attributes

- Domain knowledge
- Investigative
- Critical thinking
- Resourceful and Responsible
- Effective Communication
- Ethical and Moral values

M.Sc. Programme Educational Objective – PEO

- PEO1-To demonstrate broad knowledge of descriptive Chemistry.
- PEO2-To impart the basic analytical and technical skills to work effectively in the various fields of chemistry.

- PEO3- To motivate critical thinking and analysis skills to solve complex chemical problems, e.g., analysis of data, synthetic logic, spectroscopy, structure and modeling, team-based problem solving, etc.
- PEO4-To demonstrate an ability to conduct experiments in the above sub-disciplines with mastery of appropriate techniques and proficiency using core chemical instrumentation and modeling methods.
- PEO5-To demonstrate the ability to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions.
- PEO6-To develop skills in quantitative modeling of static and dynamic chemical systems.
- PEO7-To develop laboratory competence in relating chemical structure to spectroscopic phenomena.
- PEO8-To demonstrate the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment, and modern instrumentation.

M.Sc Programme Outcome –PO

- PO1-Think critically and analyze chemical problems.
- PO2-Present scientific and technical information resulting from laboratory experimentation in both written and oral formats.
- PO3-Work effectively and safely in a laboratory environment.
- PO4-Use technologies/instrumentation to gather and analyze data.
- PO5-Work in teams as well as independently.
- PO6-Apply modern methods of analysis to chemical systems in a laboratory setting.

M.Sc Course -C

- C1- Organic Reaction Mechanism-I
- C2- Structure and Bonding in Inorganic Compounds
- C3- Chemistry in everyday life
- C4- Organic reaction mechanism-II
- C5- Physical Chemistry-I
- C6- Industrial Chemistry
- C7- Organic synthesis and Photochemistry
- C8- Coordination Chemistry-I
- C9- Coordination Chemistry-II
- C10- Physical Chemistry-II
- C11-Project Work

M.Sc Curriculum Mapping

Programme Educational Objectives Vs Programme Outcome

Programme Outcome-PO	PO1	PO2	PO3	PO4	PO5	PO6
Programme Educational Outcome - PEO						

PE01	✓					
PE02						
PE03		✓				
PE04			✓			
PE05						
PE06					✓	
PE07				✓		
PE08						✓

M.Sc Curriculum Mapping

Programme Outcome vs Courses Outcome

Programme Outcome-PO	PO1	PO2	PO3	PO4	PO5	PO6
Courses Outcome-CO						
CO1			*	*		*
CO2		*		*	*	*
CO3	*	*			*	
CO4			*	*		*
CO5			*	*		*
CO6		*		*	*	*
CO7	*	*			*	
CO8		*	*		*	
CO9	*	*			*	*
CO10		*	*	*		*
CO11		*		*	*	



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M.SC., CHEMSITRY

SYLLABUS

**FROM THE ACADMIC YEAR
2023-2024**



SCHOOL OF ARTS AND SCIENCE

M. Sc CHEMISTRY-SYLLABUS – REGULATION 2023

COURSE STRUCTURE

Course Code	Course Title	L	T	P	C
SEMESTER I					
23214AEC11	Organic Reaction Mechanism-I	5	1		4
23214AEC12	Structure and Bonding in Inorganic Compounds	5	1		4
23214SEC13L	Organic Chemistry lab	0	1	4	5
23214DSC14-	Discipline specific Elective Courses-I	4	1	0	4
23214DSC15-	Discipline specific Elective Courses-II	4	1	0	3
23214RMC16	Research methodology	2	1	0	2
	Total	20	6	4	21
SEMESTER II					
23214AEC21	Organic reaction mechanism-II	4	1	0	4
23214AEC22	Physical Chemistry-I	4	1	0	4
23214SEC23L	Inorganic Chemistry lab	0	0	5	5
23214DSC24-	Discipline specific Elective Courses-III	4	1	0	4
23214DSC25-	Discipline specific Elective Courses-IV	4	1	0	4
23214AECC26	Participation in bounded research (AECC 2) SoftSkill-2	2	0	0	2

23214GECC27	Industrial Chemistry /	2	0	0	3
23215SEC28	Internship-	-	-	-	2
	Total	22	3	4	26
SEMESTER III					
23214AEC31	Organic synthesis and Photochemistry	5	1	0	4
23214AEC32	Coordination Chemistry-I	5	1	0	4
23214SEC33L	Physical Chemistry Practical	0	0	5	5
23214SEC34L	Analytical Instrumentation technique lab	0	0	5	5
23214DSC35	Discipline specific Elective Courses-V	3	0	0	2
23214GEC36B	Analytical chemistry	3	0	0	2
23215SEC37	Industrial Visit – fertilizer composition analysis	2	0	0	2
	Total	18	2	10	24
SEMESTER IV					
23214AEC41	Coordination Chemistry-II	4	0	0	3
23214AEC42	Physical Chemistry-II	4	0	0	3
23214SEC43L	Analytical Instrumentation lab	0	0	5	4
23214DSC44-	Discipline specific Elective Courses-VI	3	0	0	3
23214PRW45	Project with viva voce	0	0	0	3
23214SEC46	Industrial Visit – Pharmaceutical drug analysis	0	0	0	4

	Total	11	0	5	20
	Total Credits for the Programme				91

Discipline specific Electives

Semester	Discipline specific Elective Courses-I
I	23214DSC14 A Pharmaceutical Chemistry/ 23214DSC14 B Nanomaterials and Nanotechnology
	Discipline specific Elective Courses-II 23214DSC15 A Electrochemistry/ 23214DSC15 B Molecular Spectroscopy
II	Discipline specific Elective Courses-III
	23214DSC24 A Medicinal chemistry 23214DSC24 B Green chemistry
	223214DSC25 A Bio inorganic chemistry 23214DSC25 B Material science 3215SECC28- Internship
	23214DSC35-A Pharmacognosy and Phytochemistry 23214DSC35-B Biomolecules and Heterocyclic Compounds
	Discipline specific Elective Courses-IV
IV	23214DSC44-A Chemistry of Natural products 23214DSC44-B – Polymer Chemistry

CREDIT DISTRIBUTION

SEMESTER	SEC	GEC	DSE	RESEARCH	OTHERS	TOTAL
I	19		04	01		24
II	19		04	05		28
III	19	03		02		24
IV			04	9	02	15
TOTAL	57	03	12	17		91

SCHOOL OF ARTS AND SCIENCE
M. Sc CHEMISTRY-SYLLABUS – REGULATION 2023

COURSE STRUCTURE

Course Code	Course Title	L	T	P	C
23214CC11	Organic Reaction Mechanism-I	5	1	0	4
Course Outline	<p>UNIT-I:Methods of Determination of Reaction Mechanism: Reaction intermediates, The transition state, Reaction coordinate diagrams, Thermodynamic and kinetic requirements of reactions: Hammond postulate.Methods of determining mechanism: non-kinetic methods - product analysis, determination of intermediates-isolation, detection, and trapping. Cross-over experiments, isotopic labelling, isotope effects and stereo chemical evidences. Kinetic methods - relation of rate and mechanism.Effect of structure on reactivity: Hammett and Taft equations. Linear free energy relationship, partial rate factor, substituent and reaction constants.</p>				
	<p>UNIT-II:Aromatic and Aliphatic Electrophilic Substitution: Aromaticity: Aromaticity in benzenoid, non-benzenoid, heterocyclic compounds and annulenes. Aromatic electrophilic substitution: Orientation and reactivity of di- and polysubstituted phenol, nitrobenzene and halobenzene. Reactions involving nitrogen electrophiles: nitration, nitrosation and diazonium coupling; Sulphur electrophiles: sulphonation; Halogen electrophiles: chlorination and bromination; Carbon electrophiles: Friedel-Crafts alkylation, acylation and arylation reactions.Aliphatic electrophilic substitution Mechanisms: SE2 and SEi, SE1- Mechanism and evidences.</p>				
	<p>UNIT-III:Aromatic and Aliphatic Nucleophilic Substitution:Aromatic nucleophilic substitution: Mechanisms - S_NAr, S_N1 and Benzyne mechanisms - Evidences - Reactivity, Effect of structure, leaving group and attackingnucleophile. Reactions: Oxygen and Sulphur-nucleophiles, Bucherer and Rosenmund reactions, von Richter, Sommelet- Hauser and Smiles rearrangements. S_N1, ion pair, S_N2 mechanisms and evidences. Aliphatic nucleophilic substitutions at an allylic carbon, aliphatic trigonal carbon and vinyl carbon.S_N1, S_N2, S_Ni, and S_E1 mechanism and evidences, Swain- Scott, Grunwald-Winstein relationship - Ambident nucleophiles.</p>				

	<p>UNIT-IV:Stereochemistry-I:Introduction to molecular symmetry and chirality – axis, plane, center, alternating axis of symmetry. Optical isomerism due to asymmetric and dissymmetric molecules with C, N, S based chiral centers. Optical purity, prochirality, enantiotopic and diastereotopic atoms, groups, faces, axial and planar chirality, chirality due to helical shape, methods of determining the configuration. Racemic modifications: Racemization by thermal, anion, cation, reversible formation, epimerization, mutarotation. D, L system, Cram’s and Prelog’s rules: R, S-notations, proR, proS, side phase and re phase Cahn-Ingold-Prelog rules, absolute and relative configurations. Configurations of allenes, spiranes, biphenyls, cyclooctene, helicene, binaphthyls, ansa and cyclophanic compounds, exo-cyclic alkylidene-cycloalkanes. Topicity and prostereoisomerism, chiral shift reagents and chiral solvating reagents. Criteria for optical purity: Resolution of racemic modifications, asymmetric transformations, asymmetric synthesis, destruction. Stereoselective and stereospecific synthesis.</p>	
	<p>UNIT-V:Stereochemistry-II: Conformation and reactivity of acyclic systems, intramolecular rearrangements, neighbouring group participation, chemical consequence of conformational equilibrium - Curtin-Hammett Principle. Stability of five and six-membered rings: mono-, di- and polysubstituted cyclohexanes, conformation and reactivity in cyclohexane systems. Fused and bridged rings: bicyclic, poly cyclic systems, decalins and Brett’s rule. Optical rotation and optical rotatory dispersion, conformational asymmetry, ORD curves, octant rule, configuration and conformation, Cotton effect, axial haloketone rule and determination of configuration.</p>	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
Skills acquired from this course	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	

Recommended Text	<ol style="list-style-type: none"> 1. J. March and M. Smith, Advanced Organic Chemistry, 5th edition, John-Wiley and Sons.2001. 2. E. S. Gould, Mechanism and Structure in Organic Chemistry, Holt, Rinehart and Winston Inc., 1959. 3. P.S.Kalsi, Stereochemistry of carbon compounds, 8th edition, New Age International Publishers, 2015. 4. P. Y. Bruice, Organic Chemistry, 7th edn, Prentice Hall, 2013. 5. J.Clayden, N. Greeves, S. Warren, Organic Compounds, 2nd edition, Oxford University Press, 2014. 	
Reference Books	<ol style="list-style-type: none"> 1. F.A. Carey and R.J. Sundberg, Advanced Organic Chemistry Part-A and B, 5th edition, Kluwer Academic / Plenum Publishers, 2007. 2. D. G. Morris, Stereochemistry, RSC Tutorial Chemistry Text 1, 2001. 3. N.S. Isaacs, Physical Organic Chemistry, ELBS, Longman, UK, 1987. 4. E. L. Eliel, Stereochemistry of Carbon Compounds, Tata-McGraw Hill, 2000. 5. I. L. Finar, Organic chemistry, Vol-1&2, 6th edition, Pearson Education Asia, 2004. 	
Website and e-learning source	<ol style="list-style-type: none"> 1. https://sites.google.com/site/chemistryebookscollection02/home/organic-chemistry/organic 2. https://www.organic-chemistry.org/ 	

Course Code	Course Title	L	T	P	C
23214CC12	STRUCTURE AND BONDING IN INORGANIC COMPOUNDS	5	1	0	4
Course Outline	<p>UNIT-I:Structure of main group compounds and clusters: VB theory – Effect of lone pair and electronegativity of atoms (Bent’s rule) on the geometry of the molecules; Structure of silicates - applications of Paulings rule of electrovalence - isomorphous replacements in silicates – ortho, meta and pyro silicates – one dimensional, two dimensional and three-dimensional silicates. Structure of silicones, Structural and bonding features of B-N, S-N and P-N compounds; Poly acids – types, examples and structures; Borane cluster: Structural features of closo, nido, arachano and klado; carboranes, hetero and metalloboranes; Wade’s rule to predict the structure of borane cluster; main group clusters –zintl ions and mno rule.</p>				
	<p>UNIT-II: Solid state chemistry – I: Ionic crystals: Packing of ions in simple, hexagonal and cubic close packing, voids in crystal lattice, Radius ratio, Crystal systems and Bravis lattices, Symmetry operations in crystals, glide planes and screw axis; point group and space group;Solid state energetics: Lattice energy – Born-Lande equation - Kapustinski equation, Madelung constant.</p>				
	<p>UNIT-III:Solid state chemistry – II: Structural features of the crystal systems: Rock salt, zinc blende & wurtzite, fluorite and anti-fluorite, rutile and anatase, cadmium iodide and nickel arsenide; Spinel -normal and inverse types and perovskite structures. Crystal Growth methods: From melt and solution (hydrothermal, sol-gel methods) – principles and examples.</p>				

	<p>UNIT-IV:Techniques in solid state chemistry: X-ray diffraction technique: Bragg's law, Powder diffraction method – Principle and Instrumentation; Interpretation of XRD data – JCPDS files, Phase purity, Scherrer formula, lattice constants calculation; Systematic absence of reflections; Electron diffraction technique – principle, instrumentation and application. Electron microscopy – difference between optical and electron microscopy, theory, principle, instrumentation, sampling methods and applications of SEM and TEM.</p>	
	<p>UNIT-V:Band theory and defects in solids</p> <p>Band theory – features and its application of conductors, insulators and semiconductors, Intrinsic and extrinsic semiconductors; Defects in crystals – point defects (Schottky, Frenkel, metal excess and metal deficient) and their effect on the electrical and optical property, laser and phosphors; Linear defects and its effects due to dislocations.</p>	
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	

Recommended Text	<ol style="list-style-type: none"> 1. A R West, Solid state Chemistry and its applications, 2nd Edition (Students Edition), John Wiley & Sons Ltd., 2014. 2. A K Bhagi and G R Chatwal, A textbook of inorganic polymers, Himalaya Publishing House, 2001. 3. L Smart, E Moore, Solid State Chemistry – An Introduction, 4th Edition, CRC Press, 2012. 4. K. F. Purcell and J. C. Kotz, Inorganic Chemistry; W.B. Saunders company: Philadelphia, 1977. 5. J. E. Huheey, E. A. Keiter and R. L. Keiter, Inorganic Chemistry; 4th ed.; Harper and Row: New York, 1983. 	
Reference Books	<ol style="list-style-type: none"> 1. D. E. Douglas, D.H. McDaniel and J. J. Alexander, Concepts and Models in Inorganic Chemistry, 3rd Ed, 1994. 2. R J D Tilley, Understanding Solids - The Science of Materials, 2nd edition, Wiley Publication, 2013. 3. C N R Rao and J Gopalakrishnan, New Directions in Solid State Chemistry, 2nd Edition, Cambridge University Press, 199. 4. T. Moeller, Inorganic Chemistry, A Modern Introduction; John Wiley: New York, 1982. 5. D. F. Shriver, P. W. Atkins and C.H. Langford; Inorganic Chemistry; 3rd ed.; Oxford University Press: London, 2001. 	
Website and e-learning source	https://ocw.mit.edu/courses/3-091-introduction-to-solid-state-chemistry-fall-2018/video_galleries/lecture-videos/	

Course Code	Course Title	L	T	P	C
23214CC13L	Organic Chemistry Practical	5	1	0	4
Course Outline	UNIT-I: Separation and analysis: A. Two component mixtures. B. Three component mixtures.				

	<p>UNIT-II:Estimations:</p> <ul style="list-style-type: none"> a) Estimation of Phenol (bromination) b) Estimation of Aniline (bromination) c) Estimation of Ethyl methyl ketone (iodimetry) d) Estimation of Glucose (redox) e) Estimation of Ascorbic acid (iodimetry) f) Estimation of Aromatic nitro groups (reduction) g) Estimation of Glycine (acidimetry) h) Estimation of Formalin (iodimetry) i) Estimation of Acetyl group in ester (alkalimetry) j) Estimation of Hydroxyl group (acetylation) <p>Estimation of Amino group (acetylation)</p>	
	<p>UNIT-III:Two stage preparations:</p> <ul style="list-style-type: none"> a) <i>p</i>-Bromoacetanilide from aniline b) <i>p</i>-Nitroaniline from acetanilide c) 1,3,5-Tribromobenzene from aniline d) Acetyl salicylic acid from methyl salicylate e) Benzilic acid from benzoin f) <i>m</i>-Nitroaniline from nitrobenzene <p>g) <i>m</i>-Nitrobenzoic acid from methyl benzoate</p>	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC- CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	

Recommended Text	<ol style="list-style-type: none"> 1. A R West, Solid state Chemistry and its applications, 2nd Edition (Students Edition), John Wiley & Sons Ltd., 2014. 2. A K Bhagi and G R Chatwal, A textbook of inorganic polymers, Himalaya Publishing House, 2001. 3. L Smart, E Moore, Solid State Chemistry – An Introduction, 4th Edition, CRC Press, 2012. 	
Reference Books	<ol style="list-style-type: none"> 1. D. E. Douglas, D.H. McDaniel and J. J. Alexander, Concepts and Models in Inorganic Chemistry, 3rd Ed, 1994. 2. R J D Tilley, Understanding Solids - The Science of Materials, 2nd edition, Wiley Publication, 2013. 3. C N R Rao and J Gopalakrishnan, New Directions in Solid State Chemistry, 2nd Edition, Cambridge University Press, 199. 	
Website and e-learning source	https://ocw.mit.edu/courses/3-091-introduction-to-solid-state-chemistry-fall-2018/video_galleries/lecture-videos/	

Course Code	Course Title	L	T	P	C
23214DSC14A	Elective I(Generic /Discipline Specific)(One from Group A) Pharmaceutical Chemistry / Nanomaterials and Nanotechnology	0	0	4	4
	PHARMACEUTICAL CHEMISTRY				
Course Outline	UNIT-I: Physical properties in Pharmaceuticals: Physical properties of drug molecule: physical properties. Refractive index- Definition, explanation, formula, importance, determination, specific & molar refraction. Optical activity\rotation- monochromatic & polychromatic light, optical activity, angle of rotation, specific rotation examples, measurement of optical activity. Dielectric constant & Induced Polarization- Dielectric constant explanation & determination. Rheology of pharmaceutical systems: Introduction, Definition, Applications, concept of viscosity, Newton's law of flow, Kinematic, Relative, Specific, Reduced & Intrinsic viscosity. Newtonian system, non-Newtonian system- Plastic flow, Pseudoplastic flow, Dilatent flow. Viscosity measurements- selection of viscometer for Newtonian and non-Newtonian system.				

	<p>UNIT-II:Isotopic Dilution analysis: principle and applications, Neutron activation analysis: Principle, advantages and limitations, Scintillation counters: Body scanning. Introduction to radiopharmaceuticals. Properties of various types of radiopharmaceuticals, Radiopharmaceuticals as diagnostics, as therapeutics, for research and sterilization. Physico Chemical Properties and drug action. Physico chemical properties of drugs (a) Partition coefficient, (b) solubility (c) surface activity, (d) degree of ionization.</p>	
	<p>UNIT-III: Drug dosage and product development: Introduction to drug dosage Forms & Drug Delivery system – Definition of Common terms. Drug Regulation and control, pharmacopoeias formularies, sources of drug, drug nomenclature, routes of administration of drugs products, need for a dosage form, classification of dosage forms. Drug dosage and product development. Introduction to drug dosage Forms & Drug Delivery system – Definition of Common terms. Drug Regulation and control, pharmacopoeias formularies, sources of drug, drug nomenclature, routes of administration of drugs products, need for a dosage form, classification of dosage forms.</p>	
	<p>UNIT-IV:Development of new drugs: Introduction, procedure followed in drug design, the research for lead compounds, molecular modification of lead compounds. Structure-Activity Relationship (SAR): Factors effecting bioactivity, resonance, inductive effect, isosterism, bioisosterism, spatial considerations, biological properties of simple functional groups, theories of drug activity, occupancy theory, rate theory, induced-fit theory, 4.3 Quantitative structure activity relationship (QSAR): Development of QSAR, drug receptor interactions, the additivity of group contributions, physico-chemical parameters, lipophilicity parameters, electronic parameter, ionization constants, steric parameters, chelation parameters, redox potential, indicator-variables.</p>	
	<p>UNIT-V:Computers in Pharmaceutical Chemistry: Need of computers for chemistry. Computers for Analytical Chemists- Introduction to computers: Organization of computers, CPU, Computer memory, I/O devices, information storage, software components. Application of computers in chemistry: Programming in high level language (C+) to handle various numerical methods in chemistry – least square fit, solution to simultaneous equations, interpolation, extrapolation, data smoothing, numerical differentiation and integrations.</p>	

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. Physical Chemistry- Bahl and Tuli. 2. Text Book of Physical Pharmaceutics, IInd edition, Vallabh Prakashan-.C.V.S. Subramanyam. 3. Medicinal Chemistry (Organic Pharmaceutical Chemistry), G.R Chatwal, Himalaya Publishing house. 4. Instrumental method of Analysis: Hubert H, Willard,7th edition. 5. Textbook of Pharmaceutical Chemistry by,Jayshree Ghosh, S. Chand & company Ltd.Pharmaceutical Chemistry by Dr. S. Lakshmi, Sultanchand & Sons. 	
Reference Books	<ol style="list-style-type: none"> 1. Computers in chemistry, K.V. Raman, Tata Mc.Graw-Hill, 1993. 2. Computers for Chemists, S.K Pundir, Anshu bansal, A pragate prakashan., 2 nd edition, New age international (P) limited, New Delhi. 3. Physical Pharmacy and Pharmaceutical Sciences by Martins, Patrick J. Sinko, Lippincott. William and Wilkins. 4. Cooper and Gunn's Tutorial Pharmacy ,6th edition by S.J. Carter, CBS Publisher Ltd. 5. Ansels pharmaceutical Dosage forms and Drug Delivery System by Allen Popvich and Ansel, Indian edition-B.I. Publication Pvt. Ltd. 	
Website and e-learning source	https://www.ncbi.nlm.nih.gov/books/NBK482447/ https://training.seer.cancer.gov/treatment/chemotherapy/types.html	

Course Code	Course Title	L	T	P	C
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23214DSC14B	NANO MATERIALS AND NANO TECHNOLOGY	0	0	4	4
Course Outline	UNIT-I: Introduction of nanomaterials and nanotechnologies, Introduction-role of size, classification-0D, 1D, 2D, 3D. Synthesis-Bottom –Up, Top–Down, consolidation of Nano powders.Features of nanostructures, Background of nanostructures.Techniques of synthesis of nanomaterials, Tools of the nanoscience. Applications of nanomaterials and technologies.				
	UNIT-II: Bonding and structure of the nanomaterials, Predicting the Type of Bonding in a Substance crystal structure.Metallic nanoparticles, Surfaces of Materials, Nanoparticle Size and Properties.Synthesis- Physical and chemical methods - inert gas condensation, arc discharge, laser ablation, sol-gel, solvothermal and hydrothermal-CVD-types, metallo organic, plasma enhanced, and low-pressure CVD. Microwave assisted and electrochemical synthesis.				
	UNIT-III: Mechanical properties of materials, theories relevant to mechanical properties.Techniques to study mechanical properties of nanomaterials, adhesion and friction, thermal properties of nanomaterialsNanoparticles: gold and silver, metal oxides: silica, iron oxide and alumina - synthesis and properties.				
	UNIT-IV: Electrical properties, Conductivity and Resistivity, Classification of Materials based on Conductivity, magnetic properties, electronic properties of materials. Classification of magnetic phenomena.Semiconductor materials – classification-Ge, Si, GaAs, SiC, GaN, GaP, CdS,PbS. Identification of materials as p and n –type semiconductor-Hall effect - quantum and anomalous, Hall voltage - interpretation of charge carrier density. Applications of semiconductors: p-n junction as transistors and rectifiers, photovoltaic and photogalvanic cell.				
	UNIT-V: Nano thin films, nanocomposites. Application of nanoparticles in different fields. Core-shell nanoparticles-types,synthesis,and properties.Nanocomposites-metal-ceramic-and polymer-matrix composites-applications. Characterization–SEM, TEM and AFM-principle,instrumentation and applications.				

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. S.Mohan and V. Arjunan, Principles of Materials Science, MJP Publishers, 2016. 2. Arumugam, Materials Science, Anuradha Publications,2007. 3. Giacavazzo et. al., Fundamentals of Crystallography, International Union of Crystallography. Oxford Science Publications, 2010 4. Woolfson, An Introduction to Crystallography, Cambridge University Press, 2012. 5. James F. Shackelford and Madanapalli K. Muralidhara, Introduction to Materials Science for Engineers. 6th ed., PEARSON Press, 2007. 	
Reference Books	<ol style="list-style-type: none"> 1. S.Mohan and V. Arjunan, Principles of Materials Science, MJP Publishers, 2016. 2. Arumugam, Materials Science, Anuradha Publications,2007. 3. Giacavazzo et. al., Fundamentals of Crystallography, International Union of Crystallography. Oxford Science Publications, 2010 4. Woolfson, An Introduction to Crystallography, Cambridge University Press, 2012. 5. James F. Shackelford and Madanapalli K. Muralidhara, Introduction to Materials Science for Engineers. 6th ed., PEARSON Press, 2007. 	
Website and e-learning source	<ol style="list-style-type: none"> 1. http://xrayweb.chem.ou.edu/notes/symmetry.html. 2. http://www.uptti.ac.in/classroom-content/data/unit%20cell.pdf. 	

Course Code	Course Title	L	T	P	C
23214DSC15A	Elective II (Generic / Discipline Specific) (One from Group B) Electrochemistry/Molecular Spectroscopy	5	1	0	3
	Electrochemistry				
Course Outline	<p>UNIT-I:Ionics: Arrhenius theory -limitations, van't Hoff factor and its relation to colligative properties. Deviation from ideal behavior. Ionic activity, mean ionic activity and mean ionic activity coefficient-concept of ionic strength, Debye Huckel theory of strong electrolytes,activity coefficient of strong electrolytes Determination of activity coefficient ion solvent and ion-ion interactions. Born equation.Debye-Huckel Bjerrum model. Derivation of Debye-Huckel limiting law at appreciable concentration of electrolytes modifications and applications.Electrolytic conduction-Debye-Huckel Onsager treatment of strong electrolyte-qualitative and quantitative verification and limitations. Evidence for ionic atmosphere. Ion association and triple ion formations.</p>				
	<p>UNIT-II:Electrode-electrolyte interface: Interfacial phenomena -Evidences for electrical double layer, polarizable and non-polarizable interfaces, Electrocapillary phenomena - Lippmann equation electro capillary curves. Electro-kinetic phenomena electro-osmosis, electrophoresis, streaming and sedimentation potentials, colloidal and poly electrolytes. Structure of double layer: Helmholtz -Perrin, Guoy- Chapman and Stern models of electrical double layer. Zeta potential and potential at zero charge. Applications and limitations.</p>				

	<p>UNIT-III:Electrodics of Elementary Electrode Reactions: Behavior of electrodes: Standard electrodes and electrodes at equilibrium. Anodic and Cathodic currents, condition for the discharge of ions. Nernst equation,polarizable and non-polarizable electrodes. Model of three electrode system, over potential.Rate of electro chemical reactions: Rates of simple elementary reactions. Butler-Volmer equation-significance of exchange current density, net current density and symmetry factor. Low and high field approximations. symmetry factor and transfer coefficient Tafel equations and Tafel plots.</p>	
	<p>UNIT-IV:Electrodics of Multistep Multi Electron System: Rates of multi-step electrode reactions, Butler - Volmer equation for a multi-step reaction. Rate determining step, electrode polarization and depolarization. Transfer coefficients, its significance and determination,Stoichiometric number. Electro-chemical reaction mechanisms-rate expressions, order, and surface coverage. Reduction of I^3^-, Fe^{2+}, and dissolution of Fe to Fe^{2+}. Overvoltage - Chemical and electro chemical, Phase, activation and concentration over potentials. Evolution of oxygen and hydrogen at different pH. Pourbiax and Evan's diagrams.</p>	
	<p>UNIT-V:Concentration Polarization, Batteries and Fuel cells: Modes of Transport of electro active species - Diffusion, migration and hydrodynamic modes. Role of supporting electrolytes. Polarography-principle and applications. Principle of square wave polarography. Cyclic voltammetry- anodic and cathodic stripping voltammetry and differential pulse voltammetry. Sodium and lithium-ion batteries and redox flow batteries. Mechanism of charge storage: conversion and alloying. Capacitors- mechanism of energy storage, charging at constant current and constant voltage.Energy production systems: Fuel Cells: classification, alkaline fuel cells, phosphoric acid fuel cells, high temperature fuel cells.</p>	

<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	
<p>Recommended Text</p>	<ol style="list-style-type: none"> 1. D. R. Crow, Principles and applications of electrochemistry, 4th edition, Chapman & Hall/CRC, 2014. 2. J. Rajaram and J.C. Kuriakose, Kinetics and Mechanism of chemical transformations Macmillan India Ltd., New Delhi, 2011. 3. S. Glasstone, Electro chemistry, Affiliated East-West Press, Pvt., Ltd., New Delhi, 2008. 4. B. Viswanathan, S. Sundaram, R. Venkataraman, K. Rengarajan and P.S. Raghavan, Electrochemistry-Principles and applications, S. Viswanathan Printers, Chennai, 2007. 5. Joseph Wang, Analytical Electrochemistry, 2nd edition, Wiley, 2004. 	
<p>Reference Books</p>	<ol style="list-style-type: none"> 1. J.O.M. Bockris and A.K.N. Reddy, Modern Electro chemistry, vol.1 and 2B, Springer, Plenum Press, New York, 2008. 2. J.O.M. Bockris, A.K.N. Reddy and M.G. Aldeco Morden Electro chemistry, vol. 2A, Springer, Plenum Press, New York, 2008. 3. Philip H. Rieger, Electrochemistry, 2nd edition, Springer, New York, 2010. 4. L.I. Antropov, Theoretical electrochemistry, Mir Publishers, 1977. 5. K.L. Kapoor, A Text book of Physical chemistry, volume-3, Macmillan, 2001. 	
<p>Website and e-learning source</p>	<ol style="list-style-type: none"> 1. https://www.pdfdrive.com/modern-electrochemistry-e34333229. 	

Course Code	Course Title	L	T	P	C
23214DSC15B	Molecular Spectroscopy	5	1	0	3
Course Outline	<p>UNIT-I:Rotational and Raman Spectroscopy: Rotational spectra of diatomic and polyatomic molecules. Intensities of rotational spectral lines, effect of isotopic substitution. Non-rigid rotators. Classical theory of the Raman effect, polarizability as a tensor, polarizability ellipsoids, quantum theory of the Raman effect, Pure rotational Raman spectra of linear and asymmetric top molecules, Stokes and anti-Stokes lines. Vibrational Raman spectra, Raman activity of vibrations, rule of mutual exclusion, rotational fine structure-O and S branches, Polarization of Raman scattered photons.</p>				
	<p>UNIT-II:Vibrational Spectroscopy: Vibrations of molecules, harmonic and anharmonic oscillators- vibrational energy expression, energy level diagram, vibrational wave functions and their symmetry, selection rules, expression for the energies of spectral lines, computation of intensities, hot bands, effect of isotopic substitution. Diatomic vibrating rotor, vibrational-rotational spectra of diatomic molecules, P, R branches, breakdown of the Born-Oppenheimer approximation. Vibrations of polyatomic molecules – symmetry properties, overtone and combination frequencies. Influence of rotation on vibrational spectra of polyatomic molecule, P, Q, R branches, parallel and perpendicular vibrations of linear and symmetric top molecules.</p>				

	<p>UNIT-III:Electronic spectroscopy: Electronic Spectroscopy: Electronic spectroscopy of diatomic molecules, Frank-Condon principle, dissociation and predissociation spectra. $\pi \rightarrow \pi^*$, $n \rightarrow \pi^*$ transitions and their selection rules. Photoelectron Spectroscopy: Basic principles, photoelectron spectra of simple molecules, Xray photoelectron spectroscopy (XPS). Lasers: Laser action, population inversion, properties of laser radiation, examples of simple laser systems.</p>	
	<p>UNIT-IV:NMR and ESR spectroscopy: Chemical shift, Factors influencing chemical shifts: electronegativity and electrostatic effects; Mechanism of shielding and deshielding. Spin systems: First order and second order coupling of AB systems, Simplification of complex spectra. Spin-spin interactions: Homonuclear coupling interactions - AX, AX₂, AB types. Vicinal, germinal and long-range coupling-spin decoupling. Nuclear Overhauser effect (NOE), Factors influencing coupling constants and Relative intensities. ¹³CNMR and structural correlations, Satellites. Brief introduction to 2D NMR – COSY, NOESY. Introduction to ³¹P, ¹⁹F NMR. ESR spectroscopy Characteristic features of ESR spectra, line shapes and line widths; ESR spectrometer. The g value and the hyperfine coupling parameter (A), origin of hyperfine interaction. Interpretation of ESR spectra and structure elucidation of organic radicals using ESR spectroscopy; Spin orbit coupling and significance of g-tensors, zero/non-zero field splitting, Kramer's degeneracy, application to transition metal complexes (having one to five unpaired electrons) including biological molecules and inorganic free radicals. ESR spectra of magnetically dilute samples.</p>	
	<p>UNIT-V:Mass Spectrometry, EPR and Mossbauer Spectroscopy: Ionization techniques- Electron ionization (EI), chemical ionization (CI), desorption ionization (FAB/MALDI), electrospray ionization (ESI), isotope abundance, molecular ion, fragmentation processes of organic molecules, deduction of structure through mass spectral fragmentation, high resolution. Effect of isotopes on the appearance of mass spectrum. EPR spectra of anisotropic systems - anisotropy in g-value, causes of anisotropy, anisotropy in hyperfine coupling, hyperfine splitting caused by quadrupole nuclei. Zero-field splitting (ZFS) and Kramer's degeneracy. Applications of EPR to organic and inorganic systems. Structural elucidation of organic compounds by combined spectral techniques. Principle of Mossbauer spectroscopy: Doppler shift, recoil energy. Isomer shift, quadrupole splitting, magnetic interactions. Applications: Mossbauer spectra of high and low-spin Fe and Sn compounds.</p>	

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. C. N. Banwell and E. M. McCash, <i>Fundamentals of Molecular Spectroscopy</i>, 4th Ed., Tata McGraw Hill, New Delhi, 2000. 2. R. M. Silverstein and F. X. Webster, <i>Spectroscopic Identification of Organic Compounds</i>, 6th Ed., John Wiley & Sons, New York, 2003. 3. W. Kemp, <i>Applications of Spectroscopy</i>, English Language Book Society, 1987. 4. D. H. Williams and I. Fleming, <i>Spectroscopic Methods in Organic Chemistry</i>, 4th Ed., Tata McGraw-Hill Publishing Company, New Delhi, 1988. 5. R. S. Drago, <i>Physical Methods in Chemistry</i>; Saunders: Philadelphia, 1992. 	
Reference Books	<ol style="list-style-type: none"> 1. P.W. Atkins and J. de Paula, <i>Physical Chemistry</i>, 7th Ed., Oxford University Press, Oxford, 2002. 2. I. N. Levine, <i>Molecular Spectroscopy</i>, John Wiley & Sons, New York, 1974. 3. A. Rahman, <i>Nuclear Magnetic Resonance-Basic Principles</i>, Springer-Verlag, New York, 1986. 4. K. Nakamoto, <i>Infrared and Raman Spectra of Inorganic and coordination Compounds</i>, PartB: 5th ed., John Wiley & Sons Inc., New York, 1997. 5. J. A. Weil, J. R. Bolton and J. E. Wertz, <i>Electron Paramagnetic Resonance</i>; Wiley Interscience, 1994. 	
Website and e-learning source	<ol style="list-style-type: none"> 1. https://onlinecourses.nptel.ac.in/noc20_cy08/preview 2. https://www.digimat.in/nptel/courses/video/104106122/L14.html 	

Course Code	Course Title	L	T	P	C
23214AEC21	Organic Reaction Mechanism-II	4	1	0	4
Course Outline	<p>UNIT-I: Elimination and Free Radical Reactions: Mechanisms: E2, E1, and E1cB mechanisms. Syn- and anti-eliminations. Orientation of the double bond: Hoffmann and Saytzeff rules. Reactivity: Effect of substrate, attacking bases, leaving group and medium. Stereochemistry of eliminations in acyclic and cyclic systems, pyrolytic elimination. Long lived and short-lived radicals – Production of radicals by thermal and photochemical reactions, Detection and stability of radicals, characteristics of free radical reactions and free radical, reactions of radicals; polymerization, addition, halogenations, aromatic substitutions, rearrangements. Reactivity: Reactivity on aliphatic, aromatic substrates, reactivity in the attacking radical, effect of solvent.</p>				
	<p>UNIT-II: Oxidation and Reduction Reactions: Mechanisms: Direct electron transfer, hydride transfer, hydrogen transfer, displacement, addition-elimination, oxidative and reductive coupling reactions. Mechanism of oxidation reactions: Dehydrogenation by quinones, selenium dioxides, ferricyanide, mercuric acetate lead tetraacetate, permanganate, manganese dioxide, osmium tetroxide, oxidation of saturated hydrocarbons, alkyl groups, alcohols, halides and amines. Reactions involving cleavage of C-C bonds - cleavage of double bonds, oxidative decarboxylation, allylic oxidation, oxidation by chromium trioxide-pyridine, DMSO-Oxalyl chloride (Swern oxidation) and Corey-Kim oxidation, dimethyl sulphoxide- dicyclohexyl carbodiimide (DMSO-DCCD). Mechanism of reduction reactions: Wolff-Kishner, Clemmenson, Rosenmund, reduction with Trialkyl and triphenyltin hydrides, McFadyen-Steven's reduction, Homogeneous hydrogenation, Hydroboration with cyclic systems, MPV and Bouveault-Blanc reduction.</p>				
	<p>UNIT-III:Rearrangements: Rearrangements to electron deficient carbon: Pinacol-pinacolone and semi-pinacolone rearrangements -applications and stereochemistry, Wagner-Meerwein, Demjanov, Dienone-phenol, Baker-Venkataraman, Benzilic acid and Wolff rearrangements.Rearrangements to electron deficient nitrogen: Hofmann, Curtius, Schmidt, Lossen, Beckmann and abnormal Beckmann rearrangements. Rearrangements to electron deficient oxygen: Baeyer-Villiger oxidation and Dakin rearrangements. Rearrangements to electron rich atom: Favorskii, Quasi-Favorskii, Stevens, [1,2]-Wittig and [2,3]-Wittig rearrangements.Fries and Photo Fries rearrangement.Intramolecular rearrangements – Claisen, abnormal Claisen, Cope, oxy-Cope Benzidine rearrangements.</p>				

	<p>UNIT-IV: Addition to Carbon Multiple Bonds: Mechanisms: (a) Addition to carbon-carbon multiple bonds- Addition reactions involving electrophiles, nucleophiles, free radicals, carbenes and cyclic mechanisms-Orientation and reactivity, hydrogenation of double and triple bonds, Michael reaction, addition of oxygen and Nitrogen; (b) Addition to carbon-hetero atom multiple bonds: Mannich reaction, acids, esters, nitrites, addition of Grignard reagents, Wittig reaction, Prinsreaction. Stereochemical aspects of addition reactions. Addition to Carbon-Hetero atom Multiplebonds: Addition of Grignard reagents, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Mechanism of condensation reactions involving enolates –Stobbe reactions. Hydrolysis of esters and amides, ammonolysis of esters.</p>	
	<p>UNIT-V:Reagents and Modern Synthetic Reactions: Lithium diisopropylamine (LDA), Azobisisobutyronitrile (AIBN), Sodium cyanoborohydride (NaBH₃CN), <i>meta</i>-Chloroperbenzoic acid (m-CPBA), Dimethyl aminopyridine (DMAP), n-Bu₃SnD, Triethylamine (TEA), Diazobicyclo[5.4.0]undec-7-ene (DBU), Diisopropylazodicarboxylate (DIAD), Diethylazodicarboxylate (DEAD), <i>N</i>-bromosuccinimide (NBS), Trifluoroacetic acid (TFA), Tetramethyl piperiridin-1-oxyl (TEMPO), Phenyltrimethylammonium tribromide (PTAB).Diazomethane and Zn-Cu, Diethyl maleate (DEM), Copper diacetylacetonate (Cu(acac)₂), TiCl₃, NaIO₄, Pyridinium chlorochromate (PCC),Pyridinium dichromate (PDC), Meisenheimer complex.Suzuki coupling, Heck reaction, Negishi reaction, Baylis-Hillman reaction.</p>	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
Skills acquired from this course	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	

Recommended Text	<ol style="list-style-type: none"> 1. J. March and M. Smith, <i>Advanced Organic Chemistry</i>, 5th ed., John-Wiley and Sons.2001. 2. E. S. Gould, <i>Mechanism and Structure in Organic Chemistry</i>, Holt, Rinehart and Winston Inc.,1959. 3. P. S. Kalsi, <i>Stereochemistry of carbon compounds</i>, 8thedn, New Age International Publishers,2015. 4. P. Y.Bruice, <i>Organic Chemistry</i>, 7thedn.,Prentice Hall, 2013. 5. R. T. Morrison, R. N. Boyd, S. K. Bhattacharjee<i>Organic Chemistry</i>, 7th edn., Pearson Education,2010. 	
Reference Books	<ol style="list-style-type: none"> 1. S. H. Pine, <i>Organic Chemistry</i>, 5thedn, McGraw Hill International Editionn,1987. 2. L. F. Fieser and M. Fieser, <i>Organic Chemistry</i>, Asia Publishing House, Bombay,2000. 3. E.S. Gould, <i>Mechanism and Structure in Organic Chemistry</i>, Holt, Rinehart and Winston Inc.,1959. 4. T. L. Gilchrist, <i>Heterocyclic Chemistry</i>, Longman Press, 1989. 5. J. A. Joule and K. Mills, <i>Heterocyclic Chemistry</i>, 4thed., John-Wiley,2010. 	
Website and e-learning source	<ol style="list-style-type: none"> 1. https://sites.google.com/site/chemistryebookscollection02/home/organic-chemistry/organic 2. https://www.organic-chemistry.org/ 	

Course Code	Course Title	L	T	P	C
23214AEC22	Physical Chemistry-I	4	1	0	4
Course Outline	UNIT-I:Classical Thermodynamics: Partial molar properties-Chemical potential, Gibb's-Duhem equation-binary and ternary systems. Determination of partial molar quantities. Thermodynamics of real gases - Fugacity-determination of fugacity bygraphical and equation of state methods-dependence of temperature, pressure and composition.Thermodynamics of ideal and non-ideal binary mixtures, Duhem - Margulus equation applications of ideal and non-ideal mixtures. Activity and activity coefficients-standard states -determination-vapour pressure,EMF andfreezing point methods.				

	<p>UNIT-II:Statistical thermodynamics: Introduction of statistical thermodynamicsconcepts of thermodynamic and mathematicalprobabilities-distribution of distinguishable and non-distinguishable particles.Assemblies, ensembles, canonical particles. Maxwell - Boltzmann, Fermi Dirac & Bose-Einstein Statistics- comparison and applications.Partition functions-evaluation of translational, vibrational and rotational partition functions for monoatomic, diatomic and polyatomic ideal gases. Thermodynamic functions in terms of partition functions-calculation of equilibrium constants. Statistical approach to Thermodynamic properties: pressure, internal energy, entropy, enthalpy, Gibb's function, Helmholtz function residual entropy, equilibrium constants and equipartition principle.Heat capacity of mono and di atomic gases-ortho and para hydrogen. Heat capacity of solids-Einstein and Debye models.</p>	
	<p>UNIT-III:Irreversible Thermodynamics: Theories of conservation of mass and energyentropy production in open systems by heat, matter and current flow, force and flux concepts.Onsager theory-validity and verification-Onsager reciprocal relationships. Electro kinetic and thermo mechanical effects-Application of irreversible thermodynamics to biological systems.</p>	
	<p>UNIT-IV: Kinetics of Reactions: Theories of reactions-effect of temperature on reaction rates, collision theory of reaction rates, Unimolecular reactions -Lindeman and Christiansen hypothesis- molecular beams,collision cross sections, effectiveness of collisions,Potential energy surfaces. Transition state theory-evaluation of thermodynamicparameters of activation-applications of ARRT to reactions between atoms and molecules, time andtrue order-kinetic parameter evaluation. Factors determine the reaction rates in solution - primary salt effect and secondary salt effect, Homogeneous catalysis- acid-base catalysis-mechanism of acid base catalyzed reactions-Bronsted catalysis law, enzyme catalysis-Michelis-Menton catalysis.</p>	

	<p>UNIT-V: Kinetics of complex and fast reactions: Kinetics of complex reactions, reversible reactions, consecutive reactions, parallel reactions, chain reactions. Chain reactions-chain length, kinetics of $H_2 - Cl_2$ & $H_2 - Br_2$ reactions (Thermal and Photochemical reactions) - Rice Herzfeld mechanism. Study of fast reactions-relaxation methods- temperature and pressure jump methods electric and magnetic field jump methods -stopped flow flash photolysis methods and pulse radiolysis. Kinetics of polymerization-free radical, cationic, anionic polymerization - Polycondensation.</p>	
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE / TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	

Recommended Text	<ol style="list-style-type: none"> 1. J. Rajaram and J.C. Kuriacose, Thermodynamics for Students of Chemistry, 2nd edition, S.L.N.Chand and Co., Jalandhar, 1986. 2. I.M. Klotz and R.M. Rosenberg, Chemical thermodynamics, 6th edition, W.A.Benjamin Publishers, California, 1972. 3. M.C. Gupta, Statistical Thermodynamics, New Age International, Pvt. Ltd., New Delhi, 1995. 4. K.J. Laidler, Chemical Kinetics, 3rd edition, Pearson, Reprint - 2013. 5. J. Rajaram and J.C. Kuriokose, Kinetics and Mechanisms of chemical transformation, Macmillan India Ltd, Reprint - 2011. 	
Reference Books	<ol style="list-style-type: none"> 1. D.A. Mcquarrie And J.D. Simon, Physical Chemistry - A Molecular Approach, Viva Books Pvt. Ltd., New Delhi, 1999. 2. R.P. Rastogi and R.R. Misra, Classical Thermodynamics, Vikas Publishing, Pvt. Ltd., New Delhi, 1990. 3. S.H. Maron and J.B. Lando, Fundamentals of Physical Chemistry, Macmillan Publishers, New York, 1974 4. K.B. Ytsiimiriski, "Kinetic Methods of Analysis", Pergamom Press, 1996. 5. Gurdeep Raj, Phase rule, Goel Publishing House, 2011. 	
Website and e-learning source	<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/104/103/104103112/ 2. https://bit.ly/3tL3GdN 	

Course Code	Course Title	L	T	P	C
23214GEC23L	Inorganic Chemistry Practical	5	1	0	4
Course Outline	<p>UNIT-I: Analysis of mixture of cations: Analysis of a mixture of four cations containing two common cations and two rare cations. Cations to be tested.</p> <p>Group-I : W, Tl and Pb.</p> <p>Group-II : Se, Te, Mo, Cu, Bi and Cd.</p> <p>Group-III : Tl, Ce, Th, Zr, V, Cr, Fe, Ti and U.</p> <p>Group-IV : Zn, Ni, Co and Mn.</p> <p>Group-V : Ca, Ba and Sr.</p> <p>Group-VI : Li and Mg.</p>				
	<p>UNIT-II: Preparation of metal complexes: Preparation of inorganic complexes:</p> <p>a. Preparation of trithioureacopper(I) sulphate</p> <p>b. Preparation of potassium trioxalate chromate(III)</p> <p>c. Preparation of tetramminecopper(II) sulphate</p> <p>d. Preparation of Reineck's salt</p> <p>e. Preparation of hexathioureacopper(I) chloridedihydrate</p> <p>f. Preparation of <i>cis</i>-Potassium tri oxalate diaquachromate(III)</p> <p>g. Preparation of sodium trioxalato ferrate(III)</p> <p>h. Preparation of hexathiourealead(II) nitrate</p>				

	<p>UNIT-III: Complexometric Titration:</p> <ol style="list-style-type: none"> 1. Estimation of zinc, nickel, magnesium, and calcium. 2. Estimation of mixture of metal ions-pH control, masking and demasking agents. 3. Determination of calcium and lead in a mixture (pH control). 4. Determination of manganese in the presence of iron. 5. Determination of nickel in the presence of iron. 	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. A. JeyaRajendran, Microanalytical Techniques in Chemistry: Inorganic Qualitative Analysis, United global publishers, 2021. 2. V. V. Ramanujam, <i>Inorganic Semimicro Qualitative Analysis</i>; 3rded.,The National Publishing Company, Chennai, 1974. 3. <i>Vogel's Text book of Inorganic Qualitative Analysis</i>, 4thed., ELBS, London. 	
Reference Books	<p>Pass, and H. Sutcliffe, <i>Practical Inorganic Chemistry</i>; Chapman Hall,</p> <p>G. Palmer, <i>Experimental Inorganic Chemistry</i>; Cambridge city Press, 1954.</p>	

Course Code	Course Title	
23214SEC24L	Elective III (Generic /Discipline Specific) (One from Group C) Medicinal Chemistry/Green Chemistry	0
ne	UNIT-I:Introduction to receptors: Introduction, targets, Agonist, antagonist, partial agonist.Receptors, Receptor types, Theories of Drug – receptor interaction, Drug synergism, Drug resistance, physicochemical factors influencing drug action.	
	UNIT-II:Antibiotics: Introduction, Targets of antibiotics action, classification of antibiotics, enzyme-based mechanism of action, SAR of penicillins and tetracyclins, clinical application of penicillins, cephalosporin.Current trends in antibiotic therapy.	
	UNIT-III:Antihypertensive agents and diuretics: Classification of cardiovascular agents, introduction to hypertension, etiology, types, classification of antihypertensive agents, classification and mechanism of action of diuretics, Furosemide, Hydrochlorothiazide, Amiloride.	
	UNIT-IV:Antihypertensive agents and diuretics: Classification of cardiovascular agents, introduction to hypertension, etiology, types, classification of antihypertensive agents, classification and mechanism of action of diuretics, Furosemide, Hydrochlorothiazide, Amiloride.	
	UNIT-V: Analgesics, Antipyretics and Anti-inflammatory Drugs: Introduction, Mechanism of inflammation, classification and mechanism of action and paracetamol, Ibuprofen, Diclofenac, naproxen, indomethacin, phenylbutazone and meperidine. Medicinal Chemistry of Antidiabetic Agents Introduction, Types of diabetics, Drugs used for the treatment, chemical classification, Mechanism of action, Treatment of diabetic mellitus. Chemistry of insulin, sulfonyl urea.	
Professional Component (is a al component only, Not to n the external examination r)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
and from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
ed Text	1. Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry, 2. Wilson, Charles Owens: Beale, John Marlowe; Block, John H, Lipincott William, 12th edition, 2011. 3. Graham L. Patrick, An Introduction to Medicinal Chemistry, 5th edition, Oxford University Press, 2013. JayashreeGhosh, AtextbookofPharmaceuticalChemistry, S.ChandandCo.Ltd, 1999, 1999 edn. 4. O.LeRoy, Natural andsyntheticorganicmedicinal compounds, Ealemi, 1976. 5. S.AshutoshKar, MedicinalChemistry, WileyEasternLimited, NewDelhi, 1993, New edn.	
ooks	1. Foye's Princl'es of Medicinal Chemistry, Lipincott Williams, Seventh Edition, 2012 2. Burger's Medicinal Chemistry, Drug Discovery and Development, Donald J. Abraham, David P. Rotella, Alfred Burger, Academic press, 2010. 3. WilsonandGisvold'sTextbookofOrganicMedicinalandPharmaceuticalChemistry, John M.BealeJrandJohnM. Block, Wolters Kluwer, 2011, 12 th edn. 4. P.Parimoo, ATextbookofMedicalChemistry, NewDelhi: CBS Publishers. 1995. 5. S.Ramakrishnan, K.G.PrasannanandR.Rajan, TextbookofMedicalBiochemistry, Hyderabad: OrientLongman. 3 rd edition, 2001.	

1. <https://www.ncbi.nlm.nih.gov/books/NBK482447/>
2. <https://training.seer.cancer.gov/treatment/chemotherapy/types.html>
3. <https://www.classcentral.com/course/swayam-medicinal-chemistry-12908>

Course Code	Course Title	L	T	P	C
	GREEN CHEMISTRY	0	0	4	4
Course Outline	UNIT-I: Introduction- Need for Green Chemistry. Goals of Green Chemistry. Limitations/ of Green Chemistry. Chemical accidents, terminologies, Internationall green chemistry organizations and Twelve principles of Green Chemistry with examples.				
	UNIT-II: Choice of starting materials, reagents, catalysts and solvents in detail, Green chemistry in day today life.Designing green synthesis-green reagents: dimethyl carbonate.Green solvents: Water,Ionic liquids-criteria, general methods of preparation, effect on organic reaction.Supercritical carbon dioxide- properties, advantages, drawbacks and a few examples of organic reactions in scCO ₂ . Green synthesis-adipic acid and catechol.				
	UNIT-III: Environmental pollution, Green Catalysis-Acid catalysts, Oxidation catalysts, Basic catalysts, Polymer supported catalysts-Poly styrene aluminum chloride, polymeric super acid catalysts, Poly supported photosensitizers.				
	UNIT-IV: Phase transfer catalysis in green synthesis-oxidation using hydrogen peroxide, crown ethers-esterification, saponification, anhydride formation, Elimination reaction, Displacement reaction. Applications in organic synthesis.				
	UNIT-V: Micro wave induced green synthesis-Introduction, Instrumentation, Principle and applications. Sonochemistry – Instrumentation, Cavitation theory - Ultra sound assisted green synthesis and Applications.				

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. Ahluwalia, V.K. and Kidwai, M.R. New Trends in Green Chemistry, Anamalaya Publishers, 2005. 2. W. L. McCabe, J.C. Smith and P. Harriott, Unit Operations of Chemical Engineering, 7thedition, McGraw-Hill, NewDelhi,2005. 3. J. M. Swan and D. St. C. Black, Organometallics in Organic Synthesis, Chapman Hall,1974. 4. V. K. Ahluwalia and R. Aggarwal, Organic Synthesis: Special Techniques, Narosa Publishing House, New Delhi,2001. 5. A. K. De, Environmental Chemistry, New Age Publications, 2017. 	
Reference Books	<ol style="list-style-type: none"> 1. Anastas, P.T. and Warner, J.K. Oxford Green Chemistry - Theory and Practical, University Press, 1998 2. Matlack, A.S. Introduction to Green Chemistry, Marcel Dekker, 2001 3. Cann, M.C. and Connely, M.E. Real-World Cases in Green Chemistry, American Chemical Society, Washington, 2000 4. Ryan, M.A. and Tinnesand, M., Introduction to Green Chemistry, American Chemical Society Washington, 2002. 5. Chandrakanta Bandyopadhyay, An Insight into Green Chemistry, Books and Allied (P) Ltd, 2019. 	
Website and e-learning source	<ol style="list-style-type: none"> 2. https://www.organic-chemistry.org/ 3. https://www.studyorgo.com/summary.php 	

Course Code	Course Title	L	T	P	C
23214DSE25_	Elective IV(Computer/IT related)(One from Group D)Bio Inorganic Chemistry/Material Science	4	1	0	3
	BIO-INORGANIC CHEMISTRY				
Course Outline	UNIT-I:Essential trace elements: Selective transport and storage of metal ions: Ferritin, Transferrin and siderophores; Sodium and potassium transport, Calcium signalling proteins.Metalloenzymes: Zinc enzymes–carboxypeptidase and carbonic anhydrase. Ironenzymes–catalase, peroxidase. Copperenzymes – superoxide dismutase, Plastocyanin, Ceruloplasmin, Tyrosinase. Coenzymes - Vitamin-B12 coenzymes.				
	UNIT-II:Transport Proteins: Oxygen carriers-Hemoglobin and myoglobin - Structure and oxygenationBohr Effect. Binding of CO, NO, CN– to Myoglobin and Hemoglobin.Biological redox system: Cytochromes-Classification, cytochrome a, b and c. Cytochrome P-450. Non-heme oxygen carriers-Hemerythrin and hemocyanin. Iron-sulphur proteins-Rubredoxin and Ferredoxin- Structure and classification.				
	UNIT-III:Nitrogen fixation -Introduction, types of nitrogen fixing microorganisms. Nitrogenase enzyme - Metal clusters in nitrogenase- redox property - Dinitrogen complextransition metal complexes of dinitrogen - nitrogen fixation via nitride formation and reduction of dinitrogen to ammonia. Photosynthesis:photosystem-I and photosystem-II-chlorophylls structure and function.				

	UNIT-IV:Metals in medicine: Metal Toxicity of Hg, Cd, Zn, Pb, As, Sb.Therapeutic Compounds:Vanadium-Based Diabetes Drugs; Platinum-Containing Anticancer Agents.Chelation therapy; Cancer treatment. Diagnostic Agents: Technetium Imaging Agents; Gadolinium MRI Imaging Agents. temperature and critical magnetic Field.	
	UNIT-V:Enzymes -Introduction and properties - nomenclature and classification. Enzyme kinetics, free energy of activation and the effects of catalysis. Michelis - Menton equation - Effect of pH, temperature on enzyme reactions. Factors contributing to the efficiency of enzyme.	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. Williams,D.R. –Introduction to Bioinorganic chemistry. 2. F.M. Fiabre and D.R. Williams– The Principles of Bioinorganic Chemistry,RoyalSoceity of Chemistry, Monograph for Teachers-31 3. K.F. Purcell and Kotz., Inorganic chemistry, WB Saunders Co., USA. 4. G.N. Mughherjea and Arabinda Das, Elements of Bioinorganic Chemistry - 1993. 5. R. Gopalan, V. Ramalingam, <i>Concise Coordination Chemistry</i>, S. Chand, 2001. 	

Reference Books	<ol style="list-style-type: none"> 1. M.Satake and Y.Mido, Bioinorganic Chemistry-Discovery Publishing House, New Delhi (1996) 2. M.N. Hughes, 1982, The Inorganic Chemistry of Biological processes, II Edition, Wiley London. 3. R. W. Hay, Bio Inorganic Chemistry, Ellis Horwood, 1987. 4. R. M. Roat-Malone, Bio Inorganic Chemistry, John Wiley, 2002. 5. T. M. Loehr, Iron carriers and Iron proteins, VCH, 1989. 	
Website and e-learning source	<ol style="list-style-type: none"> 1. https://www.pdfdrive.com/instant-notes-in-inorganic-chemistry-the-instant-notes-chemistry-series-d162097454.html 2. https://www.pdfdrive.com/shriver-and-atkins-inorganic-chemistry-5th-edition-d161563417.html 	

Course Code	Course Title	L	T	P	C
23214DSE25_	Elective IV(Computer/IT related)(One from Group D)Bio Inorganic Chemistry/Material Science	4	1	0	3
	Material Science				
Course Outline	UNIT-I:Crystallography: symmetry - unit cell and Miller indices - crystal systems - Bravais lattices - point groups and space groups - X-ray diffraction-Laue equations-Bragg's law-reciprocal lattice and its application to geometrical crystallography. Crystal structure–powder and single crystalapplications. Electron charge density maps, neutron diffraction-method and applications.				

	<p>UNIT-II:Crystal growth methods: Nucleation–equilibrium stability and metastable state. Single crystal –Low and high temperature, solution growth– Gel and sol-gel. Crystal growthmethods-nucleation–equilibrium stabilityandmetastablestate.Singlecrystal–Lowandhightemperature, solution growth– Gel and sol-gel. Melt growth - Bridgeman-Stockbarger,Czochralskimethods.Fluxtechnique,physicalandchemical vapourtransport.Lorentz and polarization factor - primary and secondary extinctions.</p>	
	<p>UNIT-III:Properties of crystals: Optical studies - Electromagnetic spectrum (qualitative) refractive index – reflectance – transparency, translucency and opacity. Types of luminescence – photo-, electro-, and injection luminescence, LEDs – organic, Inorganic and polymer LED materials - Applications. Dielectric studies- Polarisation - electronic, ionic, orientation, and space charge polarisation. Effect of temperature. dielectric constant, dielectric loss. Types of dielectric breakdown–intrinsic, thermal, discharge, electrochemical and defect breakdown.</p>	
	<p>UNIT-IV:Special Materials: Superconductivity: Meissner effect, Critical temperature and critical magnetic Field, Type I and II superconductors, BCS theory-Cooper pair, Applications.Soft and hard magnets – Domain theory Hysteresis Loop-Applications. Magneto and gian magneto resistance. Ferro, ferri and antiferromagnetic materials-applications, magnetic parameters for recording applications. Ferro-, Piezo-, and pyro electric materials – properties and applications. Shape memory Alloys-characteristics and applications, Non-linear optics-Second Harmonic Generators, mixing of Laser wavelengths by quartz, ruby and LiNbO₃.</p>	
	<p>UNIT-V:Materials for Renewable Energy Conversion: Solar Cells: Organic, bilayer, bulk heterojunction, polymer, perovskite based. Solar energy conversion: lamellar solids and thin films, dye-sensitized photo voltaic cells, coordination compounds anchored onto semiconductor surfaces - Ru(II) and Os(II) polypyridyl complexes. Photochemical activation and splitting of water, CO₂ and N₂. Manganese based photo systems for water-splitting. Complexes of Rh, Ru, Pd and Pt - photochemical generation of hydrogen from alcohol.</p>	

<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	
<p>Recommended Text</p>	<ol style="list-style-type: none"> 1. S. Mohan and V. Arjunan, Principles of Materials Science, MJP Publishers, 2016. 2. Arumugam, Materials Science, Anuradha Publications, 2007. 3. Giacavazzo et. al., Fundamentals of Crystallography, International Union of Crystallography. Oxford Science Publications, 2010 4. Woolfson, An Introduction to Crystallography, Cambridge University Press, 2012. 5. James F. Shackelford and Madanapalli K. Muralidhara, Introduction to Materials Science for Engineers. 6th ed., PEARSON Press, 2007. 	
<p>Reference Books</p>	<ol style="list-style-type: none"> 1.Suggested Readings 1. M.G. Arora, Solid State Chemistry, Anmol Publications, New Delhi, 2001. 2. R.K. Puri and V.K. Babbar, Solid State Physics, S Chand and Company Ltd, 2001. 3.. C. Kittel, Solid State Physics, John-Wiley and sons, NY, 1966. 4. H.P. Meyers, Introductory Solid State Physics, Viva Books Private Limited, 1998. 5. A.R. West, Solid State Chemistry and Applications, John-Wiley and sons, 1987. 	

Website and e-learning source	1. http://xrayweb.chem.ou.edu/notes/symmetry.html . 2. http://www.uptti.ac.in/classroom-content/data/unit%20cell.pdf . 3. https://bit.ly/3QyVg2R	
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Course Code	Course Title	L	T	P	C
23214AEC31	Organic Synthesis and Photochemistry	5	1	0	4
Course Outline	<p>UNIT-I: Planning an Organic Synthesis and Control elements: Preliminary Planning – knowns and unknowns of the synthetic system studied, analysis of the complex and interrelated carbon framework into simple rational precursors, retrosynthetic analysis, alternate synthetic routes, key intermediates that would be formed, available starting materials and resulting yield of alternative methods. Linear Vs convergent synthesis. synthesis based on umpolung concepts of Seebach, regioselective control elements. Use of protective groups, activating groups and bridging elements. Examples on retrosynthetic approach, calculation of yield, advantages of convergent synthesis, synthesis of stereochemistry-controlled products.</p>				

	<p>UNIT-II:Organic Synthetic Methodology: Retrosynthetic analysis; Alternate synthetic routes. Synthesis of organic mono and bifunctional compounds via disconnection approach. Key intermediates, available starting materials and resulting yields of alternative methods. Convergent and divergent synthesis, Synthesis based on umpolung concepts of Seebach. Protection of hydroxyl, carboxyl, carbonyl, thiol and amino groups. Illustration of protection and deprotection in synthesis. Control elements: Regiospecific control elements. Use of protective groups, activating groups, and bridging elements. Stereospecific control elements. Functional group alterations and transposition.</p>	
	<p>UNIT-III:Pericyclic Reactions: Woodward Hoffmann rules; The Mobius and Huckel concept, FMO, PMO method and correlation diagrams. Cycloaddition and retrocycloaddition reactions; [2+2], [2+4], [4+4, Cationic, anionic, and 1,3-dipolar cycloadditions. Cheletropic reactions. ; Electrocyclization and ring opening reactions of conjugated dienes and trienes. Sigmatropic rearrangements: (1,3), (1,5), (3,3) and (5,5)-carbon migrations, degenerate rearrangements. Ionic sigmatropic rearrangements. Group transfer reactions. Regioselectivity, stereoselectivity and periselectivity in pericyclic reactions.</p>	
	<p>UNIT-IV:Organic Photochemistry-I: Photochemical excitation: Experimental techniques; electronic transitions; Jablonskii diagrams; intersystem crossings; energy transfer processes; Stern Volmer equation.</p> <p>Reactions of electronically excited ketones; $\pi \rightarrow \pi^*$ triplets; Norrish type-I and type-II cleavage reactions; photo reductions; Paterno-Buchi reactions;</p>	

	UNIT-V:Organic Photochemistry-I: Photochemistry of α,β -unsaturated ketones; cis-trans isomerisation. Photon energy transfer reactions, Photo cycloadditions, Photochemistry of aromatic compounds; photochemical rearrangements; photo-stationery state; di- π -methane rearrangement; Reaction of conjugated cyclohexadienone to 3,4-diphenyl phenols; Barton's reactions.	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC- CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. F. A. Carey and Sundberg, Advanced Organic Chemistry, 5th ed, Tata McGraw-Hill, New York, 2003. 2. J. March and M. Smith, Advanced Organic Chemistry, 5th ed., John-Wiley and sons, 2007. 3. R. E. Ireland, Organic synthesis, Prentice Hall India, Goel publishing house, 1990. 4. Clayden, Greeves, Warren, Organic Chemistry, Oxford University Press, Second Edition, 2016. 5. M. B. Smith, Organic Synthesis 3rd edn, McGraw Hill International Edition, 2011. 	

Reference Books	<ol style="list-style-type: none"> 1. Gill and Wills, Pericyclic Reactions, Chapman Hall, London, 1974. 2. J.A. Joule, G.F. Smith, Heterocyclic Chemistry, Garden City Press, Great Britain, 2004. 3. W. Caruthers, Some Modern Methods of Organic Synthesis 4thedn, Cambridge University Press, Cambridge, 2007. 4. H. O. House. Modern Synthetic reactions, W.A. Benjamin Inc, 1972. 5. Jagdamba Singh and Jaya Singh, Photochemistry and Pericyclic Reactions, New Age International Publishers, New Delhi, 2012. 	
Website and e-learning source	1. https://rushim.ru/books/praktikum/Monson.pdf	

Course Code	Course Title	L	T	P	C
23214AEC32	Coordination Chemistry – I	4	1	0	4
Course Outline	<p>UNIT-I:Modern theories of coordination compounds: Crystal field theory - splitting of d orbitals in octahedral, tetrahedral and square planar symmetries - measurement of 10Dq - factors affecting 10Dq - spectrochemical series - crystal field stabilisation energy for high spin and low spin complexes- evidences for crystal field splitting - site selections in spinels and antispinel - Jahn Teller distortions and its consequences.Molecular Orbital Theory and energy level diagrams concept of Weak and strong fields, Sigma and pi bonding in octahedral, square planar and tetrahedral complexes.</p>				

	<p>UNIT-II:Spectral characteristics of complexes: Term states for d ions - characteristics of d-d transitions - charge transfer spectra - selection rules for electronic spectra - Orgel correlation diagrams - Sugano-Tanabe energy level diagrams - nephelauxetic series - Racha parameter and calculation of inter-electronic repulsion parameter.</p>	
	<p>UNIT-III:Stability and Magnetic property of the complexes: Stability of complexes: Factors affecting stability of complexes, Thermodynamic aspects of complex formation, Stepwise and overall formation constants, Stability correlations, statistical factors and chelate effect, Determination of stability constant and composition of the complexes: Formation curves and Bjerrum's half method, Potentiometric method, Spectrophotometric method, Ion exchange method, Polarographic method and Continuous variation method (Job's method)Magnetic property of complexes: Spin-orbit coupling, effect of spin-orbit coupling on magnetic moments, quenching of orbital magnetic moments.</p>	
	<p>UNIT-IV:Kinetics and mechanisms of substitution reactions of octahedral and square planar complexes: Inert and Labile complexes; Associative, Dissociative and SN₁CB mechanistic pathways for substitution reactions; acid and base hydrolysis of octahedral complexes; Classification of metal ions based on the rate of water replacement reaction and their correlation to Crystal Field Activation Energy; Substitution reactions in square planar complexes: Trans effect, theories of trans effect and applications of trans effect in synthesis of square planar compounds; Kurnakov test.</p>	

	UNIT-V: Electron Transfer reactions in octahedral complexes: Outer sphere electron transfer reactions and Marcus-Hush theory; inner sphere electron transfer reactions; nature of the bridging ligand in inner sphere electron transfer reactions.Photo-redox, photo-substitution and photo-isomerisation reactions in complexes and their applications.	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. J E Huheey, EA Keiter, RL Keiter and OK Medhi, Inorganic Chemistry – Principles of structure and reactivity, 4th Edition, Pearson Education Inc., 2006 2. G L Meissler and D ATarr, Inorganic Chemistry, 3rd Edition, Pearson Education Inc., 2008 3. D. Bannerjea, Co-ordination Chemistry, TATA Mcgraw Hill, 1993. 4. B. N. Figgis, Introduction to Ligand Fields, Wiley Eastern Ltd, 1976. 5. F. A. Cotton, G. Wilkinson.; C. A. Murillo; M. Bochmann, Advanced Inorganic Chemistry, 6thed.; Wiley Inter-science: New York, 1988. 	

Reference Books	<ol style="list-style-type: none"> 1. Keith F. Purcell and John C. Kotz, Inorganic Chemistry, Saunders Publications, USA, 1977. 2. Peter Atkins and Tina Overton, Shriver and Atkins' Inorganic Chemistry, 5th Edition, Oxford University Press, 2010. 3. Basic Inorganic Chemistry, F. A. Cotton, G. Wilkinson, P. L. Guas, John Wiley, 2002, 3rd edn. 4. Concepts and Models of Inorganic Chemistry, B. Douglas, D. McDaniel, J. Alexander, John Wiley, 1994, 3rd edn. 5. Inorganic Chemistry, D. F. Shriver, P. W. Atkins, W. H. Freeman and Co, London, 2010. 	
Website and e-learning source	https://ocw.mit.edu/courses/5-04-principles-of-inorganic-chemistry-ii-fall-2008/pages/syllabus/	

Course Code	Course Title	L	T	P	C
23214SEC33L	Physical Chemistry Practical	4	1	0	4
Course Outline	<p>UNIT-I: Conductivity Experiments</p> <ol style="list-style-type: none"> 1. Determination of equivalent conductance of a strong electrolyte & the verification of DHO equation. 2. Verification of Ostwald's Dilution Law & Determination of pKa of a weak acid. 3. Verification of Kohlrausch's Law for weak electrolytes. 4. Determination of solubility of a sparingly soluble salt. 5. Acid-base titration (strong acid and weak acid vs NaOH). 6. Precipitation titrations (mixture of halides only). 				

	<p>UNIT-II: Kinetics</p> <ol style="list-style-type: none"> 1. Study the kinetics of acid hydrolysis of an ester, determine the temperature coefficient and also the activation energy of the reaction. 2. Study the kinetics of the reaction between acetone and iodine in acidic medium by half-life method and determine the order with respect to iodine and acetone. 	
	<p>UNIT-III: Phase diagram</p> <p>Construction of phase diagram for a simple binary system</p> <ol style="list-style-type: none"> 1. Naphthalene-phenanthrene 2. Benzophenone- diphenyl amine <p>Adsorption</p> <p>Adsorption of oxalic acid on charcoal & determination of surface area (Freundlich isotherm only).</p>	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC- CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
Skills acquired from this course	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	

Recommended Text	<ol style="list-style-type: none"> 1. B. Viswanathan and P.S.Raghavan, Practical Physical Chemistry, Viva Books, New Delhi, 2009. 2. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996. 3. V.D. Athawale and Parul Mathur, Experimental Physical Chemistry, New Age International (P) Ltd., New Delhi, 2008. 4. E.G. Lewers, Computational Chemistry: Introduction to the Theory and Applications of Molecular and Quantum Mechanics, 2nd Ed., Springer, New York, 2011. 	
Reference Books	<ol style="list-style-type: none"> 1. J. B. Yadav, Advanced Practical Physical Chemistry, Goel Publishing House, 2001. 2. G.W. Garland, J.W. Nibler, D.P. Shoemaker, Experiments in Physical Chemistry, 8th edition, McGraw Hill, 2009. 3. J. N. Gurthu and R. Kapoor, Advanced Experimental Chemistry, S. Chand and Co., 1987. 4. Shailendra K Sinha, Physical Chemistry: A laboratory Manual, Narosa Publishing House Pvt, Ltd., New Delhi, 2014. 5. F. Jensen, Introduction to Computational Chemistry, 3rd Ed., Wiley-Blackwell. 	
Website and e-learning source	https://web.iitd.ac.in/~nukurur/2015-16/Isem/cmp511/lab_handout_new.pdf	

Course Code	Course Title	L	T	P	C
23214SEC34L	Analytical Instrumentation technique Practicals	0	0	4	4
Course Outline	<p>UNIT-I:</p> <ol style="list-style-type: none"> Determination of the equivalent conductance of a weak acid at different concentrations and verifying Ostwald dilution law. Calculation of the dissociation constant of the acid. Determination of the equivalent conductance of a strong electrolyte at different concentrations and examining the validity of the Onsager's theory as limiting law at high dilutions. Conductometric titration of a mixture of HCl and CH₃COOH Vs NaOH. Conductometric titration of NH₄Cl Vs NaOH. Conductometric titration of CH₃COONa Vs HCl. Potentiometric titration of a mixture of HCl and CH₃COOH Vs NaOH Determination of pK_a of weak acid by EMF method. Potentiometric titration of FAS Vs K₂Cr₂O₇ Potentiometric titration of KI Vs KMnO₄. Potentiometric titration of a mixture of Chloride and Iodide Vs AgNO₃. Determination of the pH of buffer solution by EMF method using Quinhydrone and Calomel electrode. <p>Study of the inversion of cane sugar in the presence of acid by Polarimetric method.</p>				

UNIT-II:

1. Estimation of Fe, Cu and Ni by colorimetric method.
2. Estimation of Na and K by flame photometric method.
3. Determination of spectrophotometrically the mole ratio of the ferrithiocyanate complex and equilibrium constant for the complex formation.
4. Determination of the amount (mol/L) of ferricyanide present in the given solution using cyclic voltammetry.
5. Determination of the diffusion coefficient of ferricyanide using cyclic voltammetry.
6. Determination of the standard redox potential of ferri-ferrocyanide redox couple using cyclic voltammetry.
7. Estimation of the amount of sulphate present in the given solution using Nephelometric turbidimeter.
8. Estimation of the amount of nitrate present in the given solution using spectrophotometric method.
9. Heavy metal analysis in textiles and textile dyes by AAS
10. Determination of caffeine in soft drinks by HPLC
11. Analysis of water quality through COD, DO, BOD measurements.
12. Assay of Riboflavin and Iron in tablet formulations by spectrophotometry
13. Estimation of chromium in steel sample by spectrophotometry
14. Determination of Stern-Volmer constant of Iodine quenching by fluorimetry
15. Determination of ascorbic acid in real samples using Differential Pulse Voltammetry and comparing with specifications
16. Separation of (a) mixture of Azo dyes by TLC (b) mixture of metal ions by Paper chromatography
17. Estimation of chlorophyll in leaves and phosphate in waste water by colorimetry.
18. Estimation of Fe(II) by 1,10 phenanthroline using spectrophotometry

	<p>UNIT-III: Interpretation and identification of the given spectra of various organic compounds arrived at from the following instruments</p> <ol style="list-style-type: none"> 1.UV-Visible 2.IR 3.Raman 4.NMR 5.ESR 6.Mass etc., 	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC- CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. Vogel's Text book of Practical Organic Chemistry, 5th Ed, ELBS/Longman, England, 2003. 2. G. H. Jeffery, J. Bassett, J. Mendham and R. C. Denney, <i>Vogel's Textbook of Quantitative Chemical Analysis</i>; 6th ed., ELBS, 1989. 3. J. D. Woollins, <i>Inorganic Experiments</i>; VCH: Weinheim, 1995. 4. B. Viswanathan and P.S.Raghavan, <i>Practical Physical Chemistry</i>, Viva Books, New Delhi,2009. 5.Sundaram, Krishnan, Raghavan, <i>Practical Chemistry (Part II)</i>, S. Viswanathan Co. Pvt., 1996. 	

Reference Books	<ol style="list-style-type: none"> 1. N. S. Gnanapragasam and G. Ramamurthy, Organic Chemistry – Labmanual, S. Viswanathan Co. Pvt. Ltd, 2009. 2. J. N. Gurtu and R. Kapoor, Advanced Experimental Chemistry, S. Chand and Co., 2011. 3. J. B. Yadav, Advanced Practical Physical Chemistry, Goel Publishing House, 2001. 4. G.W. Garland, J.W. Nibler, D.P. Shoemaker, Experiments in Physical Chemistry, 8th edition, McGraw Hill, 2009. 5. J. N. Gurthu and R. Kapoor, Advanced Experimental Chemistry, S. Chand and Co., 1987. 	
Website and e-learning source	<ol style="list-style-type: none"> 1. https://bit.ly/3QESF7t 2. https://bit.ly/3QANOnX 	

Course Code	Course Title	L	T	P	C
23214DSC35A	Elective V(Generic /Discipline Specific) (One from Group E) Pharmacognosy and Phytochemistry	4	1	0	3
Course Outline	UNIT-I:Pharmacognosy and Standardization of Herbal drugs: Introduction, definition, development classification and Source of Drugs: Biological, mineral, marine,and plant tissue cultures. Study of pharmacognosticof a crude drug. Biosynthesis: Shikimic acid pathway and acetate pathway. Systematic analysis of Crude drugs. Standardization of Herbal drugs.WHO guidelines, Sampling of crude drug, Methods of drug evaluation. Determination of foreign matter, moisture Ash value. Phytochemical investigations-General chemical tests.				

	<p>UNIT-II:Extraction Techniques: General methods of extraction, types – maceration, Decoction, percolation, Immersion and soxhlet extraction.</p> <p>Advanced techniques- counter current, steam distillation, supercritical gases, sonication, Micro waves assisted extraction. Factors affecting the choice of extraction process.</p>	
	<p>UNIT-III:Drugs containing Terpenoids and volatile oils: Terpenoids: Classification, Isoprene rule, Isolation and separation techniques, General properties Camphor, Menthol, Eucalyptol. Volatile Oils or Essential Oils: Method of Preparations, Classifications of Volatile oils, Camphor oil, Geranium oil, Citral-Structure uses. Pentacyclic triterpenoids: amyrines; taraxasterol: Structure and pharmacological applications.</p>	
	<p>UNIT-IV:Drugs containing alkaloids: Occurrence,function of alkaloids in plants, pharmaceutical applications. Isolation, Preliminary Qualitative tests and general properties. General methods of structural elucidation. Morphine, Reserpine, papaverine - chemical properties,structure and uses. papaverine-structure, chemical properties and uses.</p>	
	<p>UNIT-V:Plant Glycosides and Marine drugs: Glycosides: Basic ring system, classification, isolation, properties, qualitative analysis. Pharmacological activity of Senna glycosides, Cardiacglycosides-Digoxin, digitoxin, Steroidal saponins glycosides-Diosgenin, hecogenin. Plant pigments: Occurrence and general methods of structure determination, isolation and synthesis of quercetin and cyanidin chloride.Marine drugs -Selected Drug Molecules: Cardiovascular active substances, Cytotoxic compounds, antimicrobial compounds, antibiotic compounds, Anti-inflammatory agents. Marine toxins.</p>	

<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC- CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	
<p>Recommended Text</p>	<p>1. Gurdeep R Chatwal (2016), Organic chemistry of Natural products, Volume I&II, 5th edition, Himalaya publishing House.</p> <p>2. S.V.Bhat, B.A. Nagasampagi, M.Sivakumar (2014), Chemistry of Natural Products, Revised edition, Narosa Publishers.</p>	
<p>Reference Books</p>	<p>1. Jeffrey B. Harborne (2012), Phytochemical methods: A Guide to Modern Techniques of Plant Analysis, 4th edition, Indian reprint, Springer.</p> <p>2. Ashutoshkar (2007), Pharmacognosy and Pharmacobiotechnology, 2 nd edition, New age international (P) limited, New Delhi.</p>	

Course Code	Course Title	L	T	P	C
23214AEC41	Coordination Chemistry – II	4	1	0	4
Course Outline	<p>UNIT-I: Chemistry of organometallic compounds: Classification of organometallic compounds based on M-C bond – 18 and 16 electron rule; Bonding in metal – olefin complexes (example: Ziese's salt), metal-acetylene and metal-allyl complexes; Metal-cyclopentadienyl complexes – Examples and MO approach to bonding in metallocenes; fluxional isomerism. Metal – carbonyl complexes: MO diagram of CO; Structure and bonding – bonding modes, MO approach of M-CO bonding, π-acceptor nature of carbonyl group, synergistic effect (stabilization of lower oxidation states of metals); Carbonyl clusters: Low nuclearity and high nuclearity carbonyl clusters – Structures based on polyhedral skeleton electron pair theory or Wade's rule.</p>				
	<p>UNIT-II: Reactions and catalysis of organometallic compounds: Reactions of organometallic compounds: Oxidative addition, reductive elimination (α and β eliminations), migratory insertion reaction and metathesis reaction. Organo-metallic catalysis: Hydrogenation of olefins (Wilkinson's catalyst), hydroformylation of olefins using cobalt or rhodium catalysts (oxo process), oxidation of olefin (Wacker process), olefin isomerisation, water gas shift reaction, cyclo-oligomerisation of acetylenes using Reppe's catalysts, Monsanto process.</p>				

	<p>UNIT-III: Inorganic spectroscopy -I: IR spectroscopy: Effect of coordination on the stretching frequency-sulphato, carbonato, sulphito, aqua, nitro, thiocyanato, cyano, thiourea, DMSO complexes; IR spectroscopy of carbonyl compounds. NMR spectroscopy- Introduction, applications of ^1H, ^{15}N, ^{19}F, ^{31}P-NMR spectroscopy in structural identification of inorganic complexes, fluxional molecules, quadrupolar nuclei- effect in NMR spectroscopy.</p>	
	<p>UNIT-IV: Inorganic spectroscopy-II: Introductory terminologies: g and A parameters-definition, explanation and factors affecting g and A; Applications of ESR to coordination compounds with one and more than one unpaired electrons – hyperfine and secondary hyperfine splitting and Kramer's doublets; ESR spectra of V(II), Mn(II), Fe(II), Co(II), Ni(II), Cu(II) complexes, bis(salicylaldimine)copper(II) and $[(\text{NH}_3)_5\text{Co}-\text{O}_2-\text{Co}(\text{NH}_3)_5]^{5+}$. Mossbauer spectroscopy – Mossbauer effect, Recoil energy, Mossbauer active nuclei, Doppler shift, Isomer shift, quadrupole splitting and magnetic interactions. Applications of Mössbauer spectra to Fe and Sn compounds.</p>	
	<p>UNIT-V:Photo Electron Spectroscopy: Theory, Types, origin of fine structures - shapes of vibrational fine structures – adiabatic and vertical transitions, PES of homonuclear diatomic molecules (N_2, O_2) and heteronuclear diatomic molecules (CO, HCl) and polyatomic molecules (H_2O, CO_2, CH_4, NH_3) – evaluation of vibrational constants of the above molecules. Koopman's theorem- applications and limitations. Optical Rotatory Dispersion – Principle of CD and ORD; Δ and λ isomers in complexes, Assignment of absolute configuration using CD and ORD techniques.</p>	

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC- CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. J E Huheey, EA Keiter, RL Keiter and OK Medhi, Inorganic Chemistry – Principles of structure and reactivity, 4th Edition, Pearson Education Inc., 2006 2. G L Meissler and D ATarr, Inorganic Chemistry, 3rd Edition, Pearson Education Inc., 2008 3. D. Bannerjea, Co-ordination Chemistry, TATA Mcgraw Hill, 1993. 4. B D Gupta and A K Elias, Basic Organometallic Chemistry: Concepts, Syntheses and Applications, University Press, 2013. 5. F. A. Cotton, G. Wilkinson.; C. A. Murillo; M. Bochmann, Advanced Inorganic Chemistry, 6thed.; Wiley Inter-science: New York, 1988. 	
Reference Books	<ol style="list-style-type: none"> 1. Crabtree, Robert H. The Organometallic Chemistry of the Transition Metals. 3rd ed. New York, NY: John Wiley, 2000. 2. P Gütlich, E Bill, A X Trautwein, Mossbauer Spectroscopy and Transition Metal Chemistry: Fundamentals and Applications, 1st edition, Springer-Verlag Berlin Heidelberg, 2011. 3. Concepts and Models of Inorganic Chemistry, B. Douglas, D. McDaniel, J. Alexander, John Wiley, 1994, 3rd edn. 4. K. F. Purcell, J. C. Kotz, Inorganic Chemistry; Saunders: Philadelphia, 1976. 5. R. S. Drago, Physical Methods in Chemistry; Saunders: Philadelphia, 1977. 	
Website and e-learning source	https://archive.nptel.ac.in/courses/104/101/104101100/	

Course Code	Course Title	L	T	P	C
23214AEC42	Physical Chemistry –II	4	1	0	4
Course Outline	<p>UNIT-I: Wave particle duality, Uncertainty principle, Particle wave and Schrodinger wave equation, wave function, properties of wave function. Properties of wave function, Normalized, Orthogonal, orthonormal, Eigen values, Eigen functions, Hermitian properties of operators. Introduction to quantum mechanics-black body radiation, photoelectric effect, hydrogen spectrum. Need for quantum mechanics, Postulates of Quantum Mechanics, Schrodinger wave equation, Time independent and time dependent</p>				
	<p>UNIT-II: Quantum models: Particle in a box-1D, two dimensional and three-dimensional, degeneracy, application to linear conjugated molecular system, free particles, ring systems. Harmonic Oscillator-wave equation and solution, anharmonicity, force constant and its significance. Rigid Rotor-wave equation and solution, calculation of rotational constants and bond length of diatomic molecules.</p>				
	<p>UNIT-III: Applications to Hydrogen and Poly electron atoms: Hydrogen atom and hydrogen like ions, Hamiltonian-wave equation and solutions, radial and angular functions, representation of radial distribution functions. Approximation methods – variation methods: trial wave function, variation integral and application to particle in 1D box. Perturbation method - first order applications. Hartree-Fock self-consistent field method, Hohenberg-Kohn theorem and Kohn-Sham equation, Helium atom-electron spin, Pauli exclusion principle and Slater determination.</p>				

	<p>UNIT-IV: Group theory: Groups, sub groups, symmetry elements, operations, classification-axial and non-axial. Dihedral point groups- $C_n, C_{nh}, D_n, D_{nh}, D_{nd}, T_d$ and O_h. Matrix representation and classes of symmetry operations, reducible irreducible and direct product representation. The Great orthogonality theorem – irreducible representation and reduction formula, construction of character table for C_{2v}, C_{2h}, C_{3v} and D_{2h} point groups.</p>	
	<p>UNIT-V: Applications of quantum and group theory: Hydrogen Molecule-Molecular orbital theory and Heitler London (VB) treatment, Energy level diagram, Hydrogen molecule ion; Use of linear variation function and LCAO methods. Electronic conjugated system: Huckel method to Ethylene butadiene, cyclopropenyl, cyclo butadiene and Benzene. Applications of group theory to molecular vibrations, electronic spectra of ethylene.</p>	
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC- CSIR / GATE / TNPSC others to be solved (To be discussed during the Tutorial hours)</p>	
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>	

Recommended Text	<ol style="list-style-type: none"> 1. R.K. Prasad, Quantum Chemistry, New Age International Publishers, New Delhi, 2010, 4th revised edition. 2. F. A. Cotton, Chemical Applications of Group Theory, John Wiley & Sons, 2003, 2nd edition. 3. A. Vincent, Molecular Symmetry and Group Theory. A Programmed Introduction to Chemical Applications, John and Willy & Sons Ltd., 2013, 2nd Edition. 4. T. Engel & Philip Reid, Quantum Chemistry and Spectroscopy, Pearson, New Delhi, 2018, 4th edition. 5. G. K. Vemulapalli, Physical Chemistry, Prentice Hall of India Pvt. Ltd. 2001. 6. D.A. McQuarrie, Quantum Chemistry, Viva Books PW. Ltd, 2013, 2nd edition. 	
Reference Books	<ol style="list-style-type: none"> 1. N. Levine, Quantum Chemistry, Allyn& Bacon Inc, 1983, 4th edition. 2. D.A. McQuarrie and J. D. Simon, Physical Chemistry, A Molecular Approach, Viva Books Pvt. Ltd, New Delhi, 2012. 3. R. P. Rastogi & V. K. Srivastava, An Introduction to Quantum Mechanics of Chemical Systems, Oxford & IBH Publishing Co., New Delhi, 1999. 4. R.L. Flurry. Jr, Symmetry Group Theory and Chemical applications, Prentice Hall. Inc, 1980 5. J. M. Hollas, Symmetry in Molecules, Chapman and Hall, London, 2011, Reprint. 	

Course Code	Course Title	L	T	P	C
23214DSC44A	Elective VI(Generic /Discipline Specific)(One from Group F) Chemistry of Natural Products/Polymer Chemistry	4	1	0	3
	CHEMISTRY OF NATURAL PRODUCTS				

Course Outline	UNIT-I: Alkaloids: Introduction, occurrence, classification, isolation and functions of alkaloids. Classification, general methods of structural elucidation. Chemical methods of structure determination of Coniine, Piperine, Nicotine, Papaverine. Atropine, Quinine, Belladine, Cocaine, Heptaphylline, Papaverine and Morphine.	
	UNIT-II: Terpenoids: Introduction, occurrence, Isoprene rule, classification. General methods of determining structure. Structure determination of Camphor, Abietic acid, Cadinene, Squalene, Zingiberine. Carotenoids: Introduction, geometrical isomerism, Structure, functions and synthesis of β -carotene and vitamin-A.	
	UNIT-III: Anthocyanines and flavones: Anthocyanines: Introduction to anthocyanines. Structure and general methods of synthesis of anthocyanines. Cyanidine chloride: structure and determination. Flavones: Biological importance of flavones. Structure and determination of flavone and flavonoids. Quercetin: Structure determination and importance.	
	UNIT-IV: Purines and Steroids: Purines: Introduction, occurrence and isolation of purines. Classification and spectral properties of steroids. biological importance, Structure and synthesis of Uric acid and Caffeine. Steroids: Steroids-Introduction, occurrence, nomenclature, configuration of substituents, Diels' hydrocarbon, stereochemistry, classification, Diels' hydrocarbon, biological importance, colour reactions of sterols, cholesterol-occurrence, tests, physiological activity, biosynthesis of cholesterol from squalene.	
	UNIT-V: Natural Dyes: Occurrence, classification, isolation, purification, properties, colour and constitution. Structural determination and synthesis of indigoitin and alizarin.	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE / TNPSC others to be solved (To be discussed during the Tutorial hours)	

Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	<ol style="list-style-type: none"> 1. G. K. Chatwal, Organic Chemistry on Natural Products, Vol. 1, Himalaya Publishing House, Mumbai, 2009. 2. G. K. Chatwal, Organic Chemistry on Natural Products, Vol. 2, Himalaya Publishing House, Mumbai, 2009. 3. O. P. Agarwal, Chemistry of Organic Natural Products, Vol. 1, Goel Publishing House, Meerut, 1997. 4. O. P. Agarwal, Chemistry of Organic Natural Products, Vol. 2, Goel Publishing House, Meerut, 1997. 5. I. L. Finar, Organic Chemistry Vol-2, 5th edition, Pearson Education Asia, 1975. 	
Reference Books	<ol style="list-style-type: none"> 1. I. L. Finar, Organic Chemistry Vol-1, 6th edition, Pearson Education Asia, 2004. 2. Pelletier, Chemistry of Alkaloids, Van Nostrand Reinhold Co, 2000. 3. Shoppe, Chemistry of the steroids, Butterworths, 1994. 4. I. A. Khan, and A. Khanum. Role of Biotechnology in medicinal & aromatic plants, Vol 1 and Vol 10, Ukkaz Publications, Hyderabad, 2004. 	
Website and e-learning source	https://sites.google.com/site/chemistryebookscollection02/home/organic-chemistry/organic	

Course Code	Course Title	L	T	P	C
23214DSC44B	Polymer Chemistry	4	1	0	3
Course Outline	UNIT-I: Characterization, Molecular weight and its Determination: Primary and secondary bond forces in polymers; cohesive energy, molecular structure, chemical tests, thermal methods, T _g , molecular distribution, stability. Determination of Molecular mass of polymers: Number Average molecular mass (M _n) and Weight average molecular mass (M _w) of polymers. Molecular weight determination of high polymers by physical and methods.				

	UNIT-II: Mechanism and kinetics of Polymerization: Chain growth polymerization: Cationic, anionic, free radical polymerization, Stereo regular polymers: Ziegler Natta polymerization. Reaction kinetics. Step growth polymerization, Degree of polymerization.	
	UNIT-III: Techniques of Polymerization and Polymer Degradation: Bulk, Solution, Emulsion, Suspension, solid, interfacial and gas phase polymerization. Types of Polymer Degradation, Thermal degradation, mechanical degradation, photodegradation, Photostabilizers, Solid and gas phase polymerization.	
	UNIT-IV: Industrial Polymers: Preparation of fibre forming polymers, elastomeric material. Thermoplastics: Polyethylene, Polypropylene, polystyrene, Polyacrylonitrile, PolyVinyl Chloride, Poly tetrafluoro ethylene, nylon and polyester. Thermosetting Plastics: Phenol formaldehyde and epoxidized resin. Elastomers: Natural rubber and synthetic rubber - Buna - N, Buna-S and neoprene. Conducting Polymers: Elementary ideas; examples: poly sulphur nitriles, polyphenylene, poly pyrrole and polyacetylene. Polymethylmethacrylate, polyimides, polyamides, polyurethanes, polyureas, polyethylene and polypropylene glycols.	
	UNIT-V: Polymer Processing: Compounding: Polymer Additives: Fillers, Plasticizers, antioxidants, thermal stabilizers, fire retardants and colourants. Processing Techniques: Calendaring, die casting, compression moulding, injection moulding, blow moulding and reinforcing. Film casting, Thermofoaming, Foaming. Catalysis and catalysts – Polymerization catalysis, catalyst support, clay compounds, basic catalyst, auto-exhaust catalysis, vanadium, heterogeneous catalysis and active centres.	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE / TNPSC others to be solved (To be discussed during the Tutorial hours)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	

Recommended Text	<ol style="list-style-type: none"> 1. V.R. Gowariker, <i>Polymer Science</i>, Wiley Eastern,1995. 2. G.S. Misra, <i>Introductory Polymer Chemistry</i>, New Age International (Pvt) Limited,1996. 3. M.S. Bhatnagar, <i>A Text Book of Polymers</i>, vol-I & II, S.Chand & Company, New Delhi, 2004. 	
Reference Books	<ol style="list-style-type: none"> 1. F. N. Billmeyer, <i>Textbook of Polymer Science</i>, Wiley Interscience,1971. 2. A. Kumar and S. K. Gupta, <i>Fundamentals and Polymer Science and Engineering</i>, Tata McGraw-Hill,1978. 	



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF COMPUTER SCIENCE**

**B.C.A COMPUTER APPLICATION
CURRICULUM**

FULL TIME

[Regulation 2023]

**[Candidates admitted from the academic year 2023-
2024 onwards]**

THE REGULATIONS ON LEARNING OUTCOMES BASED CURRICULUM

FRAME WORK FOR UNDERGRADUATE EDUCATION

BCA (Bachelor of Computer Application)

1. Preamble

Education is the key to development of any society. Role of higher education is crucial for securing right kind of employment and also to pursue further studies in best available world class institutes elsewhere within and outside India. Quality education in general and higher education in particular deserves high priority to enable the young and future generation of students to acquire skill, training and knowledge in order to enhance their thinking, creativity, comprehension and application abilities and prepare them to compete, succeed and excel globally. Learning Outcomes-based Curriculum Framework (LOCF) which makes it student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. LOCF also aims at ensuring uniform education standard and content delivery across the state which will help the students to ensure similar quality of education irrespective of the institute and location.

Computer Application is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer Application is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Application can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer Application also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain. Computer Application has a wide range of specialties.

These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Computer Application is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

Programme Outcome, Programme Specific Outcome and Course Outcome

Computer Application is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics.

The Students completing this programme will be able to present Software application clearly and precisely, make abstract ideas precise by formulating them in the Computer languages. Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)
LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED
REGULATIONS FOR UNDER GRADUATE PROGRAMME

Programme:	B.C.A.,
Programme Code:	23UGCOAGE
Duration:	3 years [UG].
Programme Outcomes:	<p>PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study</p> <p>PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.</p> <p>PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p>PO4: Problem solving: Capacity to extrapolate from what one has learned and applies their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real life situations.</p> <p>PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.</p> <p>PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment</p>

or investigation

PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

PO8: Scientific reasoning: Ability to analyze interprets and draws conclusions from quantitative/qualitative data; and critically evaluates ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9: Reflective thinking: Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO 13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

	<p>PO 15: Lifelong learning: Ability to acquire knowledge and skills, including learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/re-skilling.</p>
<p>Programme Specific Outcomes:</p>	<p>PSO1: Think in a critical and logical based manner</p> <p>PSO2: Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in Mathematics or statistics and real time application related sciences.</p> <p>PSO3: Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.</p> <p>PSO4: Understand, formulate, develop programming model with logical approaches to address issues arising in social science, business and other contexts.</p> <p>PSO5: Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and industrial statistics.</p> <p>PO6: Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied a reason multiple disciplines linked with Computer Science.</p> <p>PO7: Equip with Computer science technical ability, problem solving Skills creative talent and power of communication necessary for various forms of Employment.</p> <p>PO8: Develop a range of generic skills helpful in employment, internships & societal activities.</p> <p>PO9: Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of computing sciences.</p>

Programme Educational Objectives-PEO

- ❖ **PEO1**-To gain and apply knowledge of Programming concept to solve the problems.
- ❖ **PEO2**-Problem Analysis.
- ❖ **PEO3**-Design/Development of Solutions.
- ❖ **PEO4**-Conduct investigations of complex problems
- ❖ **PEO5**-Modern tool usage.
- ❖ **PEO6**-Applying to society

PO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
PO1	✓▪					
PO2		✓▪				
PO3			✓▪			
PO4				✓▪		
PO5					✓▪	
PO6						✓▪

Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the ‘Training for Competitive Examinations’ course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting an Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome/ Benefits
I	<p>Foundation Course To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning Literature and analyzing the world through the literary lens Gives rise to a new Perspective.</p>	<ul style="list-style-type: none"> ➤ Instill confidence among students ➤ Create interest for the subject
I,II,III,IV	<p>Skill Enhancement papers (Discipline centric /Generic/Entrepreneurial)</p>	<ul style="list-style-type: none"> ➤ Industry ready graduates ➤ Skilled human resource ➤ Students are equipped with essential skills to Make them employable
		<ul style="list-style-type: none"> ➤ Training on language and communication skills enable the students gain Knowledge and Exposure in the competitive world.
		<ul style="list-style-type: none"> ➤ Discipline centric skill will improve the Technical knowhow of solving real life Problems.
III,IV,V& VI	Elective papers	<ul style="list-style-type: none"> ➤ Strengthening the domain knowledge ➤ Introducing the stake holders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter-disciplinary nature ➤ Emerging topics in higher education/industry/ communication network/health sector etc. are introduced with hands-on-training.

IV	Elective Papers	<ul style="list-style-type: none"> ➤ Exposure to industry molds students into solution providers ➤ Generates Industry ready graduates ➤ Employment opportunities enhanced
V	Elective papers	<ul style="list-style-type: none"> ➤ Self-learning is enhanced ➤ Application of the concept to real situation is conceived resulting Intangible outcome
VI	Elective papers	<ul style="list-style-type: none"> ➤ Enriches the study beyond the course. ➤ Developing a research framework and presenting their independent and Intellectual ideas effectively.
Extra Credits: For Advanced Learners/Honors degree		1. To cater to the need s of peer learners/research aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical Ability ,Professional Competency, Professional Communication and Transferrable Skill

1.1.3	color
EMPLOYABILITY	
SKILL DEVELOPMENT	
ENTREPRENEURSHIP	
EMPLOYABILITY,/ENTREPRENEURSHIP,/SKILL DEVELOPMENT	
EMPLOYABILITY,/SKILL DEVELOPMENT	
EMPLOYABILITY,/ENTREPRENEURSHIP	



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**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
BCA (BACHLOR OF COMPUTER APPLICATION)
REGULATION 2023 – 2024
COURSE STRUCTURE -SEMESTER-I**

Course Code	Course Title - BCA	L	T	P	C
THEORY					
23110AEC11/ 23111AEC11/ 23132AEC11/ 23135AEC11	Tamil – I/Advanced English-I/Hindi-I/ French - I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23122AEC13	Python Programming	4	1	0	3
23122GEC14	Numerical Methods	3	1	0	3
23122GEC15	Statistics	3	1	0	3
PRACTICAL					
23122SEC16L	Python Programming Lab	0	0	3	3
SKILL ENHANCEMENT COURSE					
23122SEC17	Fundamentals of Information Technology	2	0	0	2
23122SEC18	Foundation Course	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
231AECCINC	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	-	-	-	1
	Total	22	5	3	25

SEMESTER – II

Course Code	Course Title - BCA	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Tamil – II/Advanced English-II/Hindi-II/ French - II	3	1	0	3
23111AEC22	English-II	3	1	0	3
23122AEC23	Object oriented programming concepts using C++	4	1	0	3
23122GEC24	Operations Research	4	1	0	3
23122GEC25	Discrete Mathematics	2	1	0	3
PRACTICAL					
23122SEC26L	C++ Programming Lab	0	0	3	3
SKILL ENHANCEMENT COURSE					
23122SEC27	Quantitative Aptitude	2	0	0	2
23122SEC28	Advanced Excel	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
231AECCCMS	Communication Skills	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioral Etiquette	-	-	-	1
	Total	22	5	3	25

SEMESTER – III

Course Code	Course Title - BCA	L	T	P	C
THEORY					
23110AEC31/ 23111AEC31/ 23132AEC31/ 23135AEC31	Tamil – III/Advanced English-III/Hindi-III/ French – III	3	1	0	3
23111AEC32	English-III	3	1	0	3
23122AEC33	Data Structure & Algorithm	5	1	0	4
23122DSC34_	Discipline Specific Elective-I	5	1	0	3
PRACTICAL					
23122SEC35L	Data Structure & Algorithm Lab using C++	0	0	3	3
SKILL ENHANCEMENT COURSE					
23122SEC36	Introduction to HTML	3	0	0	2
23122SEC37	Financial Accounting I	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
23122RMC38	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	-	-	-	1
	Total	23	4	3	23

SEMESTER – IV

Course Code	Course Title - BCA	L	T	P	C
THEORY					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tami – IV/Advanced English-IV/Hindi-IV/ French – IV	3	0	0	3
23111AEC42	English-IV	3	0	0	3
23122AEC43	Programming in Java	5	1	0	3
23122DSC44_	Discipline Specific Elective-II	5	1	0	3
PRACTICAL					
23122SEC45L	Programming in Java Lab	0	0	3	3
SKILL ENHANCEMENT COURSE					
23122SEC46	Enterprise Resource Planning	3	0	0	2
23122SEC47	Multimedia Systems	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
23122BRC48	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	-	-	2
AUDIT COURSE					
231LCSCLS	Leadership and Management Skills	-	-	-	1
	Total	25	2	3	24

SEMESTER – V

Course Code	Course Title - BCA	L	T	P	C
THEORY					
23122AEC51	Operating System	5	1	0	4
23122AEC52	ASP.NET Programming	5	1	0	3
23122AEC53	Information Security	5	0	0	4
23122DSC54_	Discipline Specific Elective-III	4	0	0	4
23122DSC55_	Discipline Specific Elective-IV	4	0	0	4
PRACTICAL					
23122SEC56L	ASP.NET Programming Lab	0	0	3	3
AUDIT COURSE					
23122SEC57	Internship / Industrial Training				2
231ACLSPSL	Professional Skills	-	-	-	1
231AECCVED	Value Education	2	-	-	2
	Total	25	2	3	27

SEMESTER – VI

Course Code	Course Title - BCA	L	T	P	C
THEORY					
23122AEC61	Computer Network	5	1	0	4
23122AEC62	Data Analytics using R Programming	5	0	0	4
23122DSC63_	Discipline Specific Elective-V	5	0	0	3
PRACTICAL					
23122SEC64L	Data analytics using R Lab	0	0	3	3
23122PRW65	Project	8	0	0	4
23122SEC66	Professional Competency Skill General awareness for competitive examination	2	0	0	2
23122EXACT	Extension Activity	-	-	-	1
AUDIT COURSE					
231ACSIKWS	Indian Knowledge System	-	-	-	2
	Total	25	2	3	23
Total Credits-Programme					140
Total Credits-Audit Courses					07
Total Credits					147

Discipline Specific Electives

Semester	Discipline Specific Elective Courses-I
III	a)23122DSC34A-Grid Computing b)23122DSC34B- Big Data Analytics c)23122DSC34C-Natural Language Processing
	Discipline Specific Elective Courses-II
IV	a) 23122DSC44A-Image Processing b)23122DSC44B- Analytics for Service Industry c)23122DSC44C-Computational Intelligence
V	Discipline Specific Elective Courses-III
	a) 23122DSC54A-Database Management System b)23122DSC54B- Agile Project Management c)23122DSC54C- Cloud Computing
	Discipline Specific Elective Courses-IV
	a)23122DSC55A-Disaster Management b)23122DSC55B- Artificial Neural Network c)23122DSC55C- Mobile Adhoc Network
	Discipline Specific Elective Courses-V
VI	a)23122DSC63A-Human Computer Interaction b)23122DSC63B- Data Science c)23122DSC63C- IOT and its Applications



Credit Distribution for UG Programme

Consolidated Semester wise Credit distribution

SEM	AEC	SEC	GEC	DSC	AECC	Research	others	Total
I	9	7	6	-	2	-	1	25
II	9	7	6	-	2	-	1	25
III	10	7	-	3	-	2	1	23
IV	9	7	-	3	2	2	1	24
V	11	5	-	8	-	-	3	27
VI	8	5	-	3	-	4	3	23
Total	56	38	12	17	6	8	10	147

AUDIT COURSE CREDIT DISTRIBUTION

Sem	Audit
I	1
II	1
III	1
IV	1
V	1
VI	2
Total	7

HOD

DEAN

Eligibility for admission

To be eligible to enroll in for the BCA Computer Application degree courses you need to clear the following eligibility criteria.

- Students need to have graduated their 12th standard in the science stream with physics, chemistry and mathematics (PCM),
- Students who have science with physics, chemistry and biology (PCB).

இக்கால இலக்கியம்

23110AEC11

முதல் பருவம்

பாட நோக்கங்கள்

1. இக்காலதமிழ்இலக்கியவகைகளின்மாதிரிகளைகற்பித்தல்.
2. தமிழின்இனிமையைஉணரச்செய்தல்
3. தமிழின்ஈடுபாட்டையும்சுவைக்கும்திறனையும்ஏற்படுத்துதல்.
4. கவிதை எழுதும் திறனை உருவாக்குதல்
5. படைப்பாளர்களாக உருவாக்கும் திறனை ஏற்படுத்துதல்.

பயன்கள்

- மொழி ஆளுமைத்திறன் பெறுதல்.
- சமூக சிந்தனையை வளர்த்துக் கொள்ளுதல்.
- படைப்பாளர்களாக உருவாகும் திறனைப் பெறுதல்.
- இலக்கியங்களின் அறிவை மேம்படுத்துதல்.
- கவிதைஎழுதும் முறையை புரிந்துக்கொள்ளுதல்

அலகு -1 மரபுக்கவிதை

1. பாரதியார்--விடுதலை, வந்தே மாதரம் ,காற்று
- 2.பாரதிதாசன் - அழகின்சிரிப்பு , தமிழனுக்கு வீழ்ச்சி இல்லை
- 3.கவிமணிதேசியவிநாயகம்பிள்ளை—தொழிலாளியின் முறையீடு
- 4.நாமக்கல்கவிஞர்—தருணம் இதுவே ,
- 5.கண்ணதாசன்-- அனுபவம்

அலகு -2புதுக்கவிதைகள்

- 1.அப்துல்ரகுமான் -வெற்றி
- 2.அறிவுமதி-நட்புக்காலம்
- 3.வைரமுத்து- ருசி, சிற்பி- ஓடுஓடுசங்கிலி
- 4.மு.மேத்தா- வெளிச்சம் வெளியே இல்லை

அலகு -3நாட்டுப்புறவியல்

- 1.பழமொழிகள்
2. விடுகதைகள்

3. தொழில்பாடல்

அலகு- 4 சிறுகதை

1. தடயம்- மா. ஜெயபிரகாசம்
2. எதார்த்தம் - சு. தமிழ்ச்செல்வி
- 3.நீதி-- பூமணி

அலகு- 5இலக்கியவரலாறு

1. கவிதை
2. சிறுகதை
3. நாட்டுப்புறவியல்

பொதுக்கட்டுரை -மனிதநேயம், வாழ்வியல்அறங்கள்

மனப்பாடப்பகுதி : பாரதியார் கவிதை- வேண்டும்,பாரதிதாசன் கவிதை-செந்தாமரை

பார்வை நூல்கள் :

1. பாரதியார் கவிதைகள் - மணிவாசகர் பதிப்பகம் சென்னை
- 2.பாரதிதாசன்கவிதைகள் - பாரிநிலையம், சென்னை
3. தமிழ் இலக்கிய வரலாறு - முவரதராஜன் சாகித்திய அகாதெமி,சென்னை.
4. நாட்டுப்புறவியல் - முனைவர். ஆறு. ராமநாதன் ,மணிவாசகர் பதிப்பகம், சென்னை.
- 5.தமிழ்சிறுகதையும்தோற்றம்வளர்ச்சி - தமிழ் புத்தக நிலையம், சென்னை.

இணையதளம் -www.tamilvu.org

www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
23111AEC11	Advanced English-I	4	0	0	2

Objective:

To enhance vocabulary

To understand the impact of the speeches of famous people

Outcome:

Development of vocabulary

UNIT-I:

The Origin of Language - Development of Gesture, Animals and Human Language, Language and Disadvantage

UNIT-II:

Vowels, Diphthongs and Consonants Language Varieties: Dialects, Idiolect,

UNIT-III:

Linguistic Form Morphology, Grammar, Syntax, Semantics, Pragmatics

UNIT-IV:

Branches of Linguistics- Structural Linguistics, Sociolinguistics, Psycholinguistics, Neu linguistics, Applied Linguistics

UNIT-V:

Stylistics and Discourse Analysis: Relationship between Language and Literature, Style and Function, Discourse, Narrative Discourse and Dramatic Discourse

Course Code	Course Title	L	T	P	C
23111AEC12	English-I GENERAL ENGLISH	3	1	0	3

Course Objectives

CO1: To enable learners to acquire the linguistic competence necessarily required in various life situations.

CO2: To help them understand the written text and able to use skimming, scanning skills

CO3: To assist them in creative thinking abilities

CO4: To enable them become better readers and writers

CO5: To assist those in developing correct reading habits, silently, extensively and intensively

Course Content:

UNIT I:

Poetry

- 1.1 A Patch of Land –Subramania Bharati
- 1.3 A Nation’s Strength – Ralph Waldo Emerson
- 1.4 Love Cycle - Chinua Achebe

UNIT II:

Prose

- 2.1 JRD - Harish Bhat
- 2.2 Us and Them - David Sedaris from Dress Your Family in Corduroy and Denim

UNIT III:

Short Stories

- 3.1 The Faltering Pendulum- Bhabani Bhattacharya
- 3.2 How I Taught my Grandmother to Read- Sudha Murthy
- 3.3 The Gold Frame- R.K. Laxman

UNIT IV:

Language Competency

4.1 Vocabulary: Synonyms, Antonyms, Word Formation

4.2 Appropriate use of Articles and Parts of Speech

4.3 Error correction

UNIT V:

English for Workplace

- 1.1 Self - introduction, Greetings
- 1.2 Introducing others
- 1.3 Listening for General and Specific Information
- 1.4 Listening to and Giving Instructions / Directions

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	PO1
CO2	Understand the total content and underlying meaning in the context.	PO1, PO2
CO3	Form the habit of reading for pleasure and for information	PO4,PO6
CO4	Comprehend material other than the prescribed text	PO4, PO5, PO6
CO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	PO3, PO8

Text books (Latest Editions)

1.	Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi: Sahitya Akademi, 1967
2.	How I taught my Grandmother to Read and other Stories, Murthy, Sudha,Penguin Books, India, 2004

Reference Books

(Latest Editions, and the style given must be strictly adhered to)

1.	English in use - A textbook for College Students (English ,Paper back, - T.Vijay Kumar, K DurgaBhavani, YL Srinivas
2.	Practical English Usage - 4th Edition By Michael Swan
3.	The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace -Margaret Shepherd,Penny Carter, (Illustrator), Sharon Hogan, 2005.

Web Resources

1.	A patch of land by Subramania Bharati translated by Usha Rajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&a=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
2.	The Sparrow by Paul Laurence Dunbar https://poets.org/poem/sparrow-0
3.	A Nation’s Strength by Emerson https://poets.org/poem/nations-strength
4.	Love cycle by Chinua Achebe : https://www.best-poems.net/chinua-achebe/love-cycle.html
5.	JRD by Harish Bhat https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories
.	Us and Them by David Sedaris From Dress Your Family in Corduroy and Denim https://legacy.npr.org/programs/morning/features/2004/jun/sedaris/usandthem.html
7.	Uncle Podger Hangs a Picture: http://rosyhunt.blogspot.com/2013/01/uncle-podger-hangs-picture.html
8.	The Gold Frame: https://fybaenglish.blogspot.com/2018/12/the-gold-frame-r-k-laxman.html

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PS O1	PS O2	PS O3	PS O4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

FIRST YEAR
SEMESTER-I

Subject Code	Subject Name	Category	L	T	P	C	Marks		
							CIA	External	Total
23122AEC13	PYTHON PROGRAMMING	Core	4	1	0	3	25	75	100
Learning Objectives									
LO1	To make students understand the concepts of Python programming.								
LO2	To apply the OOPs concept in PYTHON programming.								
LO3	To impart knowledge on demand and supply concepts								
LO4	To make the students learn best practices in PYTHON programming								
LO5	To know the costs and profit maximization								
UNIT	Contents								No. of Hours
I	Basics of Python Programming: History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements –Input Statements-Comments – Indentation-Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays–Array methods.								15
II	Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops .Jump Statements: break, continue and pass statements.								15
III	Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments-Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace–Defining our own modules.								15

IV	Lists: Creating a list-Access values in List-Updating values in Lists-Nested lists-Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple-Nested tuples Difference between lists and tuples .Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary-Dictionary Functions and Methods-Difference between Lists and Dictionaries.	15
V	Python File Handling: Types of files in Python -Opening and Closing files-Reading and Writing files: write() and write lines()methods-append()method-read() and readlines() methods-with keyword-Splitting words -File methods- File Positions- Renaming and deleting files.	15
TOTALHOURS		75
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1,PO2,PO3,PO4,PO5, PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1,PO2,PO3,PO4,PO5, PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1,PO2,PO3,PO4,PO5, PO6
CO4	Work with List, tuples and dictionary; Write program using list, Tuples and dictionary.	PO1,PO2,PO3,PO4,PO5, PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1,PO2,PO3, PO4,PO5,PO6
Text books		
1	Reema Thareja, —Python Programming using problem solving approach, First Edition, 2017, Oxford University Press.	
2	Dr.R.NageswaraRao,—Core Python Programming,First Edition, 2017, Dreamtech Publishers.	
Reference Books		
1.	Vamsi Kurama,—Python Programming:A Modern Approach,Pearson Education.	
2.	Mar klutz, Learning Python,Orielly.	
3.	Adam Stewarts, —Python Programming , Online.	
4.	Fabio Nelli,—Python Data Analytics, A Press.	

5.	Kenneth A. Lambert,—Fundamentals of Python–First Programs I,CENGAGE Publication.
Web Resources	
1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	2	3
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	3
CO5	3	2	2	3	3	3
Weightage of course contributed to each PSO	15	10	10	15	13	14

S-Strong-3 M-Medium-2L-Low-1

ALLIED MATHEMATICS
PAPER-1 NUMERICAL METHODS

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23122GEC14	Allied	3	1	0	3		25	75	100

Learning Objectives

LO1	To introduce the various topics in Numerical methods.
LO2	To make understand the fundamentals of algebraic equations.
LO3	To apply interpolation and approximation on examples.
LO4	To solve problems using numerical differentiation and integration.
LO5	To solve linear systems, numerical solution of ordinary differential equations

UNIT

DETAILS

I	FUNDAMENTALS OF ALGEBRAIC EQUATION: Solution of algebraic and transcendental Equations-Bisection method – Fixed point iteration method – Newton Raphson method –linear system of equations – Gauss elimination method – Gauss Jordan method.
II	ITERATIVE, INTERPOLATION AND APPROXIMATION: Iterative methods - Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi's method for symmetric matrices. Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided difference interpolation
III	INTERPOLATION WITH EQUAL INTERVAL: Difference operators and relations. - Interpolation with equal intervals – Newton's forward and backward difference formulae.
IV	NUMERICAL DIFFERENTIATION AND INTEGRATION: Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's 1/3 rule
V	INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS: Single step methods – Taylor's series method – Euler's method – Modified Euler's method – Runge Kutta method for solving(first, second , Third and 4th) order equations – Multi step methods

Course Outcomes

CO1	Know how to solve various problems on numerical methods	PO1
CO2	Use approximation to solve problems	PO1,PO2
CO3	Differentiation and integration concept are applied	PO4,PO6
CO4	Apply , direct methods for solving linear systems	PO4,PO5, PO6

CO5	Numerical solution of ordinary differential equations	PO3,PO8
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Text Books (Latest Editions)	
1	Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.
2	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition.
2	Timothy A. Budd, “Exploring Python”, Tata MCGraw Hill Education Private Limited 2011, 1 st Edition.
Web Resources	
	https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

ALLIED MATHEMATICS
PAPER-2 STATISTICS

Subject Code	Category	L	T	P	C	Credits	Inst. Hours	Marks		
								CIA	External	Total
23122GEC15	Allied	3	1	0	3			25	75	100

Learning Objectives

LO1	Distinguish among different scales of measurement and their implications for solving problems
LO2	Create tables and graphs to format, organize, and interpret data; summarize and present data
LO3	Calculate and analyze numerical descriptive measures for a given data set
LO4	Apply concepts of sample space and probability to solving problems
LO5	Calculate measures of central tendency and variation; use statistical software to analyze

UNIT

DETAILS

I	Data: quantitative and qualitative, attributes, variables, Scales of measurement: nominal, ordinal, interval and ratio, Measures of Central Value: Meaning, Need for measuring central value. Characteristics of an ideal measure of central value. Types of averages - mean, median, mode, harmonic mean and geometric mean. Merits, Limitations and Suitability of averages.
II	Correlation Analysis: Meaning and significance. Correlation and Causation, Types of correlation, Methods of studying simple correlation - Scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient.
III	Regression Analysis: Meaning and significance, Regression vs. Correlation, Simple Regression model: Linear Regression, Conditions for simple linear regression
IV	Time Series : Analysis of Time Series, Methods of measuring trend and seasonal variations
V	Index Numbers: Consumers price index and cost of living indices

Course Outcomes

CO1	The learners will apprehend the basics of data science and data analysis like Averages and forecasting techniques.	PO1
CO2	The learners will comprehend the basics of data science and data analysis like Averages and forecasting techniques.	PO1,PO2
CO3	The learners will understand use of Time series and Index numbers in management decisions.	PO4,PO6
CO4	The learners will be able to understand the business implications and probabilities of every decision being made.	PO4,PO5, PO6
CO5	Gain entrance into careers as well as in graduate or professional school.	PO3,PO8

Text Books (Latest Editions)

1	P A Navanitham (2006): Business Mathematics and Statistics
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2	Gupta S.P. (2017) : Statistical Methods, Sultan Chand & Sons, 45h Revised Edition
	Levin, R. and Rubin, D. (2017). Statistics for Management. 8thed. New Delhi: Pearson
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Harald Cramér <i>Mathematical Methods of Statistics</i> , Princeton Mathematical Series, vol. 9. Princeton University Press, Princeton, N. J., 1946. xvi+575 pp
2	S.C.Gupta, Business Statistics
Web Resources	
	https://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/Business-Statistics-by-Gupta.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Marks		
							CIA	External	Total
23122SEC16L	PYTHON LAB	Core	0	0	3	3	25	75	100

Learning Objectives

LO1	Be able to design and program Python applications.
LO2	Be able to create loops and decision statements in Python.
LO3	Be able to work with functions and pass arguments in Python.
LO4	Be able to build and package Python modules for reusability.
LO5	Be able to read and write files in Python.

LAB EXERCISES

Required Hours

<ol style="list-style-type: none"> 1. Program using variables, constants, I/O statements in Python. 2. Program using Operators in Python. 3. Program using Conditional Statements. 4. Program using Loops. 5. Program using Jump Statements. 6. Program using Functions. 7. Program using Recursion. 8. Program using Arrays. 9. Program using Strings. 10. Program using Modules. 11. Program using Lists. 12. Program using Tuples. 13. Program using Dictionaries. 14. Program for File Handling. 	60
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Course Outcomes

On completion of this course, students will

CO1	Demonstrate the understanding of syntax and semantics of PYTHON language
CO2	Identify the problem and solve using PYTHON programming techniques.
CO3	Identify suitable programming constructs for problem solving.
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.
CO5	Develop a PYTHON program for a given problem and test for its correctness.

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	1	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	15	13	15	13	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Marks			
							CIA	External	Total	
23122SEC17	FUNDAMENTALS OF INFORMATION TECHNOLOGY	Skill enhancement course	2	2	0	2	25	75	100	
Learning Objectives										
LO1	Understand basic concepts and terminology of information technology.									
LO2	Have a basic understanding of personal computers and their operation									
LO3	Be able to identify data storage and its usage									
LO4	Get great knowledge of software and its functionalities									
LO5	Understand about operating system and their uses									
UNIT	Contents							No. of Hours		
I	Introduction to Computers –Generations of Computer–Data and Information – Components of Computer – Software – Hardware – Input Devices–Output Devices—Types of Operating System.							6		
II	MSWord: Introduction–Elements of Window–Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background)–Alignment–Bullets and Numbering- Header and footer–Watermark– inserting objects (images, other application document)–Table creation – Mail merge.							6		
III	MsExcel: Introduction–Inserting rows and columns–Sizing rows and columns–Implementing formulas–Generating series–Functions in excel–Creation of Chart–Inserting objects–Filter–Sorting–Inserting worksheet.							6		
IV	MS Power Point: Introduction–Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) –Slide show– Types of Views – Types of Animations–Inserting Objects–Implementing Multimedia (Video and Audio)–Templates (Built-in and User-Defined).							6		
V	Internet: Introduction to Internet and Intranet–Services of Internet–Domain Name – URL – Browser – Types of Browsers – Search Engine –E-Mail – Basic Components of E-Mail –.How to send group mail E-Commerce: Digital Signature– Digital Currency–Online shopping and Transaction.							6		
TOTAL HOURS								30		

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	PO1, PO2, PO3,PO4,PO5 ,PO6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1, PO2, PO3,PO4,PO5 ,PO6
CO3	Concept of storing data in computer using two headers namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1, PO2, PO3,PO4,PO5 ,PO6
CO4	Work with different software, Write program in the software and Applications of software.	PO1, PO2, PO3,PO4,PO5 ,PO6
CO5	Usage of Operating system in information technology which really acts as an interpreter between software and hardware.	PO1,PO2,PO3, PO4,PO5,PO6
Text books		
1	Anoop Mathew, S.Kavitha Murugesan(2009),—Fundamental of Information Technology, Majestic Books.	
2	Alexis Leon, Mathews Leon, Fundamental of Information Technology, 2ndEdition.	
3	S.KBansal, —Fundamental of Information Technology .	
Reference Books		

1.	Bhardwaj Sushil Puneet Kumar, —Fundamental of Information Technology
2.	GGWILKINSON,—Fundamentals of Information Technology , Wiley-Blackwell
3.	ARavichandran,—Fundamentals of Information Technology , Khanna Book Publishing
Web Resources	
1.	https://testbook.com/learn/computer-fundamentals
2.	https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html
3.	https://www.javatpoint.com/computer-fundamentals-tutorial
4.	https://www.tutorialspoint.com/computer_fundamentals/index.htm
5.	https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	1	1
CO2	3	2	3	2	3	3
CO3	3	2	2	2	2	3
CO4	2	3	3	3	3	1
CO5	3	3	3	3	3	2
Weightage of course Contributed to each PSO	13	13	13	12	12	10

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst.	Marks			
								CIA	External	Total	
23122SEC18	Structured Programming Language in C	FC	2	-	-	-	2	25	75	100	
Course Objective											
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Data types in C, Mathematical and logical operations.										
LO2	To understand the concept using if statements and loops										
LO3	This unit covers the concept of Arrays										
LO4	This unit covers the concept of Functions										
LO5	To understand the concept of implementing pointers.										
UNIT	Details	No. of Hours	Course Objectives								
I	Overview of C: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables--- Assignment statement, declaring a variable as constant, as Volatile. Operators and Expression.	6	CO1								
II	Decision Making and Branching: Decision making with If, simple IF, IF ELSE, nested IF ELSE, ELSE IF ladder, switch, GOTO statement. Decision Making and Looping: While, Do-While, For, Jumps in loops.	6	CO2								
III	Arrays: Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, Multi-dimensional arrays.	6	CO3								
IV	Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions	6	CO4								
V	Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and	6	CO5								

	Structures.		
	Total		30
Course Outcomes		Programme Outcomes	
CO	On completion of this course, students will		
1	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5	
2	Understand the programming principles in C(data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6,PO7	
3	Apply the programming principles learnt in real-time problems	PO3,PO4,PO7	
4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6	
5	Code, debug and test the programs with appropriate Test cases	PO7,PO8	
Text Book			
1	E.Balagurusamy, Programming in ANSI Fifth Edition, Tata McGraw-Hill, 2010.		
Reference Books			
1.	Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.		
2.	Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998		
3.	Yashavant Kanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021		
Web Resources			
1.	https://codeforwin.org/		
2.	https://www.geeksforgeeks.org/c-programming-language/		
3.	http://en.cppreference.com/w/c		
4.	http://learn-c.org/		
5.	https://www.cprogramming.com/		

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	2	2	-
CO2	2	2	2	2	-	2
CO3	3	2	2	1	1	-
CO4	3	2	2	1	-	1
CO5	1	2	2	2	2	3
Weightage of course contributed to each PSO	7	10	10	18	15	6

S-Strong-3 M-Medium-2L-Low-1

INDIAN CONSTITUTION

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
231AECCINC	AECC	2	-	-	2	2	25	75	100
Learning Objectives									
LO1	To make the students understand about the democratic rule and parliamentary administration								
LO2	To appreciate the salient features of the Indian constitution								
LO3	To know the fundamental rights and constitutional remedies								
LO4	To make familiar with powers and positions of the union executive, union parliament and the Supreme Court								
LO5	To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy								
UNIT	DETAILS								
I	The making of Indian constitution: The constitution assembly organization - character - work salient features of the constitution- written and detailed constitution - socialism -secularism-democracy and republic.								
II	Fundamental rights and fundamental duties of the citizens: Right of equality - right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies -fundamental duties.								
III	Directive principles of state policy: Socialistic principles - Gandhi an principles-liberal and general principles -differences between fundamental rights and directive principles								
IV	The union executive, union parliament and Supreme Court : Powers and positions of the president - qualification – method of election of president and vice president -prime minister - Rajya Sabah - Lok Sabah .the supreme court - High court -functions and position of supreme court and high court								
V	State council -election system and parliamentary democracy in India: State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.								

Course Outcomes		
CO1	Students can know about constitution our fundamental rights and duties	PO1
CO2	Students can get knowledge of the Indian administrative systems.	PO1,PO2
CO3	Students will be able to understand the Nature of Indian Politics	PO4,PO6
CO4	Students will be able to understand the Indian constitution and Fundamental rights and Duties.	PO4,PO5, PO6
CO5	Integrate knowledge of the diversity of cultures and peoples.	PO3,PO8

Text Books (Latest Editions)	
1	India's Constitution by M.V.Pylee., 16 th edt.,S.Chand& Company Ltd, Ram Nagar, New Delhi-110055.
2	Introduction to the Constitution of India by Durga Das Basu · 2015, LexisNexis publication, SBN:9789351434467, 935143446X.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Palekar.s.a. Indian constitution government and politics, ABD publications, India
2	Aiyer, alladikrishnaswami, Constitution and fundamental rights 1955.
3	Markandan. K.c.directive Principles in the Indian constitution 1966.
Web Resources	
	https://www.google.co.in/books/edition/India_s_Constitution_16th_Edition/yjJlDwAAQBAJ?hl=en&gbpv=1&dq=indian+constitution+pdf&printsec=frontcover

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

UNIVERSAL HUMAN VALUES

Subject Code	Category	L	T	P	C		Inst. Hours	Marks		
								CIA	External	Total
231LSCUV	AC	-	-	-	1		-	25	75	100
Learning Objectives										
LO1	The present course deals with meaning, purpose, and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials									
UNIT	DETAILS									
I	<p>Introduction: What is love? Forms of love for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living</p> <p>Love and compassion and inter-relatedness</p> <p>Love, compassion, empathy, sympathy and non-violence</p> <p>Individuals who are remembered in history for practicing compassion and love.</p> <p>Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing love and compassion: What will learners learn gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?</p> <p>Sharing learner's individual and/or group experience(s)</p> <p>Simulated Situations</p> <p>Case studies</p>									
II	<p>Introduction: What is truth? Universal truth, truth as value, truth as fact(veracity, Sincerity, honesty among others)</p> <p>Individuals who are remembered in history for practicing this value</p> <p>Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?</p> <p>Learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Case studies</p>									
III	<p style="background-color: #00FFFF;">Introduction: What is nonviolence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non-violence</p> <p style="background-color: #00FFFF;">Ahimsa as non-violence and non-killing</p> <p style="background-color: #00FFFF;">Individuals and organizations that are known for their commitment to non-violence</p> <p style="background-color: #00FFFF;">Narratives and anecdotes about non-violence from history, and literature including</p>									

	<p>local folklore</p> <p>Practicing non-violence: What will learners learn/gain if they practice non-violence? What will learners lose if they don't practice it?</p> <p>Sharing learner's individual and/or group experience(s) about non-violence</p> <p>Simulated situations</p> <p>Case studies</p>
IV	<p>Introduction: What is righteousness?</p> <p>Righteousness and <i>dharma</i>, Righteousness and Propriety</p> <p>Individuals who are remembered in history for practicing righteousness</p> <p>Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?</p> <p>Sharing learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Case studies</p>
V	<p>Introduction: What is peace? Its need, relation with harmony and balance</p> <p>Individuals and organizations that are known for their commitment to peace</p> <p>Narratives and Anecdotes about peace from history, and literature including local folklore</p> <p>Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?</p> <p>Sharing learner's individual and/or group experience(s) about peace</p> <p>Simulated situations</p> <p>Case studies</p>
VI	<p>Introduction: What is service? Forms of service, for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.</p> <p>Individuals who are remembered in history for practicing this value.</p> <p>Narratives and anecdotes dealing with instances of service from history, literature including local folklore</p> <p>Practicing service: What will learners learn/gain if they practice service? What will</p>

	<p>Learners lose if they don't practice it?</p> <p>Sharing learners' individual and/or group experience(s) regarding service</p> <p>Simulated situations</p> <p>Case studies</p>
VII	<p>Introduction: What is renunciation? Renunciation and sacrifice. Self-restrain and Ways of overcoming greed. Renunciation with action as true renunciation</p> <p>Individuals who are remembered in history for practicing this value.</p> <p>Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.</p> <p>Practicing renunciation and sacrifice: What will learners learn/gain if they practice Renunciation and sacrifice? What will learners lose if they don't practice it?</p> <p>Sharing learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Case studies.</p>

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	2	2
CO2	3	3	3	2	3	3	3	2	3	2
CO3	2	3	3	3	2	3	3	2	2	2
CO4	3	3	3	3	3	3	3	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Course Code	Course Title	L	T	P	C
23110AEC21	Tamil-II	3	1	0	3

பக்தி இலக்கியம் - 23110AEC21

இரண்டாம்பருவம்

பாட நோக்கங்கள்

- காலந்தோறும் பக்தி இலக்கியம் வளர்ந்துள்ள தன்மையைக் கற்பித்தல்.
- நாயன்மார்கள், ஆழ்வார்களின் பக்திச்சிறப்பை அறிய செய்தல்.
- ஆழ்வார்களின் பக்தி உணர்வை ஊட்டுதல்
- பாடல்களில் இசை இன்பம், ஓசை நயம் ஆகியவற்றை உணரச்செய்தல்
- குழந்தைப் பருவத்தின் தன்மையை உணர்த்துதல்

பயன்கள்

- நாயன்மார்கள் பக்திச்சிறப்பை அறிதல்.
- ஆழ்வார்களின் பக்திநெறியை உணர்தல்.
- பக்தி இலக்கியம்காலம் தோறும் வளர்ந்ததை அறிதல்.
- பாடல்களில் இசை இன்பம், ஓசை நயம் அறிதல்.
- குழந்தைப் பருவத்தின் தன்மையை உணர்தல்.

அலகு- 1 பன்னிருதிருமுறைகள்

1. திருஞானசம்பந்தர்- திருத்தில்லைப்பதிகம்
2. திருநாவுக்கரசர் - திருநீற்றுப்பதிகம்
3. சுந்தரர் - திருவெண்ணைநல்லூர்
4. திருமூலர்- திருமந்திரம்(இளமைநிலையாமை)

அலகு- 2 பன்னிருஆழ்வார்கள்

1. ஆண்டாள் - திருப்பாவை
2. பெரியாழ்வார்- மூன்றாம்திருமுறை(பத்துபாடல்கள்)
3. மதுரகவியாழ்வார் - கண்ணின்னுண்சிறுதாம்பு

அலகு- 3சிறிலக்கியங்கள்

1. மீனாட்சியம்மைப்பிள்ளைத்தமிழ்- செங்கீரைபருவம், அம்புலிபருவம்
2. நந்திக்கலம்பகம்
3. குற்றாலகுறவஞ்சி- குறத்திநகர்வளம்கூறுதல்
4. காளமேகப் புலவர் பாடல்கள்

அலகு- 4 புதினம்

1. நா .பார்த்தசாரதியின்- குறிஞ்சிமலர்

அலகு-5 தமிழ் இலக்கிய வரலாறு

1. பக்திஇலக்கியங்கள்

2. சைவமும் தமிழும்
3. வைணவசமயம்போற்றிவளர்த்ததமிழ்
4. சிற்றிலக்கியங்கள்
5. நாவல்இலக்கியம்

பார்வைநூல்கள் :

1. தேவாரம் - மணிவாசகர்பதிப்பகம்சென்னை
 2. நாலாயிரதிவ்ய பிரபந்தம் - வர்த்தமான பதிப்பகம் சென்னை.
 3. தமிழ்இலக்கியவரலாறு - முனைவர்சசுபாஷ்சந்திரபோஸ், இயல்வெளியீடு ,தஞ்சாவூர்
 4. தமிழ் நாவல் இலக்கியம் -காலைலாசபதி- தமிழ் புத்தக,நிலையம், சென்னை
- இணையதளம் -www.tamilvu.org , www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

FIRST YEAR - SEMESTER II
PAPER II – GENERAL ENGLISH

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23111AEC22	Language	3	1	-	3	6	25	75	100
Learning Objectives									
LO1	To introduce learners to the essential skills of communication in English								
LO2	To enable them use these skills effectively in academic and non-academic contexts								
LO3	To help them identify and eliminate common mistakes in writing and speaking								
LO4	To enable them use various business communication strategies and to use advanced vocabulary								
LO5	To familiarize them in writing descriptive essays and respond to arguments orally and in writing								
Unit No.	Unit Title & Text						No. of Periods for the Unit		
I	Poetry 1.1 Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3 On Killing a Tree -Gieve Patel						20		
II	Prose 2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please –ShashiTharoor 2.3 The Spoon-fed Age- W.R.Inge						20		
III	Fiction Alchemist - Paulo Coelho						20		
IV	Language Competency 4.1 Homonyms, Homophones, Homographs Portmanteau words 4.2 Subject Verb Agreement						15		
V	English in the Workplace 5.1 Reading for General and Specific information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes						15		

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Learn to introduce themselves and talk about everyday activities confidently	PO1
CO2	Be able to write short paragraphs on people, places and events	PO1, PO2
CO3	Identify the purpose of using various tenses and effectively employ them in speaking and writing	PO4, PO6
CO4	Gain knowledge to write subjective and objective descriptions	PO4, PO5,PO6
CO5	Identify and use their skills effectively in formal contexts.	PO3,PO8

Text Books(Latest Editions)	
1	The Alchemist - Paulo Coelho Harper – 2005
Reference Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2	Descriptive English. <u>SP Bakshi, Richa Sharma</u> · 2019, Arihant Publications (India) Ltd.
3	The Reading Book: A Complete Guide to Teaching Reading. <u>Sheena Cameron, Louise Dempsey</u> , S & L. Publishing, 2019.
4	Skimming and Scanning Techniques, <u>Barbara Sherman</u> , Liberty University Press, 2014
5	Brilliant Speed Reading: Whatever you need to read, however ... <u>Phil Chambers</u> , Pearson, 2013.
6	The Archer, <u>Paulo Coelho</u> . Penguin Viking, 2020.
Web Resources	
1	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40_%202020103001102714.pdf
2	Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise
3	The Flower by Tennyson: https://www.poemhunter.com/poem/the-flower-2/
4	On Killing a tree by Gieve Patel: https://www.poemhunter.com/poem/on-killing-a-tree/
5	If you are wrong, admit it: https://www.tbr.fun/if-youre-wrong-admit-it/

6	Kindly Adjust please –ShashiTharoor https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3IhtdXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKgiNKKwdkeSg3qWp-U/
7	The Spoon Fed Age: https://www.nrkacademy.com/2016/04/spoon-feeding-by-wringe.html
8	The Alchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SEMESTER II

Title of the Course/Paper	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122AEC23	OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++	Core	4	1	0	3	5	25	75	100
Course Objective										
LO1	Describe the procedural and object oriented paradigm with concepts of streams, class, functions, data and objects									
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc									
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism									
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming									
LO5	Demonstrate the use of various OOPs concepts with the help of programs									
UNIT	Details								No.of Hours	
I	Introduction to C++ - key concepts of Object-Oriented Programming – Advantages–Object Oriented Languages–I/O in C++ - C++ Declarations. Control Structures:- Decision Making and Statements: If, else, jump, go to, break, continue, Switch case statements - Loops in C++ :for, while, do - functions in C++ - in line functions – Function Overloading.								15	
II	Classes and Objects: Declaring Objects – Defining Member Functions –Static Member variables and functions–array of objects– friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.								15	
III	Operator Overloading: Overloading unary, binary operators– Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance–Virtual base Classes–Abstract Classes.								15	
IV	Pointers–Declaration–Pointer to Class, Object–this pointer–Pointers								15	

	to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object –Binding, Polymorphism and Virtual Functions.	
V	Files –File stream classes –file modes–Sequential Read /Write operations– Binary and ASCII Files–Random Access Operation– Templates –Exception Handling- String –Declaring and Initializing string objects–String Attributes–Miscellaneous functions.	15
	Total	75
Course Outcomes		Programme Outcome
CO	Up on completion of the course the students would be Able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-Time problems	PO4,PO7
4	Analyze the various methods of solving a problem And choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
Text Book		
1	E.Balagurusamy,—Object-Oriented Programming with C++ , TMH2013, 7 th Edition.	
Reference Books		
1.	Ashok N Kamthane,—Object-Oriented Programming with ANSI and Turbo C++ , Pearson Education 2003.	
2.	Maria Litvin& Gray Litvin, — C++ for you ,Vikas publication 2002.	
Web Resources		
1.	https://alison.com/course/introduction-to-c-plus-plus-programming	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	-	-	1
CO2	2	2	2	1	-	-
CO3	3	1	1	-	1	-
CO4	1	2	1	2	2	1
CO5	3	2	1	2	3	2
Weightage of course contributed to each PSO	12	9	6	5	6	4

S-Strong-3 M-Medium-2L-Low

SEMESTER II
ALLIED MATHEMATICS
PAPER-III OPERATIONS RESEARCH

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23122GEC24	Allied	4	1	0	3		25	75	100

Learning Objectives

LO1	To understand the methodology of OR problem solving and formulate linear Programming problem.
LO2	To develop formulation skills in transportation models and finding solutions
LO3	To understand the basics in the field of game theory and assignment problems
LO4	To know how project management techniques help in planning and scheduling a project
LO5	To know the basics of dynamic programming and simulation

UNIT

DETAILS

I	Definition of operations research, models of operations research, scientific methodology of operations research, scope of operations research, importance of operations research in decision making, role of operations management, limitations of OR
II	Linear Programming: Introduction – Mathematical formulation of a problem – Graphical solutions, standard forms the simplex method for maximization and minimization problems. Method application to management decisions.
III	Transportation problem – Introduction – Initial basic feasible solution - NWC method – Least cost method – Vogel’s method – MODI – moving towards optimality – solution procedure without degeneracy
IV	Assignment problem – Algorithm – Hungarian method – simple problems.
V	Network models and simulation. Network models for project analysis CPM; Network construction and time analysis; cost time trade off, PERT – problems

Course Outcomes

CO1	To recognize the importance and value of Operations Research and linear programming in solving practical problems in industry	PO1
CO2	Interpret the transportation models' solutions and infer solutions to the real-world problems.	PO1,PO2
CO3	To know, how to transport a thing in minimum cost.	PO4,PO6
CO4	Gain knowledge about the assigning process	PO4,PO5, PO6

CO5	Gain knowledge of drawing project networks for quantitative analysis of projects	PO3,PO8
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Text Books (Latest Editions)	
1	Kalavathy, Operations Research
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	KantiSwarup, Gupta.P.K. & Man Mohan, operations Research, S.Chand& Sons
2	Taha.H.A, operation Research: An Introduction, McMilan publishing Co., 1982. 7 th ed.
Web Resources	
	https://rccmindore.com/wp-content/uploads/2015/06/Operations-Research.pdf

Mapping with Programme

Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

ALLIED MATHEMATICS
PAPRER-IV DISCRETE MATHEMATICS

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23122GEC25	Allied	2	1	0	3		25	75	100
Learning Objectives									
LO1	Use mathematically correct terminology and notation.								
LO2	Apply logical reasoning to solve a variety of problems.								
LO3	Construct correct direct and indirect proofs								
LO4	Use division into cases in a proof.								
LO5	Use counterexamples.								
UNIT	DETAILS								
I	SET THEORY: Introduction- set and Its Element – Set Description (Roster, Set Builder and cardinal number method) Types of Sets- Set Operations and Laws of set Theory. Partition of sets. Countable and uncountable set. Algebra of sets and Duality								
II	MATHEMATICAL LOGIC: Basic Logic and Proof, logical operations – Logic Propositional equivalence, Predicates and Quantities, Tautology-Contradiction- Methods of proofs (Direct and Indirect) - Function- Definition-Notation- Types of Function- Composition of Functions								
III	NUMBER THEORY: The Integers and Division, Integers and Algorithms, (Multiplication, Addition and Division -Sequences and Summations, Recursive algorithms, Program correctness								
IV	RELATIONS: Relations – Relations and their properties, Representing Relations, Closures of relations, Equivalence relations, Partial orderings-Recurrence Relations Binary Relations								
V	MATRIX, DETERMINANT OF MATRIX AND ITS APPLICATION: Introduction, definitions, Types of Matrix, Properties of matrix, operations on matrix, Inverse of matrix, Cayley Hamilton of matrix-applications								
Course Outcomes									
CO1	To gain knowledge on set theory							PO1	
CO2	Able to understand different mathematical logics and functions							PO1,PO2	
CO3	To get an idea on Permutations and Combinations							PO4,PO6	

CO4	Understanding the different form of number theory	PO4,PO5, PO6
CO5	Able to understand Relations and its applications	PO3,PO8

Text Books (Latest Editions)	
1	Rosen K.H. Discrete Mathematics and its Applications, 5th edition, Tata McGraw – Hills,2003
2	J.K Sharma “DISCRETE MATHEMATICS” 3 rd Edition Macmillan Reprint2011
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Johnson Baugh R, and Carman R, Discrete mathematics, 5th edition, Person Education, 2003.
2	Kolman B, Busoy R.C, and Ross S.C, Discrete Mathematical Structures, 5th edition, Pretitice – Hall, 2004.
Web Resources	
	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Title of the Course/Paper	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122SEC26L	C++ PROGRAMMING LAB	Core	0	0	3	3	4	25	75	100
Course Objective										
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects									
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors ,etc									
LO3	Describe the concept to function overloading, operator overloading, virtual functions and polymorphism									
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming									
LO5	Demonstrate the use of various OOPs concepts with the help of programs									
S. No	Details									No. of Hours
1	Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.									
2	Write a C++ program to demonstrate Class and Objects									
3	Write a C++ program to demonstrate the concept of Passing Objects to Functions									
4	Write a C++ program to demonstrate the Friend Functions.									
5	Write a C++ program to demonstrate the concept of Passing Objects to Functions									
6	Write a C++ program to demonstrate Constructor and Destructor									
7	Write a C++ program to demonstrate Unary Operator Overloading									
8	Write a C++ program to demonstrate Binary Operator Overloading									

9	Write a C++ program to demonstrate <ul style="list-style-type: none"> • Single Inheritance • Multilevel Inheritance • Multiple Inheritance • Hierarchical Inheritance • Hybrid Inheritance 	
10	Write a C++ program to demonstrate Virtual Functions.	
11	Write a C++ program to manipulate a Text File.	
12	Write a C++ program to perform Sequential I/O Operations on a file.	
13	Write a C++ program to find the Biggest Number using Command Line Arguments	
14	Write a C++ program to demonstrate Class Template	
15	Write a C++ program to demonstrate Function Template.	
16	Write a C++ program to demonstrate Exception Handling.	
Course Outcomes		Programme Outcomes
CO	Up on completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
Text Book		
1	E.Balagurusamy,—Object-Oriented Programming with C++ , TMH2013, 7 th Edition.	
Reference Books		

1.	Ashok N Kamthane,—Object-Oriented Programming with ANSI and Turbo C++ , PearsonEducation2003.
2.	Maria Litvin & Gray Litvin,—C++ for you ,Vikas publication 2002.
Web Resources	
1.	https://alison.com/course/introduction-to-c-plus-plus-programming

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	1	2
CO2	2	3	3	3	1	2
CO3	2	3	3	3	1	2
CO4	2	3	3	3	1	2
CO5	2	3	3	3	1	2
Weightage of course contributed to each PSO	11	15	15	15	5	10

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122SEC27	QUANTITATIVE APTITUDE	Skill Enhancement Course	2	0	0	2	2	25	75	100
Course Objective										
LO1	To understand the basic concepts of numbers									
LO2	Understand and apply the concept of percentage, profit & loss									
LO3	To study the basic concepts of time and work, interests									
LO4	To learn the concepts of permutation, probability, discounts									
LO5	To study about the concepts of data representation, graphs									
UNIT	Details						No. of Hours			
I	Numbers-HCF and LCM of numbers-Decimal fractions-Simplification-Square root and cube roots-Average-problems on Numbers.						6			
II	Problems on Ages-Surds and Indices- percentage -profits and loss - ratio and proportion-partnership-Chain-rule.						6			
III	Time and work-pipes and cisterns-Time and Distance -problems on trains-Boats and streams-simple interest -compound interest-Logarithms-Area-Volume and surface area-races and Games of skill.						6			
IV	Permutation and combination-probability-True Discount-Bankers Discount- Height and Distances-Odd man out & Series.						6			
V	Calendar-Clocks-stocks and shares- Data representation-Tabulation – Bar Graphs-Pie charts-Line graphs.						6			
	Total						30			

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Understand the concepts, application and the problems of numbers	PO1
2	To have basic knowledge and understanding about percentage, profit & loss related processing's	PO2,PO3
3	To understand the concepts of time and work	PO4,PO6
4	Speaks about the concepts of probability, discount	PO4,PO5,PO6
5	Understanding the concept of problem solving involved in stocks & shares, graphs	PO3,PO8

Text Book	
1	—Quantitative Aptitude, R.S.AGARWAL., S.Chand & Company Ltd.,
Reference Books	
1.	
Web Resources	
1.	https://www.javatpoint.com/aptitude/quantitative
2.	https://www.toppr.com/guides/quantitative-aptitude/

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	-	2
CO2	2	2	2	3	3	1
CO3	3	2	2	2	3	3
CO4	3	2	3	2	3	3
CO5	2	3	1	2	3	3
Weightage of course Contributed to each PSO	12	12	9	11	12	12

S-Strong-3 M-Medium-2L-Low-1

Subject Code	SUBJECT NAME	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122SEC28	ADVANCED EXCEL	Skill Enhancement Course	2	0	0	2	2	25	75	100
Course Objective										
LO1	Handle large amounts of data									
LO2	Aggregate numeric data and summarize in to categories and sub-categories									
LO3	Filtering, sorting, and grouping data or subsets of data									
LO4	Create pivot tables to consolidate data from multiple files									
LO5	Presenting data in the form of charts and graphs									
UNIT	Details						No. of Hours			
I	Basics of Excel-Customizing common options-Absolute and relative cells-Protecting and un-protecting worksheets and cells-Working with Functions-Writing conditional expressions- logical functions-lookup and reference functions-VlookUP with Exact Match, Approximate Match-Nested VlookUP with Exact Match-VlookUP with Tables, Dynamic Ranges-Nested VlookUP with Exact Match- Using VLookUP to consolidate Data from Multiple Sheets						6			
II	Data Validations-Specifying a valid range of values-Specifying a list of valid values-Specifying custom validations based on formula-Working with Templates Designing the structure of a template-templates for standardization of worksheets - Sorting and Filtering Data –Sorting tables –multiple –level sorting-custom sorting-Filtering data for selected view -advanced filter options-Working with Reports Creating sub totals-Multiple-level sub-total.						6			
III	Creating Pivot tables Formatting and customizing Pivot tables-advanced options of Pivot tables-Pivot charts-						6			

	Consolidating data from multiple sheets and files using Pivot tables- external data sources-data consolidation feature to consolidate data-Show Value As % of Row,% of Column, Running Total, Compare with Specific Field-Viewing Sub-total under Pivot-Creating Slicers.	
IV	More Functions Date and time functions-Text functions-Database functions-Power Functions – Formatting Using auto formatting option for worksheets-Using conditional formatting option for rows, columns and cells-What If Analysis- Goal Seek-Data Tables-Scenario Manager.	6
V	Charts -Formatting Charts-3D Graphs-Bar and Line Chart together-Secondary Axis in Graphs-Sharing Charts with PowerPoint/ MS Word, Dynamically- New Features Of Excel Spark lines ,Inline Charts, data Charts-Overview of all the new features.	6
Total		30
Course Outcomes		Programme Outcomes
CO	On completion of this course, student will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1,PO2
3	Learn and apply different mining algorithm and recommendation systems for large volumes of data.	PO4,PO6
4	Perform analytics on data streams.	PO4,PO5,PO6
5	Learn No –SQL databases and management.	PO3,PO8
Text Book		
1	Excel2019All	
2	MicrosoftExcel2019PivotTable Data Crunching	
Reference Books		
Web Resources		

1.	https://www.simplilearn.com
2	https://www.javatpoint.com
3	https://www.w3schools.com

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	1	3	-
CO2	3	2	2	1	1	3
CO3	3	2	1	2	1	3
CO4	3	3	2	2	2	1
CO5	3	2	1	3	1	3
Weightage of course Contributed to each PSO	14	11	8	9	8	10

S-Strong-3 M-Medium-2L-Low-1

SOFT SKILL -2- COMMUNICATION SKILL

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
231AECCCMS	AECC	2	0	0	2	2	25	75	100
Learning Objectives									
LO1	Identify common communication problems that may be holding learners back								
LO2	Identify what their non-verbal messages are communicating to others								
LO3	Understand role of communication in teaching-learning process								
LO4	Learning to communicate through the digital media								
LO5	Understand the importance of empathetic listening								
LO6	Explore communication beyond language.								
UNIT	DETAILS								
I	Listening <ul style="list-style-type: none"> • Techniques of effective listening • Listening and comprehension • Probing questions • Barriers to listening 								
II	Speaking <ul style="list-style-type: none"> • Pronunciation • Enunciation • Vocabulary • Fluency • Common Errors 								
III	Reading <ul style="list-style-type: none"> • Techniques of effective reading • Gathering ideas and information from a given text <ul style="list-style-type: none"> i. Identify the main claim of the text ii. Identify the purpose of the text iii. Identify the context of the text iv. Identify the concepts mentioned • Evaluating these ideas and information <ul style="list-style-type: none"> i. Identify the arguments employed in the text ii. Identify the theories employed or assumed in the 								

	<p style="text-align: center;">text</p> <ul style="list-style-type: none"> • Interpret the text <ul style="list-style-type: none"> i. To understand what a text says ii. To understand what a text does iii. To understand what a text means
IV	<p>Writing and different modes of writing</p> <ul style="list-style-type: none"> • Clearly state the claims • Avoid ambiguity, vagueness, unwanted generalizations and oversimplification of issues • Provide background information • Effectively argue the claim • Provide evidence for the claims • Use examples to explain concepts • Follow convention • Be properly sequenced • Use proper signposting techniques • Be well structured <ul style="list-style-type: none"> i. Well-knit logical sequence ii. Narrative sequence iii. Category groupings • Different modes of Writing - <ul style="list-style-type: none"> i. E-mails ii. Proposal writing for Higher Studies iii. Recording the proceedings of meetings iv. Any other mode of writing relevant for learners
V	<p>Digital Literacy</p> <ul style="list-style-type: none"> • Role of Digital literacy in professional life • Trends and opportunities in using digital technology in workplace • Internet Basics • Introduction to MS Office tools <ul style="list-style-type: none"> i. Paint ii. Office iii. Excel iv. PowerPoint
VI	<p>Effective use of Social Media</p> <ul style="list-style-type: none"> • Introduction to social media websites • Advantages of social media • Ethics and etiquettes of social media • How to use Google search better

	<ul style="list-style-type: none"> • Effective ways of using Social Media • Introduction to Digital Marketing
VII	<p>Non-verbal communication</p> <ul style="list-style-type: none"> • Meaning of non-verbal communication • Introduction to modes of non-verbal communication • Breaking the misbelieves • Open and Closed Body language • Eye Contact and Facial Expression • Hand Gestures • Do's and Don'ts • Learning from experts • Activities-Based Learning

Course Outcomes		
CO1	By the end of this program participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.	PO1

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	S. Madhu c chanda (2010), <i>An Introduction to Critical Thinking</i> , Pearson, Delhi
2	Silvia P. J. (2007), <i>How to Read a Lot</i> , American Psychological Association, Washington DC

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	2	2	2
CO3	2	3	3	3	2	3	3	2	2	2
CO4	3	3	3	2	3	3	3	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Course Code	Course Title - BCA	L	T	P	C
THEORY					
23110AEC31/	Tamil – III	3	1	0	3

காப்பிய இலக்கியம் - 23110AEC31
மூன்றாம் பருவம்

பாடந்

ாக்கங்கள்

- ◆ தமிழ்க்காப்பியங்களை அறிமுகப்படுத்தல்.▪
- ◆ காப்பியங்கள் கூறும் வாழ்வியல் அறங்களை உணர்த்தல்.▪
- ◆ காப்பிய இலக்கியங்களில் இலக்கியச் சுவகய பயிற்றுவித்தல்.▪
- ◆ நாடக இலக்கியத்தின் தனித்வத்தக்கற்பித்தல்.▪
- ◆ புராணச் சசய்திகளை மமம்படுத்திக்காள்ளச்சசய்தல்.▪

பயைகள்

- ◆ இலக்கியங்களின் சிறப்புகளை அறிவர்.▪
- ◆ காப்பியக்கதைகள்வழிஅறச்சிந்தனைசபறுவர்.▪
- ◆ பல்மவறு காப்பியவடிவங்களை பற்றிய அறிவுசபறுவர்.▪
- ◆ நாடக பகடப்பாக்கத்திற்கான தூண்டுதலைப் சபறுவர்.▪
- ◆ புராணச் சசய்திகள் வழி தமிழ்கலாச்சாரத்தை அறிவர்.▪

அலகு-1 காப்பியங்கள்

1.சிலப்பதிகாரம் - ம஑கரகாண்டம் (வழக்குகரகாகத)]

2.மணிமககல - விழாவகறகாகத

3.சீவகசிந்தாமணி - குணமாகலயார்இலம்பகம்

அலகு-2 காவிங்கள்

- 1.கம்பராமாயணம்- மந்தகரகூழ்ச்சிபடலம்
- 2.மகாபாரதம் - ஆரண்யபருவம்

அலகு-3புராணங்கள்

1. சபரியபுராணம்- இகலயான்குடிமாறநாயனார்புராணம்.
2. சீறாப்புராணம் – ஈத்தங்குகழவரவகழத்தப்படலம்.
- 3.மதம்பாவணி- பிரிந்தமககனகாண்படலம்.

அலகு-4 ாடகம் - சாபம்? விமமாசனம்

அலகு-5 இலக்கியவரலாறு

1. காப்பியங்கள்
2. இரட்கடக்காப்பியங்கள்

3. நாடகஇலக்கியம்

பார்டவ நூல்கள் :

1. காப்பியத்திறன்- மணிவாசகர்நூலகம், சிதம்பரம்.
2. தமிழ்காப்பியங்கள் - கி. வா .செகன்செகநாதன் , அமுதநிகலயம், சசன்கன.
- 3 .நவீனநாடகஉருவாக்கம் - மகாபழனி , தமிழ்பல்கலக்கழகம், தஞ்சாவூர்.
- 4.இகணயதளம் -www.tamilvu.org, www.noolulagam.com
5. சாபம்? விமமாசனம்

மு.இராமசுவாமி,

சசண்பகம்இராமசுவாமி,

பாகவபதிப்பகம்,ொனிொன்சாகல,சசன்கன – 14

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

SECOND YEAR - SEMESTER III

Part-II

Language

ENGLISH - III

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23111AEC32	LANGUAGE	3	1	0	3	4	25	75	100
Learning Objectives									
LO1	To enhance the level of literary and aesthetic experience of students and to help them respond creatively.								
LO2	To sensitize them to the major issues in the society and the world.								
LO3	To provide them with an ability to build and enrich their communication skills								
LO4	To equip them to utilize the digital knowledge resources effectively for their chosen fields of study								
LO5	To help them think and write imaginatively and critically.								
UNIT	DETAILS								
I	Poetry: 1.1 The Voice of the Mountains -Mamang Dai 1.2 A Song of Hope –Oodgeroo Noonuccal 1.3 In an Artist’s Studio - Christina Rossetti								
II	Scenes From Shakespeare: 2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene								
III	Speeches of Famous personalities 3.1 Yes, We Can-Barack Obama 3.2 You’ve Got to Find What You Love-Steve Jobs								
IV	Language Competency 4.1 Writing letters and emails. 4.2 Writing and messaging in social media platforms. [blogs, twitter, instagram, face book]. 4.3 Learning netiquette, email etiquette.								
V	English for Workplace 5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used 5.4 Conducting and participating in a meeting								

Course Outcomes		
CO1	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	PO1
CO2	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society	PO1,PO2
CO3	Produce grammatically and idiomatically correct language.	PO4,PO6
CO4	Gain knowledge in writing techniques to meet academic and professional needs.	PO4,PO5, PO6
CO5	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	PO3,PO 8

Text Books (Latest Editions)	
1	Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011)
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	The Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
2	Famous Speeches by Mahatma Gandhi, Create space Independent Publishing Platform, 2016
3	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish , Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
4	Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse , Michigan Teacher Training, 2016.
5	Role Play-Theory and Practice. Kryisia M Yardley-Matwiejczuk , SAGE publications ltd, 1997
Web Resources	
1	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3	In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4	Sita by Toru Dutt: https://www.poetrynook.com/poem/s%E2%94%9C%C2%ABta
5	Tryst with Destiny: https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html#:~:text=Jawaharlal%20Nehru%2C%20delivering%20his%20Tryst%20with%20Destiny%20speech.&text=%22Long%20years%20ago%20we%20made,awake%20to%20life%20and%20freedom.

6	Yes, We Can: https://www.englishspeecheschannel.com/english-speeches/barack-obama-speech/
7	You've got to find what you love: https://www.businessbusinessbusiness.com.au/steve-jobs-youve-got-to-find-what-you-love/#:~:text=Steve%20Jobs%2C%20in%20his%20commencement,emphasizes%20on%20believing%20in%20oneself.

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	1 5	1 5	15	1 5	1 5
Weighted percentage of Course Contribution to POs	3. 0	3 .0	3.0	3 .0	3. 0

Semester III

Title of the Course /Paper	Subject Name	Category	L	T	P	C		Inst. Hours	M a r k s		
									CIA	External	Total
23122AEC33	DATA STRUCTURES AND ALGORITHMS	Core	5	1	0	4		5	25	75	100
Course Objective											
LO1	To understand the concepts of ADTs										
LO2	To learn linear data structures-lists, stacks, queues										
LO3	To learn Tree structures and application of trees										
LO4	To learn graph structures and application of graphs										
LO5	To understand various sorting and searching										
UNIT	Details										No. of Hours
I	Abstract Data Types (ADTs)- List ADT-array-based implementation-linked list implementation singly linked lists-circular linked lists-doubly-linked lists-applications of lists-Polynomial Manipulation-All operations-Insertion-Deletion-Merge-Traversal										15
II	Stack ADT-Operations-Applications-Evaluating arithmetic expressions – Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue-Priority Queue-deQueue applications of queues.										15
III	Tree ADT-tree traversals-Binary Tree ADT-expression trees-applications of trees-binary search tree ADT- Threaded Binary Trees-AVL Trees-B-Tree- B+ Tree –Heap-Applications of heap.										15
IV	Definition-Representation of Graph-Types of graph-Breadth first traversal – Depth first traversal-Topological sort- Bi-connectivity – Cut vertex-Euler circuits- Applications of graphs.										15
V	Searching- Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort-Shell sort-Radix sort- Hashing-Hash functions- Separate chaining-Open Addressing-Rehashing Extendible Hashing										15
Total										75	

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO6
2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO2
3	Describe the hash function and concepts of collision and It's are solution methods	PO2,PO4
4	Solve problem involving graphs, trees and heaps	PO6,PO8
5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO7
Text Book		
1	1.MarkAllenWeiss,—DataStructuresandAlgorithmAnalysisinC++,Pearson Education2014, 4 th Edition.	
2	Reema Thareja,—Data Structures Using C++, Oxford Universities Press2014,2nd Edition	
Reference Books		
1.	Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein,— Introduction to Algorithms II, McGraw Hill 2009, 3rd Edition.	
2.	Aho,HopcroftandUllman,—Data Structures and Algorithms II,Pearson Education 2003	
Web Resources		
1.	NPTEL & MOOC course titled Data Structures	
2.	https://nptel.ac.in/courses/106106127/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	-	1	-
CO2	1	2	1	-	-	-
CO3	3	1	2	1	-	-
CO4	2	2	1	-	-	1
CO5	3	1	1	-	-	-
Weightage of course Contributed to each PSO	12	9	8	1	1	1

S-Strong-3 M-Medium-2L-Low-1

Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122DSC34A	Grid Computing	Elective	5	1	-	3	4	25	75	100
Course Objective										
LO1	To learn the basic construction and application of Grid computing.									
LO2	To learn grid computing organization and their Role.									
LO3	To learn Grid Computing Anatomy.									
LO4	To learn Grid Computing road map.									
LO5	To learn various type of Grid Architecture.									
UNIT	Details									No.of Hours
I	Introduction: Early Grid Activity, Current Grid Activity, Overview of Grid Business areas, Grid Applications, Grid Infrastructures.									12
II	Grid Computing organization and their Roles: Organizations Developing Grid Standards, and Best Practice Guidelines, Global Grid Forum (GCF), #Organization Developing Grid Computing Toolkits and Framework#, Organization and building and using grid based solutions to solve computing, commercial organization building and Grid Based Solutions.									12
III	Grid Computing Anatomy: The Grid Problem, The conceptual of virtual organizations, # Grid Architecture # and relationship to other distributed technology.									12
IV	The Grid Computing Road Map: Autonomic computing, Business on demand and infrastructure virtualization, Service-Oriented Architecture and Grid, #Semantic Grids#.									12
V	Merging the Grid services Architecture with the Web Services Architecture: Service-Oriented Architecture, Web Service Architecture, #XML messages and Enveloping #, Service message d encryption Mechanisms, Relationship between Web Services and Grid Services, Web services Interoperability and the role of the WS-I organization.									12
Total									60	

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	To understand the basic elements and concepts of	PO1
	Grid computing.	
2	To understand the Grid computing toolkit sand Framework.	PO1,PO2
3	To understand the concepts of Anatomy of Grid Computing.	PO4,PO6
4	To understand the concept of service oriented Architecture.	PO4,PO5,PO6
5	To Gain knowledge on grid and web service Architecture.	PO3,PO8
Text Book		
1	Joshy Joseph and Craig Fellenstein, Grid computing, Pearson/IBMPress, PTR, 2004.	
Reference Books		
1.	1 .Ahmer Abbas and Graig computing, A Practical Guide to technology and applications, Charles River Media, 2003.	
Web Resources		
1.	https://en.wikipedia.org/wiki/Grid_computing	
2.	https://link.springer.com/chapter/10.1007/978-1-84882-409-6_4	
3.	https://www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	1	2
CO2	2	1	2	1	3	1
CO3	3	2	1	1	-	1
CO4	3	-	3	2	1	3
CO5	2	3	1	2	3	2
Weightage of course Contributed to each PSO	12	9	8	8	8	9

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23122DSC34B	Big Data Analytics	EC	4	-	-	-	3	4	25	75	100
Course Objective											
LO1	Understand the Big Data Platform and its Use cases, Map Reduce Jobs										
LO2	To identify and understand the basics of cluster and decision tree										
LO3	To study about the Association Rules, Recommendation System										
LO4	To learn about the concept of stream										
LO5	Understand the concepts of No SQL Databases										
UNIT	Details						No. of Hours				
I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value – Understanding Big Data Storage —A General Overview of High-Performance Architecture— HDFS—Map Reduce And YARN—Map Reduce Programming Model						12				
II	Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method—Determining the Number of Clusters—Diagnostics — Reasons to Choose and Cautions .- Classification: Decision Trees—Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms—Evaluating a Decision Tree—Decision Trees in R — Naïve Bayes — Bayes Theorem—Naïve Bayes Classifier.						12				
III	Advanced Analytical Theory and Methods: Association						12				

	Rules—Overview—Apriori Algorithm—Evaluation of Candidate Rules—Applications of Association Rules—Finding Association & finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.	
IV	Introduction to Streams Concepts—Stream Data Model and Architecture—Stream Computing, Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments—Counting on enessina Window—Decaying Window—Real-time Analytics Platform (RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics	12
V	No SQL Databases : Schema-less Models: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores — Tabular Stores — Object Data Stores—Graph Databases Hive—Shading—H base — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.	12
Total		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1,PO2

3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4,PO6
4	Perform analytics on data streams.	PO4,PO5,PO6
5	Learn No SQL databases and management.	PO3,PO8
Text Book		
1	Anand Rajaraman and Jeffrey David Ullman, —Mining of Massive Datasetsl, CambridgeUniversityPress, 2012.	
Reference Books		
1.	David Loshin,—Big Data Analytics: From Strategic Planning to Enterprise IntegrationwithTools, Techniques,NoSQL,andGraphl,MorganKaufmann/ElsevierPublishers,2013	
2.	EMC Education Services,—Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley publishers, 2015.	
Web Resources		
1.	https://www.simplilearn.com	
2.	https://www.sas.com/en_us/insights/analytics/big-data-analytics.html	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	3	2	2	3	1
CO2	3	2	3	2	3	3
CO3	1	3	2	2	2	1
CO4	3	3	3	1	3	3
CO5	3	2	3	3	3	3
Weightage of course contributed to each PSO	11	13	13	10	14	11

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	Externa I	Total
23122DSC34C	NATURAL LANGUAGE PROCESSING	Elect	4	-	-	-	3	25	75	100
Learning Objectives										
LO1	To understand approaches to syntax and semantics in NLP.									
LO2	To learn natural language processing and to learn how to apply basic algorithms in This field.									
LO3	To understand approaches to discourse, generation, dialogue and summarization with n NLP.									
LO4	To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics etc.									
LO5	To understand current methods for statistical approaches to machine translation.									
UNIT	Contents								No.of. Hours	
I	Introduction : Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics –Information theory – Collocations -N-gram Language Models – Estimating parameters and smoothing – Evaluating language models.								12	
II	Word level and Syntactic Analysis: Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction- Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency-Parsing-Probabilistic Parsing.								12	
III	Semantic analysis and Discourse Processing: Semantic Analysis: Meaning Representation-Lexical Semantics-Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution-Discourse Coherence and Structure.								12	
IV	Natural Language Generation: Architecture of NLGS systems- Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.								12	
V	Information retrieval and lexical resources: Information Retrieval:									

	Design features of Information Retrieval Systems-Classical, Non-classical, and Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net Stemmers- POS Tagger- Research Corpora SSAS.	12
TOTAL		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Describe the fundamental concepts and techniques of natural language processing.	PO1, PO2,PO3, PO4,PO5, PO6
CO2	Use NLP technologies to explore and gain abroad understanding of text data.	PO1, PO2,PO3, PO4,PO5, PO6
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions.	PO1, PO2,PO3, PO4,PO5, PO6
CO4	Analyze large volume text data generated from a range of real-world applications.	PO1, PO2,PO3, PO4,PO5, PO6
CO5	Determine the framework in which artificial intelligence and the Internet of things may function, including interactions with people, enterprise functions, and environments.	PO1, PO2,PO3, PO4,PO5, PO6
Text books		
1	DanielJurafsky, JamesH.Martin, —Speech & language processing I, Pearson publications.	
2	Allen, James. Natural language understanding. Pearson, 1995.	
Reference Books		
1.	PierreM.Nugues,—An Introduction to Language Processing with Perl and PrologI, Springer	
Web Resources		
1.	https://en.wikipedia.org/wiki/Natural_language_processing	
2.	https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	1
CO2	2	3	3	3	2	3
CO3	1	3	3	3	1	3
CO4	3	2	1	3	2	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	12	14	13	15	11	13

S-Strong-3 M-Medium-2L-Low-1

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	M a r k s		
									CIA	External	Total
23122SEC35L	DATA STRUCTURES AND ALGORITHMS LAB using C++	Core	0	0	3	3	4	4	25	75	100
Course Objective											
LO1	To understand the concepts of ADTs										
LO2	To learn linear data structures- lists, stacks, queues										
LO3	To learn Tree structures and application of trees										
LO4	To learn graph structures and application of graphs										
LO5	To understand various sorting and searching										
S.No	Details										No.of Hours
1.	Write a program to implement the List ADT using arrays and Linked lists.										
2.	Write a programs to implement the following using a singly linked list. <ul style="list-style-type: none"> • Stack ADT • Queue ADT 										
3.	Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).										
4.	Write a program to implement priority queue ADT.										
5.	Write a program to perform the following operations: <ul style="list-style-type: none"> • Insert an element in to a binary search tree. • Delete an element from a binary search tree. • Search for a key element in a binary search tree. 										
6.	Write a program to perform the following operations <ul style="list-style-type: none"> • Insertion in to an AVL-tree • Deletion from an AVL-tree 										

7.	Write a programs for the implementation of BFS and DFS for a given graph.	
8	Write a programs for implementing the following searching methods: <ul style="list-style-type: none"> Linear search Binary search. 	
9.	Write a programs for implementing the following sorting methods: <ul style="list-style-type: none"> Bubble sort Selection sort Insertion sort Radix sort. 	
Total		

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO4,PO5
2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO1,PO4,PO8
3	Describe the hash function and concepts of collision and Its resolution methods	PO1,PO3,PO6
4	Solve problem involving graphs ,trees and heaps	PO3,PO4
5	Apply Algorithm for solving problems like sorting, searching, insertion a deletion of data	PO1,PO5,PO6

Text Book	
1	Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education 2014, 4th Edition.
2	ReemaThareja,—DataStructuresUsingCl,OxfordUniversitiesPress2014,2nd Edition

Reference Books	
1	ThomasH.Cormen,ChalesE.Leiserson,RonaldL.Rivest,CliffordStein,—Introduction to Algorithms,McGrawHill2009,3rdEdition
2.	Aho, Hopcroft and Ullman,—Data Structures and Algorithms, Pearson Education2003

Web Resources	
1.	NPTEL & MOOC courses titled Data Structures
2.	https://nptel.ac.in/courses/106106127/

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	1	-
CO2	1	2	1	-	-	2
CO3	3	1	2	1	-	-
CO4	2	2	1	2	3	1
CO5	3	2	1	-	-	-
Weightage of course contributed to each PSO	12	10	8	5	4	4

S-Strong-3 M-Medium-2L-Low-1

Subject-Code	Subject Name	Category	L	T	P	S	Credits	Marks			
								C	T	Total	
23122SEC36	INTRODUCTION TO HTML	Specific Elective	3	0	0	2	2	25	75	100	
Learning Objectives											
LO1	Insert a graphic with in a web page.										
LO2	Create a link with in a web page.										
LO3	Create a table with in a web page.										
LO4	Insert heading levels within a web page.										
LO5	Insert ordered and unordered lists with in a webpage. Create a webpage.										
UNIT	Contents								No. Of. Hours		
I	Introduction: Web Basics: What are Internet– Web browsers–What is Webpage–HTML Basics: Understanding tags?								6		
II	Tags for Document structure(HTML, Head ,Body Tag).Block level text elements: Headings paragraph(<p>tag)–Font style elements:(bold, italic, font, small, strong, strike, big tags)								6		
III	Lists: Types of lists: Ordered, Unordered– Nesting Lists –Other tags: Marquee, HR, BR-Using Images–Creating Hyperlinks.								6		
IV	Tables: Creating basic Table, Table elements, Caption–Table and cell alignment–Rowspan, Colspan –Cell padding.								6		
V	Frames: Frameset– Targeted Links– No frame–Forms: Input, Text area, Select, Option.								6		
TOTALHOURS									30		
Course Outcomes								Programme Outcomes			
CO	On completion of this course, students will										
CO1	Knows the basic concept in HTML Concept of resources in HTML								PO1, PO2, PO3,PO4,PO5, PO6		
CO2	Knows Design concept .Concept of Meta Data Understand the concept of save the files.								PO1, PO2, PO3,PO4,PO5, PO6		
CO3	Understand the page formatting. Concept to list.								PO1, PO2, PO3,PO4,PO5, PO6		
CO4	Creating Links. Know the concept of creating link to email address								PO1, PO2,PO3, PO4,PO5,PO6		
CO5	Concept of adding images Understand the table creation.								PO1, PO2,PO3, PO4,PO5,PO6		
Text books											
1	—Mastering HTML5 and CSS3 Made Easy!, Teach U CompInc., 2014.										
2	Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”										
Web Resources											
1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf										
2.	https://www.w3schools.com/html/default.asp										

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	3	3
CO3	2	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	2	3	3
Weightage of course Contributed to each PSO	14	15	14	14	15	15

S-Strong-3 M-Medium-2 L-Low-1

COURSECODE	COURSE TITLE	L	T	P	C
23122SEC37	FINANCIAL ACCOUNTING I	2	0	0	2

OBJECTIVES

- To understand the basic accounting concepts and standards.
- To know the basis for calculating business profits.
- To familiarize with the accounting treatment of depreciation.
- To learn the methods of calculating profit for single entry system.
- To gain knowledge on the accounting treatment of insurance claims.

UNIT-I

Fundamentals of Financial Accounting

Financial Accounting – Meaning, Definition, Objectives, Basic Accounting Concepts and Conventions -Journal, Ledger Accounts– Subsidiary Books — Trial Balance - Classification of Errors – Rectification of Errors– Preparation of Suspense Account– Need and Preparation-Bank Reconciliation Statement

UNIT-II

Final Accounts

Final Accounts of Sole Trading Concern- Capital and Revenue Expenditure and Receipts–Preparation of Trading, Profit and Loss Account and Balance Sheet with Adjustments.

UNIT- III

Depreciation and Bills of Exchange

Depreciation-Meaning–Objectives–Accounting Treatments-Types-Straight Line Method Diminishing Balance method–Conversion method. Annuity Method–Depreciation Fund Method–Insurance Policy Method– Revaluation Method–Depletion Method – Sum of Digits Method – Machine Hour Rate Method .**Bills of Exchange** – Definition – Specimens – Discounting of Bills – Endorsement of Bill – Collection –Noting– Renewal–Retirement of Bill under rebate–Insolvency of Acceptor–Accommodation.

UNIT-IV

Accounting from Incomplete Records

Incomplete Records -Meaning and Features -Limitations -Difference between Incomplete Records and Double Entry System - Methods of Calculation of Profit - Statement of Affairs Method – Preparation of final statements by Conversion method. Average Due Date and Account Current

UNIT-V

Royalty and Insurance of Claims

Meaning–Minimum Rent–Short Working–Recoupment of Short Working–Lessor and Lessee–Sub lease-Accounting Treatment.

Course Outcomes

- CO1 Remember the concept of rectification of errors and Bank reconciliation statements
- CO2 Apply the knowledge in preparing detailed accounts of sole trading concerns
- CO3 Analyze the various methods of providing depreciation
- CO4 Evaluate the methods of calculation of profit
- CO5 Determine the royalty accounting treatment and claims from insurance companies in case of loss of stock.

Text books	
1.	S.P. Jain and K. L. Narang Financial Accounting- I, Kalyani Publishers, New Delhi.
2.	S.N. Maheshwari, Financial Accounting, Vikas Publications, Noida.
3.	Shukla Grewal and Gupta, "Advanced Accounts", volume 1, S. Chand and Sons, New Delhi.
4.	Radhaswamy and R.L. Gupta: Advanced Accounting, Sultan Chand, New Delhi.
5.	R.L. Gupta and V.K. Gupta, "Financial Accounting", Sultan Chand, New Delhi.
Reference Books	
1.	Dr. Arulanandan and Raman: Advanced Accountancy, Himalaya Publications, Mumbai.
2.	Tulsian, Advanced Accounting, Tata McGraw-Hill's, Noida.
3.	Charumathi and Vinayagam, Financial Accounting, S. Chand and Sons, New Delhi.
4.	Goyal and Tiwari, Financial Accounting, Taxmann Publications, New Delhi.
5.	Robert N. Anthony, David Hawkins, Kenneth A. Merchant, Accounting: Text and Cases. McGraw-Hill Education, Noida.
NOTE: Latest Edition of Textbooks May be Used.	
Web Resources	
1.	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2.	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3.	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

**MAPPING WITH PROGRAMME OUTCOMES A
ND PROGRAMME SPECIFIC OUTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	2	3	3	3	2	2	2	3	2	2
TOTAL	15	10	15	15	13	11	10	10	15	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	2	3	2	2

3– Strong,2-Medium,1-Low

COURSECODE	COURSETITLE	L	T	P	C
23122RMC38	Research Methodology	2	0	0	2

AIM:

To create a basic appreciation towards research process and awareness of various research publication.

OBJECTIVES:

- To understand the steps in research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-based
- To give exposure to MATLAB platform for effective computational and graphic works required for quality research

PREREQUISITIES:

Basic computer skill for working in window environment & conceptual knowledge on basic matrices.

UNIT-I Introduction to Research Methodology

Meaning of research – Objectives of research – Type of research – Significance of research – Research approaches.

UNIT-II Research Methods

Research methods versus Methodology – Research and scientific method – criteria of good research – Problems encountered by researchers in India.

UNIT-III Literature Survey

Articles – Thesis – Journals – Patents – Primary sources of journals and patents – Secondary sources – Listing of titles – Abstracts – Review – General treatises – Monographs.

UNIT-IV Database Survey

Database search – NIST –MSDS –PubMed – Scopus – Science citation index – Information about a specific search.

UNIT-V Introduction to MATLAB:

What is MATLAB? Matrix and its application in different areas: MATLAB approach to environmental modeling; Arithmetic Matrix – Operators; Arithmetic Array – Operators and its applications in MATLAB; Expressions, Opening M-Files; Structure of MATLAB Programming; Programming; Concatenation of strings; Vectorization ; Basic Graphics.

OUTCOME:

Ability to carry out independent literature survey corresponding to the specific publication type and assess basic computation frame works used in mathematical researches.

REFERENCES BOOK:

1. C.R. Kothari, Research Methodology, New Age International publishers. New Delhi, 2004.
2. R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 1999.
3. R. Gopalan, Thesis writing, Vijay Nicole Imprints Private Ltd., 2005.
4. A Guide to MATLAB: For Beginners and experienced Users by Brian R. Hunt (Editor), Ronald L. Lipsman, J. Rosenberg.
5. Introduction to MATLAB for Engineers by William J. Palm III.

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
231ACLSOAN	OFFICE AUTOMATION	AC	-	-	-	1	2	25	75	100
Learning Objectives										
LO1	Understand the basics of computer systems and its components.									
LO2	Understand and apply the basic concepts of a word processing package.									
LO3	Understand and apply the basic concepts of electronic spreadsheet software.									
LO4	Understand and apply the basic concepts of database management system.									
LO5	Understand and create a presentation using PowerPoint tool.									
UNIT	Contents								No. of Hours	
I	Introductory concepts: Memory unit– CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS–UNIX–Windows. Introduction to Programming Languages.								6	
II	Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing– Preview, options , merge.								6	
III	Spreadsheets : Excel–opening ,entering text and data, formatting, navigating; Formulas– entering, handling and copying; Charts–creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.								6	
IV	Database Concepts: The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language(MS–Access).								6	
V	Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition–Animation effects, audio inclusion, timers.								6	

	Total	30
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Possess the knowledge on the basics of computers and its components	PO1,PO2,PO3,PO6,PO8
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1,PO2,PO3,PO6
CO3	Learn the concepts of Database and implement the Query in Database.	PO3,PO5,PO7
CO4	Demonstrate the understanding of different automation tools.	PO3,PO4,PO5,PO7
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4,PO6,PO7,PO8
Text Book		
1	PeterNorton, "Introduction to Computers"–Tata McGraw-Hill.	
Reference Books		
1.	Jennifer Ackerman Kettle, Guy Hat-Davis, Curt Simmons, "Microsoft 2003", Tata McGraw Hill.	
Web Resources		
1.	https://www.udemy.com/course/office-automation-certificate-course/	
2.	https://www.javatpoint.com/automation-tools	

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	15	14	14	15	15	15

S-Strong-3 M-Medium-2 L-Low-1

சங்க இலக்கியம் - 23110AEC41
நான்காம் பருவம்

பாடநோக்கங்கள்

- ◆ இலக்கியங்கள் வாயிலாக சமுதாயக்கருத்தக்களை
- ◆ பழந்தமிழ்இலக்கியவளத்தைஉணர்த்துதல்.
- ◆ சங்கஅக. புறபாடல்மரபுகளைப்பயிற்றுவித்தல்
- ◆ வாழ்வியல்அறங்கள்மற்றும்வரலாற்றுச்செய்திகளை .பயிற்றுவித்தல்
- ◆ புறஇலக்கியங்கள்காட்டும்வாழ்வியல்அறங்களைஎடுத்துக்கூறுதல்

பயன்கள்

- ◆ பழந்தமிழ்இலக்கியமரபைஅறிவர்.
- ◆ சங்கஇலக்கியங்களில்உள்ளஅழகியல்கூறுகளைஉணர்வர்.
- ◆ வாழ்வியல்அறங்கள்மற்றும்வரலாற்றுச்செய்திகளைஅறிவர்.
- ◆ சங்கஅக, புறபாடல்மரபுகளைபுரிந்துக்கொள்வர்.
- ◆ புறஇலக்கியங்கள்காட்டும்வாழ்வியல்அறங்களைஉணர்வர்.

அலகு-1

1. குறுந்தொகை- பாடல்எண்: 28,38
2. நற்றிணை- பாடல்எண்: 1,27,28,167,168
- 3.ஐங்குறுநூறு- பாடல்எண்: இளவேனில்பத்து

அலகு-2

- 1.கலித்தொகை- பாடல்எண்: 3,7
- 2.அகநானூறு- பாடல்எண்:5,42,100
3. புறநானூறு- பாடல்எண்: 182,204,41,121

அலகு-3

- 1 சிறுபாணாற்றுப்படைமுழுவதும்

அலகு-4

1. திருக்குறள்- செய்நன்றிஅறிதல், கூடாநட்பு ,நலம்புனைந்துரைத்தல்.
2. நாலடியார் - பாடல்எண்: 1,172,215,253

அலகு-5

இலக்கியவரலாறு

- 1.சங்கஇலக்கியம்
- 2.எட்டுத்தொகை, பத்துப்பாட்டு
- 3.பதினெண் கீழ்க்கணக்குநூல்கள்

பார்வைநூல்கள்

- 1.குறுந்தொகை - கழகவெளியீடு,சென்னை.
- 2.நற்றிணை - கழகவெளியீடு,சென்னை.
- 3.ஐங்குறுநூறு - கழகவெளியீடு,சென்னை.
- 4.கலித்தொகை - கழகவெளியீடு,சென்னை.
- 5.அகநானூறு - கழகவெளியீடு,சென்னை.
- 6.புறநானூறு - கழகவெளியீடு,சென்னை.
- 7.திருக்குறள் -பரிமேலழகர்உரை ,கழகவெளியீடு,சென்னை

8.இணையதளம் -www.tamilvu.org , www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

SECOND YEAR - SEMESTER IV

PAPER II – GENERAL ENGLISH [23111AEC42]

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23111AEC42	Language	3	0	0	3	6	25	75	100

Learning Objectives

LO1	To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.
LO2	To enable them use receptive skills through reading and listening to acquire good exposure to language and literature.
LO3	To help them develop style in speech and writing and manipulate the tools of language for effective communication.
LO4	To provide exposure to plays, autobiographies and expose them to value based ideas.
LO5	To enhance their language skills especially in the areas of grammar and pronunciation.

Unit No.	Unit Title & Text	No. of Periods for the Unit
I	Life Writing 1.1 I am Malala-Malala Yousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2	20
II	One Act Plays 2.1 The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov	20
III	Interviews 3.1 Nelson Mandela’s Interview with Larry King. 3.2 Rakesh Sharma’s Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)	20
IV	Language Competency 4.1 Refuting, Arguing & Debating 4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help 4.3 Interviews (face to face, telephone and video conferencing)	15

V	English for Workplace	15
	5.1 Job Applications: Covering letters, CV and Resume	
	5.2 Creating a digital profile - LinkedIn	
	5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card	
	5.4 Body Language - Practical Skills for Interviews	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Learn to communicate effectively and appropriately in real life situation.	PO1
CO2	Use English effectively for study purpose across the curriculum	PO1,PO2
CO3	Develop interest in and appreciation of Literature	PO4,PO6
CO4	Develop and integrate the use of the four language skills	PO4,PO5,PO 6
CO5	Enhance their language skills especially in the areas of grammar and pronunciation.	PO3,PO8

Text Books (Latest Editions)	
1	I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by <u>Malala Yousafzai</u> , <u>Christina Lamb</u> , Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Autobiographies, Mary , Taylor & Francis, 2021

2	One-act Plays for Acting Students: An Anthology of Short <u>Norman A. Bert</u> · 1987 ·
3	<u>The One-Act Play Companion: A Guide to plays, playwrights ...</u> <u>Colin Dolley, Rex Walford</u> · 2015
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Role Play-Theory and Practice.Krysia M Yardley-Matwiejczuk, SAGE publications ltd, 1997

Web Resources

1	For Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s (the link to the performance; refer scripts by Aaron Sheperd)
2	http://BBC learn English.com
3	http://onestopenglish.com
4	http://hearn-english-today.com
5	http://talkenglish.com
6	TheZooStory: http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pdf
7	The Proposal: https://www.one-act-plays.com/comedies/proposal.html
8	Nelson Mandela with Larry King Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lk1.00.html
9	Rakesh Sharma with Indira Gandhi Interview : https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-told-indira-gandhi-about-india-from-space-2204839
10	Lionel Messi with Sid Lowe Interview: https://www.worldsoccer.com/world-soccer-latest/lionel-messi-interview-part-one-338553

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

S-Strong-3 M-Medium-2 L-Low-1

SEMESTER IV

Subject Code	Subject Name	Category	L	T	P	C	Inst.	Marks		
								CIA	Ext	Total
23122AEC43	PROGRAMMING IN JAVA	Core	5	1	0	3	5	25	75	100
Learning Objectives										
LO1	To provide fundamental knowledge of object-oriented programming									
LO2	To equip the student with programming knowledge in Core Java from the basics up.									
LO3	To enable the students to use AWT controls, Event Handling and Swing for GUI.									
LO4	To provide fundamental knowledge of object-oriented programming.									
LO5	To equip the student with programming knowledge in Core Java from the basics up.									
UNIT	Contents						No. of Hours			
I	<p>Introduction: Review of Object Oriented concepts – History of Java – Java buzz words – JVM architecture – Data types - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes.</p>						15			
II	<p>Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword.</p> <p>Packages: Definition- Access Protection –Importing Packages.</p> <p>Interfaces: Definition–Implementation–Extending Interfaces.</p> <p>Exception Handling: try – catch- throw - throws – finally – Built-in exceptions - Creating own Exception classes.</p>						15			

III	<p>Multithreaded Programming: Thread Class - Runnable interface –Synchronization–Using synchronized methods– Using synchronized statement- Inter thread Communication –Deadlock.</p> <p>I/O Streams: Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.</p>	15
IV	<p>AWT Controls: The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Colour - Fonts and layout managers.</p> <p>Event Handling: Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes</p>	15
V	<p>Swing: Introduction to Swing - Hierarchy of swing components. Containers - Top level containers – JFrame – JWindow – JDialog – JPanel – JButton – JToggleButton – JCheckBox – JRadioButton – JLabel, JtextField – JtextArea – JList – JComboBox – JScrollPane.</p>	15
	Total	75
Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1, PO2, PO6
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO2, PO3, PO8
CO3	Implement multi-threading and I/O Streams of Core Java	PO1, PO3, PO5
CO4	Implement AWT and Event handling.	PO2, PO6
CO5	Use Swing to create GUI.	PO1, PO3, PO6

Text Books:	
1.	Herbert Schildt, <i>The Complete Reference</i> , Tata McGraw Hill, New Delhi, 7th Edition, 2010
2.	Gary Cornell, <i>Core Java 2 Volume I – Fundamentals</i> , Addison Wesley, 1999
References :	
1.	Head First Java, O’Rielly Publications,
2.	Y. Daniel Liang, <i>Introduction to Java Programming</i> , 7th Edition, Pearson Education India, 2010
Web Resources	
1.	https://javabeginnerstutorial.com/core-java-tutorial
2.	http://docs.oracle.com/javase/tutorial/
3.	https://www.coursera.org/

Mapping with Programme Outcomes:

S-Strong-3 M-Medium-2 L-Low-1

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	1
Weightage of course contributed to each PSO	14	14	13	14	14	11

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23122DSC44A	Image Processing	Elective	5	1	0	3	3	4	25	75	100
Course Objective											
LO1	To learn fundamentals of digital image processing.										
LO2	To learn about various 2D Image transformations										
LO3	To learn about various image enhancement processing methods and filters										
LO4	To learn about various classification of Image segmentation techniques										
LO5	To learn about various image compression techniques										
UNIT	Details										No. of Hours
I	Digital Image Fundamentals: Image representation - Basic relationship between pixels, Elements of DIP system -Applications of Digital Image Processing - 2D Systems - Classification of 2D Systems – Mathematical Morphology- Structuring Elements- Morphological Image Processing- 2D Convolution-2D Convolution Through Graphical Method-2D Convolution Through Matrix Analysis										12
II	2D Image transforms: Properties of 2D-DFT-Walsh transform-Hadamard transform-Haar transform-Discrete Cosine Transform-Karhunen -Loeve Transform- Singular Value Decomposition										12
III	Image Enhancement: Spatial domain methods-Point processing-Intensity transformations-Histogram processing-Spatial m filtering-smoothing filter- Sharpening filters - Frequency domain methods: low pass filtering, high pass Filtering-Homomorphic filter.										12
IV	Image segmentation: Classification of Image segmentation techniques –Region approach–Clustering techniques-Segmentation based on thresholding-Edge based segmentation-Classification of edges-Edge Detection- Hough transform-Active contour.										12
V	Image Compression: Need for compression-Redundancy-Classification Of image-Compression schemes-Huffman coding-Arithmetic coding- Dictionary based compression-Transform based compression,										12
Total										60	
Course Outcomes							Programme Outcome				

CO	On completion of this course, students will	
1	Understand the fundamental concepts of digital image processing.	PO1
2	Understand various 2D Image transformations	PO1, PO2
3	Understand image enhancement processing Techniques and filters	PO4, PO6
4	Understand the classification of Image segmentation techniques	PO4, PO5, PO6
5	Understand various image compression techniques	PO3, PO8
Text Book		
1	S Jayaraman, S Esakkirajan, T Veerakumar, Digital image processing, Tata McGraw Hill, 2015	
2	Gonzalez Rafael C, Digital Image Processing, Pearson Education, 2009	
Reference Books		
1.	1. Jain Anil K, Fundamentals of digital image processing: , PHI, 1988	
2.	Kenneth R Castleman, Digital image processing: , Pearson Education, 2/e, 2003	
3.	Pratt William K, Digital Image Processing: , John Wiley, 4/e, 2007	
Web Resources		
1.	https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing%20-Vijaya%20Raghavan.pdf	
2.	http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf	
3.	https://dl.acm.org/doi/10.5555/559707	
4.	https://www.ijert.org/image-processing-using-web-2-0-2	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	3	2	2	3	1
CO2	3	2	3	2	3	3
CO3	3	3	2	2	2	1
CO4	3	3	3	1	3	3
CO5	3	2	3	3	3	3
Weightage of course contributed to each PSO	13	13	13	10	14	11

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Marks		
							CIA	External	Total
23122DSC44B	ANALYTICS FOR SERVICE INDUSTRY	Elective	5	1	0	3	25	75	100
Learning Objectives									
LO1	Recognize challenges in dealing with data sets in service industry.								
LO2	Identify and apply appropriate algorithms for analyzing the healthcare, Human Resource, hospitality and tourism data.								
LO3	Make choices for a model for new machine learning tasks.								
LO4	To identify employees with high at triton risk.								
LO5	To Prioritizing various talent management initiatives for your organization.								
UNIT	Contents								No. Of. Hours
I	Healthcare Analytics: Introduction to Healthcare Data Analytics- Electronic Health Records– Components of EHR- Coding Systems- Benefits of EHR- Barrier to Adopting HER Challenges- Phenotyping Algorithms. Biomedical Image Analysis and Signal Analysis- Genomic Data Analysis for Personalized Medicine. Review of Clinical Prediction Models.								12
II	Healthcare Analytics Applications: Applications and Practical Systems for Healthcare– Data Analytics for Pervasive Health- Fraud Detection in Healthcare –Data Analytics for Pharmaceutical Discoveries-Clinical Decision Support Systems- Computer-Assisted Medical Image Analysis Systems- Mobile Imaging and Analytics for Biomedical Data.								12
III	HR Analytics: Evolution of HR Analytics, HR information systems and data sources, HR Metric and HR Analytics, Evolution of HR Analytics; HR Metrics and HR Analytics; Intuition versus analytical thinking; HRMS/HRIS and data sources; Analytics frameworks like LAMP, HCM: 21(r) Model.								12
IV	Performance Analysis: Predicting employee performance, Training requirements, evaluating training and development, Optimizing selection And promotion decisions.								12
V	Tourism and Hospitality Analytics: Guest Analytics – Loyalty Analytics–Customer Satisfaction–Dynamic Pricing–optimized Disruption management–Fraud detection in payments.								12
TOTAL HOURS								60	

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Understand and critically apply the concepts and methods of business analytics	PO1, PO2,PO3, PO4,PO5, PO6
CO2	Identify, model and solve decision problems in different settings.	PO1,PO2, PO3,PO4,PO5, PO6
CO3	Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity.	PO1,PO2,PO3, PO4, PO5,PO6
CO4	Create solutions to decision making problems.	PO1,PO2, PO3,PO4,PO5, PO6
CO5	Instill a sense of ethical decision-making and a commitment to the long-run welfare of both organizations and the communities they serve.	PO1, PO2,PO3, PO4,PO5, PO6
Text books		
1	Chandan K. Reddy and Charu C Aggarwal, —Health care data analytics †, Taylor & Francis, 2015.	
2	EdwardsMartinR,EdwardsKirsten(2016),—PredictiveHRAnalytics:MasteringtheHRMetric†, Kogan Page Publishers, ISBN-0749473924	
3	Fitz-enzJac(2010),—The new HR analytics :predicting the economic value of your company‘shumancapitalinvestments†,AMACOM,ISBN-13:978-0-8144-1643-3	
4	RajendraSahu, ManojDashandAnilKumar.ApplyingPredictiveAnalyticsWithintheServiceSector.	
Reference Books		
1.	HuiYangandEvaK.Lee,—Healthcare Analytics: From Datato Knowledge to HealthcareImprovement,Wiley,2016	
2.	Fitz-enzJac,MattoxIIJohn(2014),—PredictiveAnalyticsforHumanResources†, Wiley,ISBN-1118940709.	
Web Resources		
1.	https://www.ukessays.com/essays/marketing/contemporary-issues-in-marketing-marketing-essay.php	
2.	https://yourbusiness.azcentral.com/examples-contemporary-issues-marketing-field-26524.html	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	2	3	3	3	3	3
CO3	3	3	2	3	3	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Weightage of course Contributed to each PSO	14	15	14	15	15	14

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C		Inst. Hours	Marks		
									CIA	External	Total
23122DSC44C	Computational Intelligence	Elective	5	1	0	3		4	25	75	100
Course Objective											
LO1	To identify and understand the basics of AI and its search.										
LO2	To study about the Fuzzy logic systems.										
LO3	Understand and apply the concepts of Neural Network and its functions.										
LO4	Understand the concepts of Artificial Neural Network										
LO5	To study about the Genetic Algorithm.										
UNIT	Details							No. of Hours			
I	Introduction to AI: Problem formulation – AI Applications – Problems – State Space and Search – Production Systems–Breadth First and Depth First– Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.							12			
II	Fuzzy Logic Systems: Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inference – De fuzzification – Fuzzy Clustering–fuzzy rule-based classifier.							12			
III	Neural Networks What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Back propagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications							12			

IV	Artificial Neural Networks: Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs–McCulloch-Pitts Neuron–Linear Separability– Hebb Network.	12
V	Genetic Algorithm: Introduction–Biological Background – Genetic Algorithm Vs Traditional Algorithm–Basic Terminologies in Genetic Algorithm–Simple GA–General Genetic Algorithm– Operators in Genetic Algorithm	12
	Total	60

2.	ChinTengLin,C.S.GeorgeLee, Neuro-FuzzySystems ,PHI.
Web Resources	
1.	https://www.javatpoint.com/artificial-intelligence-tutorial
2.	https://www.w3schools.com/ai/

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23122SE C45L	JAVA PROGRAMMING LAB	Core	0	0	3	3	4	4	25	75	100
Learning Objectives											
LO1	To provide fundamental knowledge of object-oriented programming.										
LO2	To equip the student with programming knowledge in Core Java from the basics up.										
LO3	To enable the students to know about Event Handling.										
LO4	To enable the students to use String Concepts.										
LO5	To equip the student with programming knowledge in to create GUI using AWT controls.										
EXERCISE	Details										
1	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer										
2	Write a Java program to multiply two given matrices.										
3	Write a Java program that displays the number of characters, lines and words in a text										
4	Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.										
5	Write a program to do String Manipulation using CharacterArray and perform the following string operations: a. String length b. Finding a character at a particular position c. Concatenating two strings										
6	Write a program to perform the following string operations using String class:										

	<ul style="list-style-type: none"> a. String Concatenation b. Search a substring c. To extract substring from given string 	
7	<p>Write a program to perform string operations using String Buffer class:</p> <ul style="list-style-type: none"> a. Length of a string b. Reverse a string c. Delete a substring from the given string 	
8	<p>Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.</p>	
9	<p>Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread2.</p>	60
10	<p>Write a program to demonstrate the use of following exceptions.</p> <ul style="list-style-type: none"> a. Arithmetic Exception b. Number Format Exception c. ArrayIndexOutOfBoundsException d. NegativeArraySizeException 	
11	<p>Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes</p>	
12	<p>Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.</p>	
13	<p>Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired.</p>	

	(Use adapter classes).	
14	Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.	
15	Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message shown.	
	Total	60
	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1
2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO1, PO2
3	Implement multi-threading and I/O Streams of Core Java	PO4, PO6
4	Implement AWT and Event handling.	PO4, PO5, PO6
5	Use Swing to create GUI.	PO3, PO6
	Text Book	
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.	
2.	Gary Cornell, <i>Core Java 2 Volume I – Fundamentals</i> , Addison Wesley, 1999.	
	Reference Books	
1.	Head First Java, O’Rielly Publications,	
2.	Y. Daniel Liang, <i>Introduction to Java Programming</i> , 7th Edition, Pearson Education India, 2010.	
	Web Resources	
1.	https://www.w3schools.com/java/	
2.	http://java.sun.com	
3.	http://www.afu.com/javafaq.html	

Mapping with Programme Outcomes:
S-Strong M-Medium L-Low

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	2
Weightage of course contributed to each PSO	14	14	13	14	14	12

Subject Code	Subject Name	Category	L	T	P	C	I.	Hours	Marks		
									CIA	External	Total
23122SEC46	Enterprise Resource Planning	Skill Enhancement Course	3	-	-	2		2	25	75	100
Course Objectives											
LO1	To understand the basic concepts, Evolution and Benefits of ERP.										
LO2	To know the need and Role of ERP in logical and Physical Integration.										
LO3	Identify the important business functions provided by typical business software such as A sender price are source planning and customer relationship management										
LO4	To train the students to develop the basic understanding of how ERP enriches the Business organizations in achieving a multidimensional growth										
LO5	To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills										
UNIT	Details							No. of Hours			
I	ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, the Evolution of ERP, the Structure of ERP, Components and needs of ERP, ERP Vendors; Benefits & Limitations of ERP Packages.							6			
II	Need to focus on Enterprise Integration/ERP; Information mapping; Role of common shared Enterprise database; System Integration, Logical vs. Physical System Integration, Benefits & limitations of System Integration, ERP's Role in Logical and Physical Integration. Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing (OLAP), Product Life Cycle Management (PLM), LAP, Supply chain Management.							6			
III	ERP Market place and Market place Dynamics: Market Overview, Market place Dynamics, and the Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications. Cloud and Open Source, Quality Management, Material Management, Financial Module, CRM and Case Study.							6			

IV	ERP Implementation Basics, ERP implementation Strategy, ERP Implementation Life Cycle, Pre-Implementation task, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.	6
V	ERP & E-Commerce, Future Directives-in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP In to organizational culture. Using ERP tool: either SAP or ORACLE format to case study.	6
	Total	30
Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the basic concepts of ERP.	PO1,PO2,PO6
CO2	Identify different technologies used in ERP	PO2,PO3,PO8
CO3	Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules	PO1,PO3,PO7
CO4	Discuss the benefits of ERP	PO2,PO6
CO5	Apply different tools used in ERP	PO1,PO3,PO8
Reference Text:		
1.	Enterprise Resource Planning–Alexis Leon, Tata McGraw Hill.	
References:		
1.	Enterprise Resource Planning–Diversified by Alexis Leon, TMH.	
2.	Enterprise Resource Planning–Ravi Shankar & S. Jaiswal, Galgotia	
Web Resources		
1.	1. https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm	
2.	1. https://www.saponlinetutorials.com/what-is-erp-systems-enterprise-resource-planning/	
3.	1. https://www.guru99.com/erp-full-form.html	
4.	2. https://www.oracle.com/in/erp/what-is-erp/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	3	2	1	3	2
CO2	3	2	-	1	2	-
CO3	2	3	2	2	3	2
CO4	1	-	2	1	-	2
CO5	3	3	-	1	3	-
Weightage of course contributed to each PSO	10	11	6	7	11	6

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	V. Hours	Marks		
								CIA	External	Total
23122SEC47	Multimedia Systems	Skill Enhancement Course	2	-	-	2	2	25	75	100
Course Objective										
LO1	Understand the definition of Multimedia									
LO2	To study about the Image File Formats, Sounds Audio File Formats									
LO3	Understand the concepts of Animation and Digital Video Containers									
LO4	To study about the Stage of Multimedia Project									
LO5	Understand the concept of Ownership of Content Created for Project Acquiring Talent									
UNIT	Details						No. of Hours			
I	Multimedia Definition-Use Of Multimedia-Delivering Multimedia- Text: About Fonts and Faces-Using Text in Multimedia-Computers and Text Font Editing and Design Tools-Hypermedia and Hypertext.						6			
II	Images: Plan Approach-Organize Tools-Configure Computer Workspace-Making Still Images-Color – Image File Formats. Sound: The Power of Sound-Digital Audio-Midi Audio- Midi vs. Digital Audio-Multimedia System Sounds Audio File Formats-Vaughan's Law of Multimedia Minimums-Adding Sound to Multimedia Project						6			
III	Animation: The Power of Motion-Principles of Animation- Animation by Computer-Making Animations that Work. Video: Using Video – Working with Video and Displays-Digital Video Containers- Obtaining Video Clips-Shooting and Editing Video						6			
IV	Making Multimedia: The Stage of Multimedia Project-The Intangible Needs -The Hardware Needs - The Software Needs-An Authoring System's Needs-Multimedia Production Team.						6			
V	Planning and Costing: The Process of Making Multimedia-Scheduling-Estimating-RFPs and Bid Proposals. Designing and Producing-Content and Talent: Acquiring Content-Ownership of Content Created for Project-Acquiring Talent						6			
Total							30			

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	understand the concepts, importance, application and the process of developing multimedia	PO1
2	To have basic knowledge and understanding about image related processing	PO1,PO2
3	To understand the framework of frames and bit images to animations	PO4,PO6
4	Speaks about the multimedia projects and stages of requirement in phases of project.	PO4,PO5,PO6
5	Understanding the concept of cost involved in multimedia planning designing, and producing	PO3,PO8
Text Book		
1	TayVaughan,"Multimedia:MakingItWork",8 th Edition,Osborne/McGraw-Hill, 2001.	
Reference Books		
1.	Ralf Steinmetz & KlaraNahrstedt"Multimedia Computing, Communication&Applications",PearsonEducation,2012.	
Web Resources		
1.	https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	3	2	1
CO2	3	2	3	3	2	1
CO3	3	2	3	3	2	1
CO4	3	2	3	3	1	1
CO5	3	3	3	3	1	1
Weightage of course contributed to each PSO	15	11	15	15	8	5

S-Strong-3 M-Medium-2 L-Low-1

ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
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23122BRC48	Participation in Bounded Research	2	0	0	2
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Course Code	Course Title	L	T	P	C
231AECCEVS	Environmental Studies	2	0	0	2

AIM:

To create the awareness about environmental problems among the students.

OBJECTIVE:

- It deals with the study of flow of energy and materials in the environment
- It deals with the study of natural and its function

UNIT-I

The Multidisciplinary Nature of Environmental Studies – Definition, Scope and Importance - Need for public awareness - **Natural Resources: Renewable and Non-Renewable Resources** - Forest resources - Water resources - Mineral resources - Food resources - Energy resources - Land resources.

UNIT-II

Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids - Types of ecosystem - Forest ecosystem - Grassland ecosystem - Desert ecosystem - Aquatic ecosystems.

UNIT-III

Biodiversity and its Conservation – Definition - Genetic, species and ecosystem diversity - Bio geographical classification of India - Values of biodiversity - Biodiversity at global, National and local levels - India as a mega - diversity nation - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India - Conservation of biodiversity.

UNIT-IV

Environmental Pollution – Definition - Air pollution - Water pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Nuclear hazards - Solid waste Management - Role of an individual in prevention of pollution - Disaster management.

UNIT-V

Social Issues and the Environment - From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Environmental ethics - Climate change greenhouse effect and global warming - Ozone depletion - Waste land reclamation - Consumerism and waste products - Environmental Legislation - Issues involved in enforcement of environmental legislation - Public awareness - **Human Population and the Environment.**

REFERENCE BOOK:

1. “ENVIRONMENTAL STUDIES”, K.Kumarasamy, A.Alagappa Moses, M.Vasanthi.

SEMESTER IV

Course Code	Course Title	L	T	P	C
231LCSCLS	Leadership and Management Skills	-	-	-	1

Aim:

The aim of the course cultivating and nurturing the innate leadership skills of the youth so that they may transform these challenges into opportunities and become torch bearers of the future by developing creative solutions.

Course Objective:

The Module is designed to:

- Help students to develop essential skills to influence and motivate others
- Inculcate emotional and social intelligence and integrative thinking for effective leadership
- Create and maintain an effective and motivated team to work for the society
- Nurture a creative and entrepreneurial mindset
- Make students understand the personal values and apply ethical principles in professional and social contexts.

Course Outcomes:

Upon completion of the course students will be able to:

1. Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision
2. Learn and demonstrate a set of practical skills such as time management, self-management, handling conflicts, team leadership, etc.
3. Understand the basics of entrepreneurship and develop business plans
4. Apply the design thinking approach for leadership
5. Appreciate the importance of ethics and moral values for making of a balanced personality.

UNIT I- Leadership Skills

a. Understanding Leadership and its Importance

- What is leadership?
- Why Leadership required?
- Whom do you consider as an ideal leader?

Traits and Models of Leadership

- Are leaders born or made?
- Key characteristics of an effective leader
- Leadership styles
- Perspectives of different leaders

Basic Leadership Skills

- Motivation
- Team work
- Negotiation
- Networking

UNIT II - Managerial Skills

a. Basic Managerial Skills

- Planning for effective management
- How to organize teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate
- Conflict management

Self-Management Skills

- Understanding self-concept
- Developing self-awareness
- Self-examination
- Self-regulation

UNIT III - Entrepreneurial Skills

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurship
- Traits and competencies of entrepreneur

Creating Business Plan

- Problem identification and idea generation
- Idea validation
- Pitch making

UNIT IV - Innovative Leadership and Design Thinking

a. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

Design Thinking

- What is design thinking?
- Key elements of design thinking:
 - Discovery
 - Interpretation
 - Ideation
 - Experimentation
 - Evolution.
- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

UNIT V- Ethics and Integrity

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

Ethics and Conduct

- Importance of ethics
- Ethical decision making
- Personal and professional moral codes of conduct
- Creating a harmonious life

Bibliography and Suggested Readings:

Books

- Ashokan, M. S. (2015). *Karmayogi: A Bibliography of E. Sreedharan*. Penguin, UK.
- Brown, T. (2012). *Change by Design*. Harper Business
- Elkington, J., & Hartigan, P. (2008). *The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World*. Harvard Business Press.
- Goleman D. (1995). *Emotional Intelligence*. Bloomsbury Publishing India Private Limited.
- Kalam A. A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin Books India
- Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us All*. William Collins
- Kurien V., & Salve G. (2012). *I Too Had a Dream*. Roli Books Private Limited
- Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success*. New

York: American Management Association

- McCormack M. H. (1986). *What They Don't Teach You at Harvard Business School: Notes From A Street-Smart Executive*. RHUS
- O'Toole J. (2019) *The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good*. HarperCollins
- Sinek S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. Penguin
- Sternberg R. J., Sternberg R. J., & Baltes P. B. (Eds.). (2004). *International Handbook of Intelligence*. Cambridge University Press.

E-Resources

- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019- 02- 15 from <https://www.forbes.com/sites/kimberlyfries/2018/02/08/8-essential-qualities-that-define-great-leadership/#452ecc963b63>.
- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence.
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention.
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - . "A Leader Should Know How to Manage Failure" <https://www.youtube.com/watch?=laGZaS4sdeU>
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, 85(6): 60.
- NPTEL Course on Leadership - <https://nptel.ac.in/courses/122105021/9>.

Subject Code	Subject Name	Category	L	T	P	C	V. Hours	Marks		
								CIA	External	Total
23122AEC51	Operating Systems	Core	5	1	-	4	5	25	75	100
Course Objective										
LO1	Understanding the design of the Operating System									
LO2	Imparting knowledge on CPU scheduling, Process and Memory Management.									
LO3	To code specialized programs form an aging over all resources and operations of the computer.									
LO4	To study about the concept of Job and processor scheduling									
LO5	To learn about the concept to memory organization and multiprogramming									
UNIT	Details						No. of Hours			
	Introduction: operating system, history (1990sto2000 and beyond), distributed computing, parallel computation. Process concepts: definition of process, process states-Lifecycle of a process, process management-process state transitions, process control block(PCB), process operations , suspend and resume, context switching, Interrupts-Interrupt processing, interrupt classes, Inter process communication-signals, message passing.						15			
II	Asynchronous concurrent processes: mutual exclusion- critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Petersons algorithm, software solutions to the mutual Exclusion Problem-,n-thread mutual exclusion-Lampports Bakery. Algorithm. Semaphores–Mutual exclusion with Semaphores, thread synchronization with semaphores,						15			

	Counting semaphores, implementing semaphores. Concurrent programming: monitors, message passing	
III	Dead lock and in definite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery.	15
IV	Job and processor scheduling: scheduling levels, scheduling objectives, scheduling criteria, Preemptive non-preemptive scheduling, interval time orient interrupting clock, priorities, scheduling algorithms-FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling.	15
V	Real Memory organization and Management: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non- contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping Virtual Memory organization: virtual memory basic concepts, multilevel storage organization, Block mapping, paging basic concepts, segmentation, paging/segmentation systems. Virtual Memory Management: Demand Paging, Page replacement strategies	15
	Total	75

Course outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Define the fundamentals of OS and identify the concepts relevant to process, process life cycle, Scheduling Algorithms, Deadlock and Memory management	PO1
2	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1,PO2
3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock.	PO4,PO6
4	Have complete knowledge of Scheduling Algorithms and its types.	PO4,PO5,PO6
5	Understand memory organization and management	PO3,PO8
Text Book		
1	H.M.Deitel,OperatingSystems,ThirdEdition,PearsonEducationAsia,2011	
Reference Books		
1.	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.	
2.	A.Silberschatz, and P.B. Galvin., Operating Systems Concepts, Ninth Edition, JohnWiley&Sons(ASIA)PteLtd.,2012	
Web Resources		
1.		
2.		

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	1	2	-	1
CO2	2	3	1	2	-	1
CO3	3	2	-	3	-	1
CO4	1	3	1	1	3	2
CO5	3	-	1	3	2	1
Weightage of course contributed to each PSO	12	8	4	11	5	6

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C		Hours	Marks		
									CIA	External	Total
23122AEC52	ASP.Net Programming	Core	5	1	-	3		5	25	75	100
Course Objective											
LO1	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.										
LO2	To develop ASP.NET Web application using standard controls.										
LO3	To implement file handling operations.										
LO4	To handles SQL Server Database using ADO.NET.										
LO5	Understand the Grid view control and XML classes.										
UNIT	Details							No. of Hours			
I	Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library-C# Fundamentals: Primitive types and Variables – Operators –Conditional statements-Looping statements –Creating and Using Objects–Arrays–String operations.							15			
II	Introduction to ASP.NET-IDE-Language supported Components-Working with Web Forms– Web form standard controls: Properties and its events–HTML Controls-List Controls: Properties and its events.							15			
III	Rich Controls: Properties and its events–validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files –File uploading.							15			
IV	ADONET Overview–Database Connections–Commands –Data Reader- Data Adapter- Data Sets- Data Controls and							15			

	Its Properties–Data Binding	
v	Grid View control: Deleting, editing, Sorting and Paging.XML classes–Web form to manipulate XML files-Website Security-Authentication-Authorization–Creating a Web application.	15
	Total	75
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of C# programming constructs and the .NET Framework	PO1,PO2,PO6
2	To develop a software to solve real-world problems using ASP.NET	PO2,PO3,PO8
3	To Work On Various Controls Files	PO1,PO3,PO7
4	To create a web application using Microsoft ADO.NET.	PO2,PO6
5	To develop web applications using XML	PO1,PO3,PO8
Text Book		
1	Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.	
2	Mathew, MacDonald, The complete Reference ASP.NET, Tata McGraw-Hill, 2015.	
Reference Books		
1.	Herbert Schildt, The Complete Reference C#. NET, Tata McGraw-Hill, 2017.	
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET4.5 Black Book, Dream tech press, 2013.	
3.	Anne Boehm, Joe lMurach, Murach's C# 2015, Mike Murach & Associates Inc. 2016.	
4.	Denielle Otey, Michael Otey, ADO.NET: The Complete reference, McGraw Hill, 2008.	
5.	Matthew Mac Donald, Beginning ASP.NET 4 in C# 2010, A PRESS, 2010.	
Web Resources		
1.	https://www.geeksforgeeks.org/introduction-to-net-framework/	
2.	https://www.javatpoint.com/net-framework	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	2	1	3
CO2	3	2	2	2	2	3
CO3	3	3	2	2	3	3
CO4	3	1	2	2	1	3
CO5	3	1	2	2	1	2
Weightage of course contributed to each PSO	15	8	10	10	8	14

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122AEC53	Information Security	Elective	5	-	-	4	4	25	75	100
Course Objectives										
LO1	To know the objectives of information security									
LO2	Understand the importance and application of each of confidentiality, integrity, authentication and availability									
LO3	Understand various cryptographic algorithms									
LO4	Understand the basic categories of threats to computers and networks									
LO5	To study about the concepts of security in networks, web security									
UNIT	Details						No. of Hours			
I	Introduction to Information Security: Security mindset, Computer Security Concepts(CIA), Attacks, Vulnerabilities and protections, Security Goals, Security Services, Threats, Attacks, Assets, malware, program analysis and mechanisms						12			
II	The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense. Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption						12			
III	Symmetric and Asymmetric Cryptographic Techniques: DES, AES, RSA algorithms .Authentication and Digital Signatures: Use of Cryptography for authentication, Secure Hash function, Key management–Kerberos						12			

IV	Program Security : Non-malicious Program errors –Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels. File protection Mechanisms, User Authentication Designing Trusted O.S: Security polices, models of security, trusted O.S design, Assurance in trusted O.S. Implementation examples	12
V	Security in Networks: Threats in networks, Network Security Controls–Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honey pots, Traffic flow security. Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction	12
	Total	60

Course Outcomes

Course Outcomes	On completion of this course, students will;	Programme Outcomes
CO1	Understand network security threats, security services, and counter measures	PO1
CO2	Understand vulnerability analysis of network security	PO1,PO2
CO3	Acquire background on hash functions; authentication; firewalls; intrusion detection techniques	PO4,PO6
CO4	Gain hands-on experience with programming and simulation techniques for security protocols.	PO4,PO5,PO6
CO5	Apply methods for authentication, access control, Intrusion detection and prevention	PO3,PO8

Text Books

(Latest Editions)

1.	Security in Computing, Fourth Edition, by Charles. Pfleeger, Pearson Education
2.	Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Cryptography and Network Security: CKShyamala, NHarini, Dr TR Padmanabhan, WileyIndia, 1st Edition
2.	Cryptography and Network Security: Forouzan Mukho padhyay, McGraw Hill, 2nd Edition
3.	Information Security, Principles and Practice: Mark Stamp, Wiley India
4.	Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
Web Resources	
1.	https://www.geeksforgeeks.org/what-is-information-security/
2.	https://www.tutorialspoint.com/what-is-information-security#:~:text=Information%20security%20is%20designed%20and,destruction%2C%20alteration%2C%20and%20disruption.

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	3	2
CO2	2	-	1	-	3	2
CO3	-	3	1	3	-	-
CO4	2	3	1	3	3	-
CO5	2	3	1	3	3	2
Weightage of course contributed to each PSO	8	12	5	11	12	6

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122DSC54A	Database Management System	Core	4	-	-	4	4	25	75	100
Course Objective										
LO1	To enable the students to learn the designing of database systems, foundation on the Relational model of data and normal forms.									
LO2	To understand the concepts of database management system, designs implement Database Models									
LO3	To learn and understand to write queries using SQL, PL/SQL.									
LO4	To enable the students to learn the designing of database systems, foundation on the Relational model of data and normal forms.									
LO5	To understand the concepts of database management system, design simple Database Models									
UNIT	Details						No. of Hours			
	Database Concepts: Database Systems-Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models-Importance-Basic Building Blocks-Business rules - Evolution of Data models - Degrees of Data Abstraction						12			
II	Design Concepts: Relational database model – logical view of data-keys-Integrity rules-relational set operators – data dictionary and the system catalog-relationships-data redundancy revisited- indexes-codd's rules. Entity relationship model-ER diagram						12			
III	Normalization of Database Tables: Database tables						12			

	<p>and Normalization – The Need for Normalization – The Normalization Process–Higher level Normal Form.</p> <p>Introduction to SQL: Data Definition Commands– Data Manipulation Commands– SELECT Queries–Additional Data Definition Commands– Additional SELECT Query Keywords–Joining Database Tables.</p>	
IV	<p>Advanced SQL: Relational SET Operators: UNION –UNIONALL–INTERSECT–MINUS. SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function–Numeric Function–String Function–Conversion Function</p>	12
V	<p>PL/SQL: A Programming Language: History– Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation –Arithmetic operators. Control Structures and Embedded SQL: Control Structures –Nested Blocks–SQL in PL/SQL–Data Manipulation – Transaction Control statements.PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes–Cursor FOR loops– SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables –Exceptions–Types of Exceptions.</p>	12
	Total	60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	

1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS And compare various data models.	PO1
2	Define the integrity constraints. Understand the Basic concepts of Relational Data Model, Entity-Relationship Model.	PO1,PO2
3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	PO4,PO6
4	Classify the different functions and various join Operations and enhance the knowledge of handling Multiple tables.	PO4,PO5,PO6
5	Learn to design Database operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop program using Cursors, Exceptions	PO3,PO8
Text Book		
1	Coronel, Morris,Rob,"Database Systems, Design, Implementation and Management", Ninth Edition	
2	NileshShah,"DatabaseSystemsUsingOracle",2 nd edition,PearsonEducationIndia,2016	
Reference Books		
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,—Database System Conceptsll, McGraw Hill International Publication, VI Edition	
2.	Shio Kumar Singh,—Database Systems—,Pearson publications, I Edition	
Web Resources		
1.	Web resources from NDL Library, E-content from open-source libraries	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	2	3
CO3	3	3	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	3	3	3	2
Weightage of course contributed to each PSO	15	15	14	15	14	14

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23122DSC54B	Agile Project Management	Elective	4	-	-	-	3	4	25	75	100
Course Objective											
LO1	Learning of software design, software technologies and APIs.										
LO2	Detailed demonstration about Agile development and testing techniques.										
LO3	Learning about Agile Planning and Execution.										
LO4	Learning of Agile Management Design and Quality Check.										
LO5	Detailed examination of Agile development and testing techniques.										
UNIT	Details										No.of Hours
I	<p>Introduction: Modernizing Project Management: Project Management Needed a Makeover–Introducing Agile Project Management.</p> <p>Applying the Agile Manifesto and Principles: Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 15 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values–The Agile must test.</p> <p>Why Being Agile Works Better: Evaluating Agile benefits – How Agile approaches beat historical approaches – Why people like being Agile.</p>										12
II	<p>Being Agile</p> <p>Agile Approaches: Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, Extreme Programming- Summary</p>										12

	<p>Agile Environments in Action: Creating the physical environment– Low –tech communicating–High-tech communicating–Choosing tools.</p> <p>Agile Behaviours in Action: Establishing Agile roles–Establishing new values–Changing team philosophy.</p>	
<p>III</p>	<p>Agile Planning and Execution</p> <p>Defining the Product Vision and Roadmap: Agile planning–Defining the product vision – Creating a product roadmap – Completing the product backlog.</p> <p>Planning Releases and Sprints: Refining requirements and estimates – Release planning–Sprint planning.</p> <p>Working Throughout the Day: Planning your day–Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day.</p> <p>Showcasing Work, Inspecting and Adapting: The sprint review – The sprint retrospective.</p> <p>Preparing for Release: Preparing the product for deployment (the release sprint) – Preparing the operational support–Preparing the organization for product deployment - Preparing the market place for product deployment</p>	<p>12</p>
<p>IV</p>	<p>Agile Management</p> <p>Managing Scope and Procurement: What’s different about Agile scope management–Managing Agile scope–What’s different about Agile procurement–Managing Agile procurement.</p> <p>Managing Time and Cost: What’s different about Agile time management– Managing Agile schedules–What’s different about Agile cost management–Managing Agile budgets.</p> <p>Managing Team Dynamics and Communication: What’s different about Agile team dynamics– Managing Agile team dynamics–What’s</p>	<p>12</p>

	Different about Agile communication–Managing Agile communication. Managing Quality and Risk: What’s different about Agile quality– Managing Agile quality–What’s different about Agile risk management –Managing Agile risk.	
V	Implementing Agile Building a Foundation: Organizational and individual commitment – Choosing the right pilot team members– Creating an environment that enables Agility–Support Agility initially and overtime. Being a Change Agent: Becoming Agile requires change–why change doesn’t happen on its own – Platinum Edge’s Change Roadmap – Avoiding pitfalls– Signs your changes are slipping. Benefits, Factors for Success and Metrics: Ten key benefits of Agile project management – Ten key factors for project success – Ten metrics for Agile Organizations.	12
	Total	60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understanding of software design, software technologies and APIs using Agile Management.	PO1
2	Understanding of Agile development and testing techniques.	PO1,PO2
3	Understanding about Agile Planning and Execution using Sprint.	PO4,PO6
4	Understanding of Agile Management Design, scope, Procurement, managing Time and Cost and Quality Check.	PO4,PO5,PO6

5	Analyzing of Agile development and testing techniques.	PO3,PO8
Text Book		
1	MarkC.Layton, Steven J. Ostermiller, Agile Project Management for Dummies, 2nd Edition, Wiley India Pvt. Ltd., 2018.	
	Jeff Sutherland, Scrum – The Art of Doing Twice the Work in Half the Time, Penguin, 2014.	
Reference Books		
1.	Mark C. Layton, David Morrow, <i>Scrum for Dummies</i> , 2 nd Edition, Wiley India Pvt. Ltd., 2018.	
2.	Mike Cohn, Succeeding with Agile–Software Development using Scrum, Addison-Wesley Signature Series, 2010.	
3.	Alex Moore, Agile Project Management, 2020.	
4.	Alex Moore, <i>Scrum</i> , 2020.	
5.	Andrew Stellman and Jennifer Greene, <i>Learning Agile: Understanding Scrum, XP, Lean, and Kanban</i> , Shroff/O'Reilly, First Edition, 2014.	
Web Resources		
1.	www.agilealliance.org/resources	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	1	2
CO2	3	1	2	1	3	1
CO3	3	2	1	1	3	1
CO4	3	2	3	2	1	3
CO5	2	3	1	2	3	2
Weightage of course Contributed to each PSO	13	11	8	8	11	9

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23122DSC54C	Cloud Computing	Elective	4	-	-	-	3	4	25	75	100
Course Objective											
LO1	Learning fundamental concepts and Technologies of Cloud Computing.										
LO2	Learning various cloud service types and their uses and pitfalls.										
LO3	To learn about Cloud Architecture and Application design.										
LO4	To know the various aspects of application design, benchmarking and security on the Cloud.										
LO5	To learn the various Case Studies in Cloud Computing.										
UNIT	Details										No. of Hours
I	<p>Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples–Cloud-based Services and Applications.</p> <p>Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking–Network Function Virtualization– Map Reduce – Identity and Access Management–Service Level Agreements– Billing.</p>										12
II	<p>Cloud Services</p> <p>Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine-Windows Azure Virtual Machines</p> <p>Storage Services: Amazon Simple Storage Service –Google Cloud Storage-Windows Azure storage</p> <p>Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database- Windows Azure Table Service</p> <p>Application Services: Application Runtimes and Frameworks – Queuing Services-Email Services-Notification Services-Media Services</p> <p>Content Delivery Services: Amazon Cloud Front- Windows Azure Content Delivery Network</p> <p>Analytics Services: Amazon Elastic Map Reduce - Google Map Reduce Service-Google Big Query-Windows Azure HD Insight</p>										12

	<p>Deployment and Management Services: Amazon Elastic Bean stack- Amazon Cloud Formation</p> <p>Identity and Access Management Services: Amazon Identity and Access Management-Windows Azure Active Directory</p> <p>Open Source Private Cloud Software: Cloud Stack– Eucalyptus - Open Stack</p>	
III	<p>Cloud Application Design: Introduction – Design Consideration for Cloud Applications–Scalability–ReliabilityandAvailability–Security – Maintenance and Up gradation – Performance – Reference Architectures for Cloud Applications–Cloud Application Design Methodologies: Service Oriented Architecture(SOA),Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), Restful Web Services –Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach(No SQL).</p>	12
IV	<p>Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics–Design Consideration for Benchmarking Methodology–Benchmarking Tools and Types of Tests –Deployment Prototyping.</p> <p>Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO)–Authorization–Identity and Access Management – Data Security: Securing data at rest, securing data in motion –Key Management–Auditing.</p>	12
V	<p>Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems – Cloud Computing for Manufacturing Industry-Cloud Computing for Education.</p>	12
Total		60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the fundamental concepts and Technologies in Cloud Computing.	PO1
2	Able to understand various cloud service types and their uses and pitfalls.	PO1,PO2
3	Able to understand Cloud Architecture and	PO4,PO6

	Application design.	
4	Understand the various aspects of application design, benchmarking and security in the Cloud.	PO4,PO5,PO6
5	Understand various Case Studies in Cloud Computing.	PO3,PO8
Text Book		
1	Arshdeep Bahga, Vijay Madiseti, <i>Cloud Computing–A Hands On Approach</i> , Universities Press(India) Pvt.Ltd.,2018	
Reference Books		
1.	AnthonyT Velte,TobyJVelte, Robert Elsenpeter, <i>Cloud Computing: A Practical Approach</i> , Tata McGraw-Hill, 2013.	
2.	Barrie Sosinsky, <i>Cloud Computing Bible</i> , Wiley India Pvt. Ltd., 2013.	
3.	David Crookes, <i>Cloud Computing in Easy Steps</i> , Tata McGraw Hill, 2015.	
4.	Dr.Kumar Saurabh, <i>Cloud Computing</i> , Wiley India, Second Edition 2012.	
Web Resources		
1.	https://en.wikipedia.org/wiki/Cloud_computing	
2.	https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7	
3.	https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-CDW-Cloud-Computing-Reference-Guide.pdf	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	3	1
CO2	3	1	2	3	3	-
CO3	3	2	1	2	1	3
CO4	3	3	2	3	2	-
CO5	2	2	1	3	3	3
Weightage of course contributed to each PSO	13	10	8	14	12	7

S-Strong-3 M-Medium-2L-Low-1

Course Code	Course Title	L	T	P	C
23122DSC55A	Disaster Management	4	0	0	4

AIM: Disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery.

Course Objectives:

1. To provide students an understanding the need for studying the disaster management
2. Develop an understanding about the various types of disasters.
3. To expose students to the risk and vulnerability analysis
4. To create awareness about disaster prevention and risk reduction
5. To establish relationship between disasters and developments.
6. To understand Rehabilitation, Reconstruction and Recovery in the event of Disaster
7. To gain knowledge on Climate Change Adaptation and IPCC Scenario and Scenarios in the context of India.

Course Outcomes:

- CO1: Understand the need and significance of studying disaster management
- CO2: Understand the different types of disasters and causes for disasters.
- CO3: Gain knowledge on the impacts Disasters on environment and society
- CO4: Study and assess vulnerability of a geographical area.
- CO5: Students will be equipped with various methods of risk reduction measures and risk mitigation.
- CO6: Understand the role of Information Technology in Disaster Management
- CO7: Understand Geographical Information System applications in Disaster Management

Content of Course
Unit I: Introduction to Disasters
Chapter No.1 Disaster: Concept, Meaning, and Definition Chapter No.2 History of Major Disaster Events in India Chapter No.3 Types of Disasters– Natural Disasters: Famine, Drought, Flood, Cyclone, Tsunami, Earthquake
Unit II: Disaster Mitigation and Disaster Management
Chapter No. 4 Man-made Disasters: Riots, Blasts, Industrial, Militancy Chapter No. 5 Profile, Forms and Reduction of Vulnerability Chapter No. 6 Disaster Mitigation: Concept and Principles
Unit III: Impact of Disaster
Chapter No.7 Disaster Management: Concept and Principles Chapter No.8 Pre-disaster- Prevention and Preparedness Chapter No.9 Physical, Economic, Social, Psycho-socio Aspects, Environmental Impacts
Unit IV: Disaster Process and Intervention
Chapter No.10 During Disaster-Rescue and Relief Chapter No.11 Post-disaster-Rehabilitation and Reconstruction Chapter No.12 Victims of Disaster- Children, Elderly, and Women Chapter No.13 Displacement-Causes , Effects and Impact
Unit V: Disaster Intervention
Chapter No.14 Major Issues and Dynamics in the Administration of Rescue,Relief, Reconstruction and Rehabilitation Chapter No.15 Components of Rescue, Relief, Reconstruction; Rehabilitation Chapter No.16 Disaster Policy in India; Disaster Management Authority-NDMA, SDMA, DDMA; Disaster Management Act, 2005

Key Words: Disaster, Disaster Mitigation, Disaster Management and Disaster Process

References:

- Anil Sinha (2001), Disaster Management-Lessons Drawn and Strategies for Future. New Delhi, Jain Publications.
- Backer, C.W. and Chapman.(ed.).(1969),Man and Society in Disasters, New Delhi,
- Clarke, J.I., Peter Curson, et.al.(ed.)(1991),Population and Disaster,Oxford,Basil Blackwell Ltd.
- Cuny, Frederick(1984), Disasters and Development,Oxford,Oxford University Press. Disaster Management Act 2005
- Garb,S. and Eng.(1969),Disasters Hand Book, New York, Springer.
- Gupta, M.C, L.C. Gupta, B. K. Tamini and Vinod K. Sharma (2000), Manual on Natural Disaster Management in India, New Delhi, National Institute of Disaster Management. Hoff, A. (1978),People in Crisis-Understanding and Helping, California,AddisonWesley.
- Maskrey, Andrew (1989), Disaster Mitigation: A Community Based Approach, Oxford, Oxfarm.
- Narayan, Sachindra (ed.) (2000), Anthropology of Disaster Management, New Delhi, Gyan Publishing House.
- Nidhi G Dhawan (2014), Disaster Management and Preparedness, New Delhi, Jain Publications.
- Parasuraman, S. and Unnikrishnan, P.V. (2000), India Disasters Report: Towards Policy Initiative, New Delhi, and Oxford University Press.
- Satendra, K.J. Anandha Kumar and V.K.Naik (2013), India's Disaster Report, New Delhi, National Institute of Disaster Management.
- Singh, R.B. (ed.) (2000), Disaster Management, New Delhi, Rawat Publications.
- Sinha, P.C. (ed.) (1998), Encyclopedia of Disaster Management (Vol.1-10), New Delhi, Anmol Publications.
- Tata Institute of Social Sciences (2002). Special Volume on Disaster Management, Indian Journal of Social Work, Vol.63, Issue 2, April.

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23122DSC55B	Artificial Neural Networks		4	-	-	-	3	4	25	75	100
Course Objective											
LO1	Understand the basics of artificial neural networks, learning process, single layer And multi-layer perceptron networks.										
LO2	Understand the Error Correction and various learning algorithms and tasks.										
LO3	Identify the various Single Layer Perception Learning Algorithm.										
LO4	Identify the various Multi-Layer Perception Network.										
LO5	Analyze the Deep Learning of various Neural network and its Applications.										
UNIT	Details										No. of Hours
I	Artificial Neural Model-Activation functions-Feed forward and Feedback, Convex Sets, Convex Hull and Linear Reparability, Non- Linear Separable Problem - Multilayer Networks. Learning Algorithms- Error correction- Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem.										12
II	Introduction, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann learning, credit assignment problem, Learning with and without teacher, learning tasks, Memory and Adaptation.										12
III	Single layer Perception: Introduction, Pattern Recognition, Linear classifier, Simple perception, Perception learning algorithm, Modified Perception learning algorithm, Adaptive linear combiner, Continuous perception, Learning in continuous perception. Limitation of Perception.										12
IV	Multi-Layer Perception Networks: Introduction, MLP with 2 hidden layers, Simple layer of a MLP, Delta learning rule of the output layer,										12
	Multi-layer feed forward neural network with continuous perceptions, Generalized delta learning rule, Back propagation algorithm										

V	Deep learning- Introduction- Neuro architectures building blocks for the DL techniques, Deep Learning and Neo cognition, Deep Convolutional Neural Networks, Recurrent Neural Networks (RNN), feature extraction, Deep Belief Networks, Restricted Boltzmann Machines, Training of DNN And Applications	12
Total		60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Students will learn the basics of artificial neural networks with single layer and multi-layer Perception networks.	PO1
2	Learn about the Error Correction and various Learning algorithms and tasks.	PO1,PO2
3	Learn the various Perception Learning Algorithm.	PO4,PO6
4	Learn about the various Multi-Layer Perception Network.	PO4,PO5,PO6
5	Understand the Deep Learning of various Neural Network and its Applications.	PO3,PO8
Text Book		
1	Neural Networks A Classroom Approach- Satish Kumar, McGraw Hill-Second Edition.	
2.	—Neural Network- A Comprehensive Foundationl-Simon Haykins, Pearson Prentice Hall, 2nd Edition,1999.	
Reference Books		
1.	Artificial Neural Networks- B. Yegnanarayana, PHI, New Delhi 1998.	
Web Resources		
1.	https://www.w3schools.com/ai/ai_neural_networks.asp	
2.	https://en.wikipedia.org/wiki/Artificial_neural_network	
3.	https://link.springer.com/chapter/10.1007/978-3-642-21004-4_12	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23122DSC55C	Mobile Adhoc Network		4	-	-	-	3	4	25	75	100

UNIT-1

INTRODUCTION: Introduction to ad-hoc networks—definition, characteristics features, applications. Characteristics of wireless channel, ad-hoc mobility models: indoor and outdoor models.

UNIT-2

MEDIUM ACCESS PROTOCOLS:

MAC Protocols: Design issues, goals and classification. Contention based protocols—with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15.HIPERLAN.

UNIT-3

NETWORK PROTOCOLS:

Routing Protocols: Design issues, goals and classification. Proactive vs reactive routing, unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, QoS aware routing.

UNIT-4

END-END DELIVERY AND SECURITY:

Transport Layer: Issues in designing – Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

UNIT-5

CROSS LAYER DESIGN:

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of adhoc with Mobile IP networks.

TEXT BOOKS:

1. C.SivaRamMurthy and B.S.Manoj, Adhoc Wireless Networks Architecture and Protocols, 2ndedition, Pearson Edition, 2007.
2. Charles Perkins, Adhoc Networking, Addison–Wesley, 2000.

REFERENCES:

1. Stefano Basagni, MarcoConti, Silvia Giordano and Ivanstojmenovic, Mobile ad-hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of ad-hoc wireless networks, CRC press, 2002.
3. T.Camp,J.Boleng, and V.Davies“A Survey of Mobility Models for Ad-hoc Network”
4. Research, “Wireless Commun, and MobileComp.Special Issue on Mobile Ad-hoc Networking Research, Trends and Applications, Vol.2, no.5, 2002, pp.483–502.
5. A survey of integrating IP mobility protocols and Mobile Ad-hoc networks, Fekri M.bduljalil and Shrikant K.Bodhe, IEEE communication Survey and tutorials, no: 12007.

Subject Code	Subject Name	Category	L	T	P	C		Inst.	Marks		
									CIA	External	Total
23122AEC56L	ASP.Net Programming LAB	Core	-	-	3	3		5	25	75	100
Course Objective											
LO1	To develop ASP.NET Web application using standard controls.										
LO2	To create rich database applications using ADO .NET.										
LO3	To implement file handling operations.										
LO4	To implement XML classes.										
LO5	To utilize ASP.NET security features for authenticating the website										
Sl. No	Programs										
1.	Create an exposure of Web applications and tools										
2.	Implement the Html Controls										
3.	Implement the Server Controls										
4.	Web application using Web controls.										
5.	Web application using List controls.										
6.	Web Page design using Rich control. Validate user input using Validation controls. Working with File concepts.										
7.	Web application using Data Controls.										
8.	Data binding with Web controls										
9.	Data binding with Data Controls.										
10.	Database application to perform insert, update and delete operations.										
11.	Database application using Data Controls to Perform insert, delete, edit, paging and sorting operation.										

12.	Implement the Xml classes.	
13.	Implement Authentication–Authorization.	
14.	Ticket reservation using ASP.NET controls.	
15.	Online examination using ASP.NET controls	
Total		
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	To create web applications and implement various controls	PO1,PO2,PO6
2	Create a web pages in Rich control.	PO3,PO8
3	Develop knowledge about file handling operations	PO1,PO4,PO8
4	An ability to design XML classes	PO2,PO6,PO7
5	To develop a software to solve real-world problems using ASP.NET	PO1,PO3,PO5,PO8
Text book		
1	Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.	
2	Mathew, MacDonald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.	
Reference Books		
1.	Herbert Schildt, The Complete Reference C#. NET, Tata McGraw-Hill, 2017.	
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET4.5 Black Book, Dream tech press, 2013.	
3.	Anne Boehm, Joel Murach , Murach's C# 2015, Mike Murach & Associates Inc.2016.	
4.	Denielle Otey, Michael Otey,ADO.NET: The Complete reference, McGraw Hill,2008.	
5.	Matthew MacDonald, Beginning ASP.NET4 in C# 2010, A PRESS, 2010.	
Web Resources		
1.	https://www.geeksforgeeks.org/introduction-to-net-framework/	
2.	https://www.javatpoint.com/net-framework	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	1	1
CO2	3	2	3	2	2	2
CO3	3	3	2	2	1	1
CO4	3	2	3	2	1	1
CO5	3	2	2	2	1	2
Weightage of course contributed to each PSO	15	11	12	10	6	7

S-Strong-3 M-Medium-2L-Low-1

23122SEC57	Internship / Industrial Training				2
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231ACLSPSL	Professional Skills	-	-	-	1
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231AECCVED	Value Education	2	-	-	2
Course Objectives:					
<ul style="list-style-type: none"> • To understand the meaning of values • To interpret Indian culture in a scientific manner • To assess the values of health, mind, aestheticism, spiritualism, • To evaluate the impact of society • To appraise moral values in the society 					
Unit: I		Introduction to Value Education			
Value Education–Definition, Views on Education–Socrates ,Plato, Aristotle, Mahatma Gandhi, Swami Vivekananda, Sri Aurbindo, Rabindrath Tagore and Dr.R.Radhakrishnan– Concept of Human Values–Family Values–Aesthetic Values–Ethical Values–Spiritual Values					
Unit: II		Character Formation–Personal &Personality Development			
Self-Discipline–Self-Confidence–Self-Initiative–Self-awareness–Empathy–Compassion–Forgiveness–Honestyand Courage Leadership qualities–Personality Development					
Unit: III		Religious Values and Communal Harmony			
Introduction to Religious Vales– Karma Yoga in Hinduism–Love and Justice in Christianity– Brotherhood in Islam–Compassion in Buddhism–Ahimsa in Jainism Courage in Sikhism– Need for Religious Harmony					
Unit :IV		The Power of Mind–Therapeutic Measures			
Controlling Mind–Physical Exercise–Meditation–Mudras–Yoga–Asanas Concept of Mind in the Upanishads–Moralization of Desires–Neutralization of Anger–Five Ways to Check Worry Habit and Eradication–Benefits of Blessings The Power of Mind–the Power of Positive Thinking					

Unit: V	Human Rights and Universal Values	
Concept of Human Rights–Classifications–Human Rights of Women and Children–Violation and Redressal–Safeguards Universal Values– Mutual respect for different cultures, people in India and across the globe		
Books for Study:		
1. Materials will be prepared by Dr.V.P.Rathiand Dr.R.Meenakshi Devi		
Books for References:		
<ol style="list-style-type: none"> 1. Das,M.S.&Gupta,V.K.:<i>SocialValuesamongYoungadults:AchangingScenario</i>,M.D.Publications,NewDelhi,1995. 2. Jash,P. <i>Glimpses of Hindu Cults and Culture</i>, Sundeep Prakashan, Deli,1997.NCERT,Education in Values,NewDelhi,1992. 3. R. C. Pradhan, “Language and Mind in the Upanishads”, <i>Language and Mind: The Classical Indian Perspective</i>, ed. K. S. Prasad, Hyderabad Studies in Philosophy no. 5, Decent Books, New Delhi,2008. 4. Vincent Peale, Norman. <i>Six Attitudes for Winners</i>, Jaico Publishing Hose, Mumbai,2009. 5. Vivekananda, Swami. “Personality Development”, Advaita Ashrama, Kolkata,2008. 		
Web Resources:		
https://www.hzu.edu.in/bed/Basics-in-Education%20(NCERT).pdf https://nptel.ac.in/content/storage2/courses/109101003/downloads/Lecture-notes/Lecture-6.pdf https://nptel.ac.in/content/storage2/courses/109104115/PDF/lec38.pdf		
Course Outcomes		K Level
CO1:	Understand the meaning of values and culture	K2
CO2:	Develop as socially responsible citizens	K3
CO3:	Create a communal harmonious society and practice unity in diversity	K6
CO4:	Identify the power oft thoughts and words	K3
CO5:	Correlate the relationship between values and human rights	K4

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122AEC61	Computer Networks	CORE/ Elective	5	1	-	4	5	25	75	100
Course Objective										
LO1	To understand the concept of Data communication and Computer network									
LO2	To get a knowledge on routing algorithms.									
LO3	To impart knowledge about networking and inter-networking devices									
LO4	To study about Network communication.									
LO5	To learn the concept to Transport layer									
UNIT	Details									No.of Hours
I	Introduction–Network Hardware–Software–Reference Models–OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs-Physical Layer–Theoretical Basis for Data Communication-Guided Transmission Media									15
II	Wireless Transmission- Communication Satellites–Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues–Error Detection and Correction.									15
III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem–Multiple Access Protocols–Bluetooth									15
IV	Network Layer-Design Issues-Routing Algorithms-Congestion Control Algorithms– IP Protocol–IP Addresses–Internet Control Protocols.									15
V	Transport Layer-Services-Connection Management-Addressing, Establishing and Releasing a Connection–Simple Transport Protocol–Internet Transport Protocols (ITP)-Network Security: Cryptography.									15
	Total									75
Course Outcomes							Programme Outcome			
CO	On completion of this course, students will									
1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference model						PO1			

2	To gain knowledge on Telephone systems using Wireless network	PO1,PO2
3	To understand the concept to fMAC	PO4,PO6
4	To analyze the characteristics of Routing and Congestion control algorithms	PO4,PO5,PO6
5	To understand network security an define various Protocols such as FTP, HTTP, Telnet, DNS	PO3,PO8
Text Book		
1	A.S. Tanenbaum,—Computer NetworksI, 4th Edition, Prentice-Hall of India, 2008.	
Reference Books		
1.	B.A.Forouzan,—DataCommunicationsandNetworkingI,TataMcGrawHill,4th Edition,2017	
2.	F. Halsall, —Data Communications, Computer Networks and Open SystemsI,PearsonEducation,2008	
3.	D.Bertsekasand R. Gallager,—Data NetworksI, 2 nd Edition, PHI, 2008.	
4.	Lamarca,—Communication Networks II,TataMcGraw-Hill,2002	
Web Resources		
1.	https://en.wikipedia.org/wiki/Computer_network	
2.	https://citationsy.com/styles/computer-networks	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	2	1	-
CO2	3	2	1	2	2	-
CO3	3	-	-	2	-	2
CO4	3	1	-	2	1	-
CO5	3	3	-	2	1	-
Weightage of course Contributed to each PSO	15	8	1	10	5	2

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122AEC62	Data Analytics Using R Programming	Core	5	-	-	4	6	25	75	100
Course Objective										
LO1	To understand the problem solving approaches									
LO2	To learn the basic programming constructs in R Programming									
LO3	To learn the basic programming constructs in R Programming									
LO4	To use R Programming data structures-lists, tuples, and dictionaries.									
LO5	To do input/output with files in R Programming.									
UNIT	Details						No. of Hours			
I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value –Understanding Big Data Storage —A General Overview of High-Performance Architecture—HDFS— Map Reduce and YARN— Map Reduce Programming Model						18			
II	CONTROL STRUCTURES AND VECTORS - Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical						18			

	Operations, Vector Indexing, Common Vector Operations	
III	LISTS- Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations	18
IV	FACTORS AND TABLES-Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and maxima, Calculus, Functions for Statistical Distributions R PROGRAMMING.	18
V	OBJECT-ORIENTED PROGRAMMING S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an SClass, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation	18
	Total	90
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data utilizing clustering and classification algorithms.	PO1,PO2

3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4,PO6
4	Perform analytics on data streams.	PO4,PO5,PO6
5	Learn No SQL databases and management.	PO3,PO8
Text Book		
1	RogerD.Peng, RProgrammingforDataScience—,2012	
2	Norman Mat off, The Art of R Programming- A Tour of Statistical Software Design , 2011	
Reference Books		
1.	1.GarrettGrolemund, HadleyWickham, Hands- OnProgrammingwithR:WriteYourOwnFunctionsand Simulations , 1stEdition,2014	
2.	Venables, W.N.,and Ripley, Sprogramming—,Springer,2000.	
Web Resources		
1.	https://www.simplilearn.com	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	3	1	-
CO2	3	3	2	2	-	2
CO3	1	2	3	1	2	1
CO4	2	2	1	-	2	1
CO5	2	2	2	1	3	1
Weightage of course Contributed to ach PSO	11	11	8	7	8	5

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23122DSC63A	Human Computer Interaction	Elective	5	-	-	3	4	25	75	100
Course Objective										
LO1	To learn about the foundations of Human Computer Interaction.									
LO2	To learn the design and software process technologies.									
LO3	To learn HCI models and theories.									
LO4	To learn Mobile Ecosystem.									
LO5	To learn the various types of Web Interface Design.									
UNIT	Details									No. of Hours
I	FOUNDATIONS OF HCI: <ul style="list-style-type: none"> The Human: I/O channels–Memory Reasoning and problem solving; The Computer: Devices– Memory–processing and networks; Interaction: Models– frameworks–Ergonomics–styles– elements–interactivity-Paradigms.-Case Studies 									12
II	DESIGN & SOFTWARE PROCESS: <ul style="list-style-type: none"> Interactive Design: Basics– process–scenarios Navigation: screen design Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice–design rationale. Design rules: principles, standards, Guidelines, rules. Evaluation Techniques– Universal Design 									12

III	MODELS AND THEORIES: <ul style="list-style-type: none"> HCI Models: Cognitive models:-Socio-Organizational issues and stakeholder requirements Communication and collaboration models-Hypertext, Multimedia and WWW. 	12
IV	Mobile HCI: <ul style="list-style-type: none"> Mobile Ecosystem: Platforms, Application frameworks• Types of Mobile Applications: Widgets, Applications, Games• Mobile Information Architecture, Mobile 2.0,• Mobile Design: Elements of Mobile Design, Tools.- Case Studies• 	12
V	WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies	12
Total		60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the fundamentals of HCI.	PO1
2	Understand the design and software process technologies.	PO1, PO2
3	Understand HCI models and theories.	PO4, PO6
4	Understand Mobile Ecosystem, types of Mobile Applications, mobile Architecture and design.	PO4, PO5, PO6
5	Understand the various types of Web Interface Design.	PO3, PO8
Text Book		
1	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, Human-Computer Interaction, III Edition, Pearson Education, 2004 (UNIT I, II & III)	
2	Brian Fling, — Mobile Design and Development, I Edition, O_Reilly Media Inc., 2009 (UNIT – IV)	
3	Bill Scott and Theresa Neil, — Designing Web Interfaces, First Edition, O_Reilly,	

	2009.(UNIT-V)
Reference Books	
1.	Shneiderman,—DesigningtheUserInterface:StrategiesforEffectiveHuman-Computer Interaction, Edition, Pearson Education.
Web Resources	
1.	https://www.interaction-design.org/literature/topics/human-computer-interaction
2.	https://link.springer.com/10.1007/978-0-387-39940-9_192
3.	https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	-	1	2	1	2
CO2	2	1	2	1	3	1
CO3	3	2	1	1	-	1
CO4	2	-	3	2	1	3
CO5	2	3	-	2	3	2
Weightage of course contributed to each PSO	11	6	7	8	8	9

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23122DSC63B	Introduction to Data Science	Elective	5	-	-	-	4	5	25	75	100
Course Objective											
LO1	To learn about basics of Data Science and Big data.										
LO2	To learn about overview and building process of Data Science.										
LO3	To learn about various Algorithms in Data Science.										
LO4	To learn about Hadoop Framework.										
LO5	To learn about case study about Data Science.										
UNIT	Details										No.of Hours
I	Introduction: Benefits and uses–Facts of data–Data science process–Big data ecosystem and data science										15
II	The Data science process: Overview–research goals-retrieving data-Transformation–Exploratory Data Analysis–Model building.										15
III	Algorithms: Machine learning algorithms–Modeling process–Types – Supervised– Unsupervised-Semi-supervised										15
IV	Introduction to Hadoop: Hadoop framework–Spark–replacing Map Reduce–No SQL–ACID–CAP–BASE–types										15
V	Case Study: Prediction of Disease-Setting research goals-Data retrieval–preparation-exploration-Disease profiling-presentation and automation										15
Total										75	
Course Outcomes							Programme Outcome				
CO	On completion of this course, students will										
1	Understand the basics in Data Science and Big data.						PO1				
2	Understand overview and building process in Data Science.						PO1,PO2				
3	Understand various Algorithms in Data Science.						PO4,PO6				
4	Understand Hadoop Framework in Data Science.						PO4,PO5,PO6				

5	Case study in Data Science.	PO3,PO8
Text Book		
1	DavyCielen,ArnoD.B.Meysman,MohamedAli,—Introducing Data Science, manningpublications2016	
Reference Books		
1.	RogerPeng,—TheArtofDataScience, lulu.com2016.	
2.	MurtazaHaider,—GettingStartedwithDataScience–MakingSenseofDatawith Analytics, IBMpress,E-book.	
3.	DavyCielen, ArnoD.B.Meysman, MohamedAli,—Introducing DataScience:Big Data,MachineLearning,andMore,UsingPythonTools, DreamtechPress2016.	
4.	AnnalynNg, KennethSoo,—Numsense! Data Science for the Layman:NoMath Added, 2017, 1stEdition.	
5.	CathyO'Neil,RachelSchutt,—DoingDataScienceStraightTalkfromtheFrontline, O'ReillyMedia2013.	
6.	LillianPierson,—DataScienceforDummies, 2017IIEdition	
Web Resources		
1.	https://www.w3schools.com/datascience/	
2.	https://en.wikipedia.org/wiki/Data_science	
3.	http://www.cmap.polytechnique.fr/~lepennec/en/post/references/refs/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	-
CO2	2	3	2	2	-	1
CO3	3	2	2	1	1	3
CO4	1	2	2	1	3	1
CO5	2	2	-	3	1	1
Weightage of course Contributed to each PSO	11	11	7	9	7	6

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23122DSC63C	Internet of Things and its applications	Elective	4	-	-	-	3	4	25	75	100
Course Objective											
C1	Use of Devices, Gateways and Data Management in IoT.										
C2	Design IoT applications in different domain and be able to analyze their performance										
C3	Implement basic IoT applications on embedded platform										
C4	To gain knowledge on Industry Internet of Things										
C5	To Learn about the privacy and Security issues in IoT										
UNIT	Details						No. of Hours				
I	IoT& Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.						12				
II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.						12				
III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-						12				

	Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views	
IV	IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management	12
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	12
	Total	60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
4	Perform analytics on data streams.	PO4, PO5, PO6
5	Learn NoSQL databases and management.	PO3, PO5
Text Book		
1	Vijay Madiseti and ArshdeepBahga, "Internet of Things: (A Hands-on Approach)", Universities Press (INDIA) Private Limited 2014, 1st Edition.	
Reference Books		
1.	Michael Miller, "The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and	

	Smart Cities Are Changing the World”, kindle version.
2.	Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, Apress Publications 2013, 1st Edition,.
3	WaltenegusDargie, ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice” 4..CunoPfister, “Getting Started with the Internet of Things”, O’Reilly Media 2011
Web Resources	
1.	https://www.simplilearn.com
2.	https://www.javatpoint.com
3.	https://www.w3schools.com

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	3	3
CO3	3	2	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	12	11	15	15	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst.Hours	M a r k s		
								CIA	External	Total
23122AEC64L	R Programming-LAB	Core	-	-	3	3	5	25	75	100
Course Objective										
LO1	To understand the problem solving approaches									
LO2	To learn the basic programming constructs in R Programming									
LO3	To practice various computing strategies for R Programming- based solutions to real world problems									
LO4	To use R Programming data structures-lists, tuples, and dictionaries.									
LO5	To do input/output with files in R Programming.									
Sl. No	Details									
1.	Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending Upon user' choice.									
2.	Program, to find the area of rectangle, square, circle and triangle by accepting suitable input Parameters from user.									
3.	Write a program to find list of even numbers from 1 to n using R-Loops.									
4.	Create a function to print squares of numbers in sequence.									
5.	Write a program to join columns and rows in a data frame using cbind() and rbind() in R.									
6.	Implement different String Manipulation functions in R.									
7.	Implement different data structures in R(Vectors, Lists, Data Frames)									

8	Write a program to read a cv file and analyze the data in the file in R.	
9	Create pie chart and bar chart using R.	
10	10.Create a data set and do statistical analysis on the data using R.	
11	Program to find factorial of the given number using recursive function	
12	Write an R program to count the number of even and odd numbers from array of N numbers.	
Total		
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Acquire programming skills in core R Programming	PO1,PO4,PO5
2	Acquire Object-oriented programming skills In RProgramming.	PO1,PO4,PO8
3	Develop the skill of designing graphical-user interfaces(GUI) in RProgramming	PO1,PO3,PO6
4	Acquire RProgramming skills to move into Specific branches	PO3,PO4
5		PO1,PO5,PO6
Text Book		
1	RogerD.Peng, RProgrammingforDataScience—,2012	
2	NormanMatloff, The Art of R Programming-A To our of Statistical Software Design , 2011	
Reference Books		
1	Garrettn Golemund, Hadley Wickham, Hands –On Programming with R:Write Your Own Functions and Simulations ,1stEdition,2014	
2.	Venables,W.N.,andRipley, Sprogramming—,Springer,2000.	
web Resources		
1.	https://www.simplilearn.com	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	1	2
CO2	2	3	3	3	1	2
CO3	2	3	3	3	1	2
CO4	2	3	3	3	1	2
CO5	2	3	3	3	1	2
Weightage of course contributed to each PSO	11	15	15	15	5	10

S-Strong-3 M-Medium-2L-Low-1

Course Code	Course Title	L	T	P	C
23122PRW65	Project Work	8	0	0	4

231ACSIKWS	INDIAN KNOWLEDGE SYSTEM	0	0	0	2
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Course Objectives:

The course design seeks to address the following issues:

- To introduce to the students the overall organization of IKS
- To develop an appreciation among the students the role and importance of Veda, Vedanta's, Upa Vedas and Purānas.
- To show case the multi-dimensional nature of IKS and their importance in the contemporary society.
- To motivate the students to take up a detailed study of some of these topics and explore their application potential

Course Outcomes:

CO1: Explain the historicity of Indian Knowledge System and the broad classification of Indian philosophical systems.

CO2: Explain the potential of Sanskrit in natural language processing.

CO3: Explain the features of Indian numeral system and its role in science & technology advancement.

CO4: Illustrate the basic elements of the Indian calendar and the components of Indian Panchanga.

CO5: Outline the science, engineering & technology heritage of ancient and medieval India.

Syllabus

Unit I: Introduction to Indian Knowledge System (IKS), Definition, Concept and Scope of IKS (4)

Definition, Concept and Scope of IKS

IKS based approaches on Knowledge Paradigms

IKS in ancient India and in modern India

Unit II: IKS and Indian Scholars, Indian Literature (8)

1. Philosophy and Literature(MaharishiVyas,Manu,Kanad,Pingala,Parasar,Banabhatta, Nagarjuna and Panini)
2. Mathematics and Astronomy(Aryabhata,Mahaviracharya,Bodhayan,Bhashkaracharya, Varahamihira and Brahmgupta)
3. Medicine and Yoga(Charak,Susruta,MaharishiPatanjaliandDhanwantri)
4. Sahitya(Vedas,Upvedas,Upavedas(Ayurveda,Dhanurveda,Gandharvaveda)
5. PuranandUpnishad)andshaddarshan(Vedanta,Nyaya.Vaisheshik,Sankhya,Mimamsa, Yoga, Adhyatma and Meditation)

6. Shasta(Nyaya,vyakarana,Krishi,Shilp,Vastu,Natya and Sangeet)

Unit III: Indian Traditional/tribal/ethnic communities, their livelihood and local wisdom (6)

1. Geo physical aspects, Resources and Vulnerability
2. Resource availability ,utilization pattern and limitations
3. Socio-Cultural linkages with Traditional Knowledge System
4. Tangible and in tangible cultural heritage.

Unit IV: Unique Traditional Practices and Applied Traditional Knowledge (8)

1. Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives
2. Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices
3. Indigenous Bio-resource Conservation, Utilization Practices and Food Preservation Methods, Handicrafts, Wood Processing and Carving, -Fiber Extraction and Costumes
4. Vaidya(traditional healthcare system), Tantra-Mantra, Amchi Medicine System
5. Knowledge of dyeing, chemistry of dyes, pigments and chemicals

Unit V: Protection, preservation, conservation and Management of Indian Knowledge System (4)

1. Documentation and Preservation of IKS
2. Approaches for conservation and Management of nature and bio-resources
3. Approaches and strategies to protection and conservation of IKS **Mapping with Programme Outcomes:**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	2	3
CO3	3	3	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	3	3	3	2
Weightage of course contributed to each PSO	15	15	14	15	14	14

S-Strong-3 M-Medium-2L-Low-1



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

**M.C.A.,
SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF COMPUTER SCIENCE**

PG CURRICULUM

FULL TIME

[Regulation 2023]

[Candidates admitted from the academic year 2023-2024 onwards]

PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)
REGULATIONS ON LEARNING OUTCOME-BASED CURRICULUM
FRAMEWORK FOR POSTGRADUATE EDUCATION

Programme	M.C.A.,
Programme Code	23PGCOAGE
Duration	PG - Two Years
Programme Outcomes (Pos)	<p>PO1: Problem Solving Skill Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.</p> <p>PO2: Decision Making Skill Foster analytical and critical thinking abilities for data-based decision-making.</p> <p>PO3: Ethical Value Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.</p> <p>PO4: Communication Skill Ability to develop communication, managerial and interpersonal skills.</p> <p>PO5: Individual and Team Leadership Skill Capability to lead themselves and the team to achieve organizational goals.</p> <p>PO6: Employability Skill Inculcate contemporary business practices to enhance employability skills in the competitive environment.</p> <p>PO7: Entrepreneurial Skill Equip with skills and competencies to become an entrepreneur.</p> <p>PO8: Contribution to Society Succeed in career endeavors and contribute significantly to society.</p> <p>PO 9 Multicultural competence Possess knowledge of the values and beliefs of multiple cultures and a global perspective.</p> <p>PO 10: Moral and ethical awareness/reasoning Ability to embrace moral/ethical values in conducting one's life.</p>
Programme Specific Outcomes (PSOs)	<p>PSO1 – Placement To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions.</p> <p>PSO 2 - Entrepreneur To create effective entrepreneurs by enhancing their critical thinking,</p>

	<p>problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.</p> <p>PSO3 – Research and Development Design and implement HR systems and practices grounded in research that complies with employment laws, leading the organization towards growth and development.</p> <p>PSO4 – Contribution to Business World To produce employable, ethical and innovative professionals to sustain in the dynamic business world.</p> <p>PSO 5 – Contribution to the Society To contribute to the development of the society by collaborating with stakeholders for mutual benefit.</p>
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1.1.3	color
EMPLOYABILITY	
SKILL DEVELOPMENT	
ENTREPRENEURSHIP	
EMPLOYABILITY,/ENTREPRENEURSHIP,/SKILL DEVELOPMENT	
EMPLOYABILITY,/SKILL DEVELOPMENT	
EMPLOYABILITY,/ENTREPRENEURSHIP	



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
MCA (MASTER OF COMPUTER APPLICATION)
REGULATION 2023 – 2024
COURSE STRUCTURE
SEMESTER-I**

Course Code	Course Title – MCA	L	T	P	C
THEORY					
23222AEC11	Discrete Mathematics	5	1	0	4
23222AEC12	Linux and shell programming	4	1	0	3
23222AEC13	Python Programming	4	1	0	3
PRACTICAL					
23222SEC14L	Linux and shell programming Lab	0	0	3	3
23222SEC15L	Python Programming Lab	0	0	3	3
Electives					
23222SEC16	Data Science	2	-	-	2
23222RMC17	Research Methodology	2	-	-	2
	Total	17	3	6	20

SEMESTER – II

Course Code	Course Title – MCA	L	T	P	C
THEORY					
23222AEC21	Data Structures and Algorithms	4	1	0	3
23222AEC22	Big Data Analytics	4	1	0	3
23222DSC23_	Internet of Things	5	0	0	4
23222DSC24_	Cyber Security	5	0	0	4
PRACTICAL					
23222SEC25L	Data Structures and Algorithms Lab	0	0	3	3
23222SEC26L	Big Data Analytics Lab	0	0	3	3
PRACTICAL					
23222SEC27	NME Fundamentals of Human Rights	2	0	0	2
23222BRC28	Participation in Bounded Research	2	0	0	2
23222SEC29	Internship Industrial Activity			0	2
	Total	22	2	6	26

SEMESTER – III

Course Code	Course Title – MCA	L	T	P	C
THEORY					
23222AEC31	Advanced Java Programming	5	2	0	6
23222AEC32	Web Technology	5	2	0	6
23222AEC33	Advanced Machine Learning (AML)	5	2	0	5
PRACTICAL					
23222SEC34L	Advanced Java Programming lab	0	0	3	3
23222SEC35L	Web Technology Lab	0	0	3	3
23222SEC36	Industrial visit	0	0	0	2
	Total	15	6	9	25

SEMESTER – IV

Course Code	Course Title – MCA	L	T	P	C
THEORY					
23222AEC41	Data Visualization Tools	5	1	0	4
23222AEC42	Mobile Computing	5	1	0	4
23222DSC43_	Social Networks	5	1	0	4
23222PRW44	Project with Viva voce	0	0	10	4
23222SEC45	Skill Enhancement Professional Competency Skill	2	0	0	2
23222SEC46	Internship Industrial Activity	-	-	-	2
	Total	17	3	10	20
	Total Credits for the Programme				91

Discipline Specific Electives

Semester	Discipline Specific Elective Courses-I
II	a) 23222DSC23A- Internet of Things b) 23222DSC23B- Internet of Things Lab c) 23222DSC23C- Computer Vision
	Discipline Specific Elective Courses-II
II	a) 23222DSC24A- Cyber Security b) 23222DSC24B- Cyber Security Lab c) 23222DSC24C- Block chain Technologies
	Discipline Specific Elective Courses-III
IV	a) 23222DSC43A- Social Networks b) 23222DSC43B- Social Networks Lab c) 23222DSC43C- High Performance Computing

Credit Distribution for PG Programme

MCA (MASTER OF COMPUTER APPLICATION)

SEM	AEC	SEC	DSC	RSB Courses	others	Total
I	10	8	-	2	-	20
II	6	10	8	2	-	26
III	17	8	-	-	-	25
IV	8	4	4	-	4	20
Total	41	30	12	4	4	91

Course Code	Course Title – MCA	L	T	P	C
23222AEC11	Discrete Mathematics	5	1	0	4

Course Objective

- To know the concepts of relations and functions
- To distinguish among different normal forms and quantifiers
- To solve recurrence relations and permutations & combinations

Unit-I

Relations- Binary relations-Operations on relations- properties of binary relations in a set – Equivalence relations— Representation of a relation by a matrix -Representation of a relation by a digraph – **Functions-**Definition and examples-Classification of functions-Composition of functions-Inverse function

Unit-II

Mathematical Logic-Logical connectives-Well-formed formulas – Truth table of well formed formula –Algebra of proposition –Quine’s method- Normal forms of well formed formulas- Disjunctive normal form-Principal Disjunctive normal form-Conjunctive normal form-Principal conjunctive normal form-Rules of Inference for propositional calculus – Quantifiers- Universal Quantifiers- Existential Quantifiers

Unit-III

Recurrence Relations- Formulation -solving recurrence Relation by Iteration- solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two- Solving Linear Non homogeneous Recurrence Relations. Permutations-Cyclic permutation- Permutations with repetitions-permutations of sets with indistinguishable objects- Combinations- Combinations with repetition

Unit-IV

Matrices- special types of matrices-Determinants-Inverse of a square matrix-Cramer’s rule for solving linear equations-Elementary operations-Rank of a matrix-solving a system of linear equations-characteristic roots and characteristic vectors-Cayley-Hamilton Theorem-problems

Unit-V

Graphs -Connected Graphs -Euler Graphs- Euler line-Hamiltonian circuits and paths –planar graphs – Complete graph-Bipartite graph-Hyper cube graph-Matrix representation of graphs

Text book

1. N.Chandrasekaran and M.Umaparvathi, Discrete mathematics, PHI Learning Private Limited, New Delhi, 2010.

Reference Book

1. Kimmo Eriksson & Hillevi Gavel, Discrete Mathematics & Discrete Models, Student literature AB, 2015.

Course Code	Course Title – MCA	L	T	P	C
23222AEC12	Linux and shell programming	4	1	0	3

Course Outcomes

On the successful completion of the course, students will be able

CO1:	To understand the concepts of relations and functions distinguish among normal forms	K2	IO
CO2:	To analyze and evaluate the recurrence relations	K4,K5	HO
CO3:	To distinguish among various normal forms and predicate calculus	K5	HO
CO4:	To solve and know various types of matrices	K1	LO
CO5:	To evaluate and solve various types of graphs	K5	HO

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Course Objective

- To teach principles of operating system including File handling utilities, Basic Linux commands, Scripts and filters.
- To familiarize fundamentals of shell (bash), shell programming, pipes, Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.
- To impart fundamentals of file concepts kernel support for file, File structure related system calls (file API's).
- To facilitate students in understanding Inter process communication, semaphore and shared memory.
- To explore real-time problem solution skills in Shell programming.

Unit-I

Basic bash Shell Commands: Interacting with the shell-Traversing the file system-Listing files and directories-Managing files and directories-Viewing file contents. **Basic Script Building:** Using multiple commands-Creating a script file-Displaying messages-Using variables-Redirecting input and output-Pipes-Performing math-Exiting the script. **Using Structured Commands:** Working with the if-then statement-Nesting ifs-Understanding the test command-Testing compound conditions-Using double brackets and parentheses-Looking at case.

Unit-II

More Structured Commands: Looping with for statement-Iterating with the until statement-Using the while statement-Combining loops-Redirecting loop output. **Handling User Input:** Passing parameters-Tracking parameters-Being shifty-Working with options-Standardizing options-Getting user input. **Script Control:** Handling signals-Running scripts in the background-Forbidding hang-ups-Controlling a Job-Modifying script priority-Automating script execution.

Unit-III

Creating Functions: Basic script functions-Returning a value-Using variables in functions-Array and variable functions-Function recursion-Creating a library-Using functions on the command line. **Writing Scripts for Graphical Desktops:** Creating text menus-Building text window widgets-Adding X Window graphics. **Introducing sed and gawk:** Learning about the sed Editor-Getting introduced to the gawk Editor-Exploring sed Editor basics.

Unit-IV

Regular Expressions: Defining regular expressions-Looking at the basics-Extending our patterns-Creating expressions. **Advanced sed:** Using multiline commands-Understanding the hold space-Negating a command-Changing the flow-Replacing via a pattern-Using sed in scripts-Creating sed utilities. **Advanced gawk:** Reexamining gawk-Using variables in gawk-Using structured commands-Formatting the printing-Working with functions.

Unit-V

Working with Alternative Shells: Understanding the dash shell-Programming in the dash shell-Introducing the zsh shell-Writing scripts for zsh.**Writing Simple Script Utilities:** Automating backups-Managing user accounts-Watching disk space. **Producing Scripts for Database, Web, and E-Mail:** Writing database shell scripts-Using the Internet from your scripts-Emailing reports from scripts. **Using Python as a Bash Scripting Alternative:** Technical requirements-Python Language-Hello World the Python way-Pythonic arguments-Supplying arguments-Counting arguments-Significant whitespace-Reading user input-Using Python to write to files-String manipulation.

Text book:

1. Richard Blum, Christine Bresnahan, “Linux Command Line and Shell Scripting BIBLE”, Wiley Publishing, 3rd Edition, 2015. **Chapters:** 3, 11 to 14, and 16 to 25.
2. Mokhtar Ebrahim, Andrew Mallett, “Mastering Linux Shell Scripting”, Packt Publishing, 2nd Edition, 2018. **Chapter:** 14.

3. Reference Books:

1. Clifflynt, SarathLakshman, ShantanuTushar, “Linux Shell Scripting Cookbook ”, Packt Publishing, 3rd Edition, 2017.
2. Stephen G.Kochan, Patrick Wood, “Shell Programming in Unix, Linux, and OS X”, Addison Wesley Professional, 4th Edition, 2016.
3. Robert Love, “Linux System Programming”, O'Reilly Media, Inc, 2013
4. W.R. Stevens, “Advanced Programming in the UNIX environment”, 2nd Edition, Pearson Education, 2013
5. Graham Glass, King Ables, “ UNIX for Programmers and Users”, 3rd Edition, Pearson Education, 2003

Course Outcomes

On the successful completion of the course, students will be able

CO1:	To understand, apply and analyze the concepts and methodology of Linux shell programming	K1-K6
CO2:	To comprehend, impart and apply fundamentals of control structure and script controls	K1-K6
CO3:	To understand, analyses and evaluate the functions, graphical desktop interface and editors	K1-K6
CO4:	To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk	K1-K6
CO5:	To comprehend, use and illustrate the advance concepts such as alternate shell script, data connectivity and bash scripting using python	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	S	S	S	-	S	L	-	M	M	M	M	S
CO2	S	S	M	-	S	L	-	M	M	M	M	S
CO3	S	S	M	-	S	L	-	M	M	S	S	S
CO4	S	S	M	-	S	L	-	M	M	M	M	S
CO5	S	S	M	-	S	L	-	M	M	M	M	S

S- Strong; M-Medium; L-Low

23222AEC13	Python Programming	4	1	0	3
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Course Objectives:

- To acquire programming skills in core Python
- To learn Strings and function
- To develop object oriented skills in Python
- To comprehend various Python Packages
- To develop web applications using Django

Unit I

Introduction : Fundamental ideas of Computer Science - Strings, Assignment, and Comments - Numeric Data types and Character sets – Expressions – Loops and Selection Statements: Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop

Unit II

Strings and Text Files: Accessing Characters and substrings in strings - Data encryption-Strings and Number systems- String methods – Text - Lists and Dictionaries: Lists – Dictionaries – Design with Functions: A Quick review - Problem Solving with top-Down Design - Design with recursive Functions - Managing a Program’s namespace - Higher-Order Functions

Unit III

Design with Classes: Getting inside Objects and Classes – Data-Modeling Examples – Building a New Data Structure – The Two – Dimensional Grid - Structuring Classes with Inheritance and Polymorphism Graphical User Interfaces -The Behavior of terminal-Based programs and GUI-Based programs - Coding Simple GUI-Based programs - Windows and Window Components - Command Buttons and responding to events

Unit IV

Working with Python Packages: NumPy Library-Ndarray – Basic Operations – Indexing, Slicing and Iteration – Array manipulation - Pandas –The Series – The Data Frame - The Index Objects – Data Visualization with Matplotlib – The Matplotlib Architecture – pyplot – The Plotting Window – Adding Elements to the Chart – Line Charts – Bar Charts – Pie charts

Unit V

Django: Installing Django – Building an Application – Project Creation – Designing the Data Schema - Creating an administration site for models - Working with QuerySets and Managers – Retrieving Objects – Building List and Detail Views

Text Book:

1. K.A. Lambert, “ Fundamentals of Python: first programs”, Second Edition, Cengage Learning, 2018 (**Unit - I, II and III**)
2. Fabio Nelli, “Python Data Analytics: With Pandas, NumPy, and Matplotlib”, Second Edition, Kindle Edition, 2018 (**Unit - IV**)
3. Antonio Mele, “Django 3 By Example”, Third Edition, 2020 (**Unit - V**)

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Comprehend the programming skills in python and develop applications using conditional branches and loop	K1- K6
CO2	Create python applications with strings and functions	
CO3	Understand and implement the Object Oriented Programming paradigm with the concept of objects and classes, Inheritance and polymorphism	
CO4	Evaluate the use of Python packages to perform numerical computations and data vizualization	
CO5	Design interactive web applications using Django	

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
CO1	S	S	M	S	M	S	S	S	S	M	S	S
CO2	S	S	S	M	S	S	S	S	S	S	M	S
CO3	S	M	S	S	M	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	M	M	S

S- Strong; M-Medium; L-Low

Course Objectives

- To enable the students to study and understand the efficiency of Linux shell script.
- To demonstrate the File Backup process.
- To develop and implement the shell script for GUI processing.
- To develop and implement the shell script for IPC and Networking.
- To demonstrate Postgre SQL.

List of Programs

1. Write a Shell Script program to calculate the number of days between two dates.
2. Write a Shell Script program to check systems on local network using control structures with user input.
3. Write a Shell Script program to check systems on local network using control structures with file input.
4. Write a Shell Script program to demonstrate the script control commands.
5. Write a Shell Script program to demonstrate the Shell script function.
6. Write a Shell Script program to demonstrate the Regular Expressions.
7. Write a Shell Script program to demonstrate the sed and awk Commands.
8. Write a Shell Script program to demonstrate the File Backup process through creating a daily archive location.
9. Write a Shell Script program to create a following GUI tools.
 - a) Creating text menus
 - b) Building text window widgets
10. Write a Shell Script program to demonstrate to connect a Postgre SQL database and performing CRUD operations.

Course Outcomes

On the successful completion of the course, students will be able to

CO1:	To understand, apply and analyze the concepts and methodology of Linux shell programming	K1-K6
CO2:	To comprehend, impart and apply fundamentals of control structure and script controls	K1-K6
CO3:	To understand, analyses and evaluate the functions, graphical desktop interface and editors	K1-K6
CO4:	To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk	K1-K6
CO5:	To comprehend, use and analyze the advance concepts such as alternate shell script, dy and bash scripting using PostgreSQL	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	-	S	-	-	-	M	-	-	-
CO2	S	S	S	-	S	-	-	-	M	-	-	-
CO3	S	S	S	-	S	-	-	-	M	S	S	S
CO4	S	S	S	-	S	-	-	-	M	-	-	-
CO5	S	S	S	-	S	-	-	-	M	S	S	S

S- Strong; M-Medium; L-Low

23222SEC15L	Python Programming Lab	0	0	3	3
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Course Objectives:

This course enables the students:

- To master the fundamentals of writing python scripts
- To create program using elementary data items
- To implement Python programs with conditionals and loops
- To use functions for structuring Python programs
- To develop web programming with Django

Implement the following in Python:

1. Program using elementary data items, lists, dictionaries and tuples
2. Program using conditional branches, loops
3. Program using functions
4. Program using classes and objects
5. Program using inheritance
6. Program using polymorphism
7. Program using Numpy
8. Program using Pandas
9. Program using Matplotlib
10. Program for creating dynamic and interactive web pages using forms

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Comprehend the programming skills in python and write scripts	K1- K6
CO2	Create python applications with elementary data items, lists, dictionaries and tuples	
CO3	Implement the Object Oriented Programming concepts such as objects and classes, Inheritance and polymorphism	
CO4	Assess the use of Python packages to perform numerical computations and perform data visualization	
CO5	Create interactive web applications using Django	

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	M	L	S
CO4	S	S	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	L	S	M	S	S	M	M	S

S- Strong; M-Medium; L-Low

23222SEC16	Data Science	2	-	-	2
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Unit – I:

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit – II:

Data Collection and Data Pre-Processing Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

Unit – III:

Exploratory Data Analytics Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Unit – IV:

Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

Unit – V:

Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Over fitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

REFERENCES:

1. Jojo Moolayil, “Smarter Decisions: The Intersection of IoT and Data Science”, PACKT, 2216.
2. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O’Reilly, 2215.
3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2213
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.

23222RMC17	RESEARCH METHODOLOGY	2	-	-	2
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OBJECTIVES:

- To understand the approaches towards and constraints in good research.
- To identify various statistical tools used in research methodology
- To appreciate and compose the manuscript for publication
- To train in MATLAB platform for basic computational programming and analysis.

OUTCOME:

Ability to develop research questions and the various research strategies and compile research results in terms of journal manual scripts.

UNIT-I Introduction to research methodology Objectives of research – type of research – Significance of research. Research methodology – Research and scientific method – Criteria of good research – Problems encountered by research in India.

UNIT-II Data base and Literature Survey Articles – Thesis – Journals – Patents – Primary sources of journals and patents – Secondary sources – Listing of titles – Abstracts – Chemical Abstract Service – Reviews – Monographs – Literature search.

UNIT-III Data Analysis: Precision and accuracy – Reliability – Determinate and random errors – Distribution of random errors – normal distribution curve – Statistical treatment of finite samples – T test and F test (ANOVA) co – Variance (ANCOVA) correlation and multiple regression.

UNIT-IV Thesis and paper writing: Conventions in writing – General format – Page and chapter format – Use of quotations and footnotes – Preparations of tables and figures – Reference and Appendices.

UNIT-V Application on MATLAB: Numerical Integration – Numerical integration, ordinary differential equations, partial differential equations, and boundary value problems - Fourier analysis – Fourier transforms, convolution.

References:

1. C.R. Kothari, Research Methodology, New Age International publishers. New Delhi, 2224.
2. R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 1999.
3. R. Gopalan, Thesis writing, Vijay Nicole Imprints Private Ltd., 2225.
4. A Guide to MATLAB: For Beginners and experienced Users by Brian R. Hunt (Editor), Ronald L. Lipsman, J. Rosenberg
5. Introduction to MATLAB for Engineers by William J. Palm III.

23222AEC21	Data Structures and Algorithms	4	1	0	3
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Course Objectives:

- To get a clear understanding of various ADT structures.
- To understand how to implement different ADT structures with real-time scenarios.
- To analyze the various data structures with their different implementations.
- To get an idea of applying right models based on the problem domain.
- To realize, and understand how and where to implement modern data structures with Python language.

Unit-I

Abstract Data Types: Introduction-Date Abstract Data Type-Bags-Iterators. **Arrays:** Array Structure-Python List-Two Dimensional Arrays-Matrix Abstract Data Type. **Sets, Maps:** Sets-Maps-Multi-Dimensional Arrays.

Unit-II

Algorithm Analysis: Experimental Studies-Seven Functions-Asymptotic Analysis. **Recursion:** Illustrative Examples-Analyzing Recursive Algorithms-Linear Recursion- Binary Recursion-Multiple Recursion.

Unit-III

Stacks, Queues, and Deques: Stacks- Queues- Double-Ended Queues Linked. **Lists:** Singly Linked Lists-Circularly Linked Lists-Doubly Linked Lists. **Trees:** General Trees-Binary Trees-Implementing Trees-Tree Traversal Algorithms.

Unit-IV

Priority Queues: Priority Queue Abstract Data Type- Implementing a Priority Queue- Heaps-Sorting with a Priority Queue. **Maps, Hash Tables, and Skip Lists:** Maps and Dictionaries-Hash Tables-Sorted Maps-Skip Lists-Sets, Multisets, and Multimaps.

Unit-V

Search Trees: Binary Search Trees-Balanced Search Trees-AVL Trees-Splay Trees. **Sorting and Selection:** Merge sort-Quick sort-Sorting through an Algorithmic Lens- Comparing Sorting Algorithms-Selection. **Graph Algorithms:** Graphs-Data Structures for Graphs-Graph Traversals-Shortest Paths-Minimum Spanning Trees.

Text book:

1. Rance D. Necaie, “Data Structures and Algorithms Using Python”, John Wiley & Sons, 2011. (Unit – 1)**Chapters:** 1, 2, 3.
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, John Wiley & Sons, 2013. (Unit – 2, 3, 4, and 5)**Chapters:** 3 to 12, and 14.

Reference books:

1. Dr. Basant Agarwal; Benjamin Baka, “Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7”, Packt Publishing, 2018.
2. Magnus Lie Hetland, “Python Algorithms: Mastering Basic Algorithms in the Python Language”, Apress, 2014.

Course Outcome:

On the successful completion of the course, students will be able to,

CO1	Understand various ADT concepts	K1-K6
CO2	Familiar with implementation of ADT models with Python language and understand how to develop ADT for the various real-time problems	
CO3	Apply with proper ADT models with problem understanding	
CO4	Apply and Analyze right models based on the problem domain	
CO5	Evaluate modern data structures with Python language	

K1- Remember, K2 - Understand, K3 - Apply , K4 - Analyze, K5 - Evaluate, K6 -Create

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	L	L	S	S	S	L	M	M
CO2	S	M	S	M	M	L	L	L	L	L	M	M
CO3	S	S	S	L	L	L	M	M	M	M	M	L
CO4	S	S	S	L	L	L	M	M	M	L	L	L
CO5	S	S	S	L	M	M	S	S	S	S	M	L

L - Low, M- Medium, S - Strong

Course Objectives

- To introduce big data tools & Information Standard formats.
- To understand the basic concepts of big data.
- To learn Hadoop, HDFS and Map Reduce concepts.
- To teach the importance of No SQL.
- To explore the big data tools such as Hive, H Base and Pig.

UNIT I

Big Data and Analytics: Classification of Digital Data: Structured Data- Semi Structured Data and Unstructured Data. Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop. Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools

UNIT II

Technology Landscape: No SQL, Comparison of SQL and No SQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

UNIT III

Mongoddb and Mapreduce Programming: MongoDB: Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language.

MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression

UNIT IV

Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile - Implementation - Hive User Defined Function - Serialization and Deserialization.

UNIT V

Pig: Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive

Text Book:

1. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publications, First Edition, 2015

Reference Book:

1. Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman, "Big data for dummies", John Wiley & Sons, Inc. (2013)
2. Tom White, "Hadoop The Definitive Guide", O'Reilly Publications, Fourth Edition, 2015
3. Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss, "Hadoop For Dummies", Wiley Publications, 2014

Course Outcomes On the successful completion of the course, students will be able to

CO1:	To understand, illustrate and evaluate the concepts and techniques of Data Science, Big Data Analytics and its tools	K1-K6
CO2:	To collaborate, apply and review the computing for big data in Hadoop, and NoSQL environment.	K1-K6
CO3:	To comprehend, implement and review the concepts of data science and big data analytics projects using MapReduce, and MongoDB	K1-K6
CO4:	To understand, use and analyze the concepts of big data analytics projects using HIVE database.	K1-K6
CO5:	To illustrate, develop and review the concepts of PIG database in Hadoop environment.	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5 Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO1 2
CO1	S	-	-	-	-	L	-	-	-	-	-	-
CO2	S	-	M	-	M	L	-	-	-	-	-	-
CO3	S	-	S	-	S	L	-	-	-	S	S	S
CO4	S	-	S	-	S	L	-	-	-	S	S	S
CO5	S	-	S	-	S	L	-	-	-	S	S	S

S- Strong; M-Medium; L-Low

23222SEC25L	Data Structures and Algorithms Lab	0	0	3	3
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Course Objectives:

- To understand Stack, Queue and Doubly Linked ADT structures.
- To implement different ADT structures with real-time scenarios.
- To analyze the recursion concepts.
- To apply different sorting and tree techniques.
- To implement modern data structures with Python language.

Implement the following problems using Python 3.4 and above

1. Recursion concepts.

i) Linear recursion

ii) Binary recursion.

2. Stack ADT.

3. Queue ADT.

4. Doubly Linked List ADT.

5. Heaps using Priority Queues.

6. Merge sort.
7. Quick sort.
8. Binary Search Tree.
9. Minimum Spanning Tree.
10. Depth First Search Tree traversal.

Course Outcome:

On the successful completion of the course, students will be able to,

CO1	Strong understanding in various ADT concepts	K1-K6
CO2	To become a familiar with implementation of ADT models	
CO3	Apply sort and tree search algorithms	
CO4	Evaluate the different data structure models	
CO5	Learn how to develop ADT for the various real-time problems	

K1- Remember, K2 - Understand, K3 - Apply, K4 - Analyze, K5 - Evaluate, K6 -Create

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	L	L	S	S	M	M	S	S
CO2	S	M	S	M	M	L	S	M	S	L	M	M
CO3	S	S	S	L	L	L	M	M	M	M	S	L
CO4	S	S	S	M	M	S	M	M	S	S	S	L
CO5	S	S	S	S	L	M	S	M	M	M	M	L

L - Low, M- Medium, S - Strong

23222SEC26L	Big Data Analytics Lab	0	0	3	3
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Course Objectives

- To teach the fundamental techniques for handling the big data tools.
- To familiarize the tools required to manage big data.
- To analyze big data using Hadoop, Map Reduce, Hive, and Pig
- To teach the fundamental principles in achieving big data analytics with scalability and streaming capability
- To enable students to have skills that will help them to solve complex.

List of Programs

1. Implement File System Shell Commands for HDFS in Hadoop Environment
2. Write a Map reduce program using single reduce function for finding Maximum and Minimum Number
3. Write a Map reduce program using multiple reduce function for Word Count in an given Text document
4. Implement the following using Pig Latin Input and Output Operations Relational Operations
5. Implement the following using Pig Latin User Defined Functions Advanced Relational Operations
6. Write a Word Count program using Pig Latin Script
7. Write a program to find a maximum temperature using Pig Latin Script
8. Implement the following using Hive commands Handling the Database Creating and Manipulating table
9. Implement Simple Queries for database using Mongo
10. Implement Simple Queries for collections using Mongo

Course Outcomes

On the successful completion of the course, students will be able to

CO1:	Understand and develop conceptually how Big Data is stored and implement it using different tools	K1-K6
CO2:	Comprehend and implement programs for data storage in HDFS and table manipulation using Big Data tools in Hadoop environment	K1-K6
CO3:	Understand and Critically analyze existing Big Data datasets and implementations the solutions for it using Mongo DB	K1- K6
CO4:	Understand and examine existing Big Data datasets and implementations the solutions using HIVE database	K1- K6
CO5:	Comprehend and review existing datasets and implementations the solutions to handle it using PIG	K1- K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	S	S	M		M	S	-	-	-	-	-	-
CO2	S	M	S	S	S	M	-	-	-	-	-	-
CO3	S	S	S	S	S	S	-	-	-	-	-	-
CO4	S	M	S	S	S	M	-	-	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-	-	-

23222DSC23A	Internet of Things	5	0	0	4
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Course Objectives:

- To get familiar with the evolution of IOT with its design principles
- To outline the functionalities and protocols of internet communication
- To analyze the hardware and software components needed to construct IOT applications

UNIT I: FUNDAMENTALS OF IOT Evolution of Internet of Things – Enabling Technologies – IOT Architectures: oneM2M, IOT World Forum (IOTWF) and Alternative IOT models – Simplified IOT Architecture and Core IOT Functional Stack – Fog, Edge and Cloud in IOT – Functional blocks of an IOT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II: IOT PROTOCOLS IOT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IOT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT.

UNIT – III: DESIGN AND DEVELOPMENT Prototyping Embedded Devices: Electronics - Embedded Computing Basics – Arduino - Raspberry Pi - Beagle Bone Black - Electric Imp. Prototyping the Physical Design: Non digital Methods - Laser Cutting - 3D printing - CNC Milling - Repurposing/Recycling.

UNIT – IV: Prototyping Online Components: Getting started with an API - Writing a New API - Real-Time Reactions - Other Protocols. Techniques for Writing Embedded Code: Memory Management - Performance and Battery Life – Libraries - Debugging.

UNIT – V: Business Models: History of Business Models – Model – Internet of Starting up – Lean Startups. Moving to Manufacture: Designing Kits - Designing Printed circuit boards – Certification – Costs - Scaling up Software. Ethics: Privacy – Control – Environment – Solutions.

Text Books:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017 (UNIT I and II)
2. Adrian McEwen and Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2014. (UNIT III, IV and V)

Reference Books:

1. Ovidiu Vermesan and Peter Friess, “Internet of Things – From Research and Innovation to Market Deployment”, River Publishers, 2014.
2. Peter Waher, “Learning Internet of Things”, Packt Publishing, 2015.
3. Donald Norris, “The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBoneBlack”, McGraw Hill, 2015.

Course Outcomes

On the successful completion of the course, students will be able to

CO1:	Comprehend the IoT evolution with its architecture and sensors	K1- K6
CO2:	Understand the networking concepts for communication and underlying IoT protocols	
CO3:	Assess the embedded technologies and develop prototypes for the IoT products	
CO4:	Evaluate the use of Application Programming Interface and design an API for IoT in real-time	
CO5:	Recognize the ethics of business models and perform security analysis	

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	M	S
CO3	S	M	S	S	S	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S

S- Strong; M-Medium; L-Low

23222DSC23B	Internet of Things Lab	0	0	3	3
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Course Objectives:

- To create IoT program to turn ON/OFF LED
- To implement IoT program for object detection
- To develop IoT programs for agricultural purpose
- To create web server program for local hosting
- To design IoT application for health monitoring

1. To develop an IoT program to turn ON/OFF LED light (3.3V)

2. To develop an IoT program using IR sensor (Smart Garbage Monitoring, Detecting Parking Availability, etc.)

3. To develop an IoT program using Humidity and Temperature Monitoring (Forest fire Detection, Weather Monitoring)

4. To develop an IoT web server program for local hosting

5. To develop an IoT program using Soil Moisture Sensor

6. To develop an IoT program using Ultrasonic Sensor (Distance Measurement, etc.)

7. To develop an real-time IoT program using Relay Module (Smart Home Automation with 230V)

8. To develop an IoT program for Fire Detection (Home, Industry,etc.)

9. To develop an IoT program for Gas Leakage detection (Home, Industry, etc.)

10. To develop an IoMT program using Heartbeat Sensor

Course Outcomes

On the successful completion of the course, students will be able to,

CO1	Implement IoT programs to turn ON/OFF LED	K1 - K6
CO2	Develop IoT programs for object detection	
CO3	Create IoT programs for agricultural purpose	
CO4	Implement web server program for local hosting	
CO5	Design IoT application for health monitoring	

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	S	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	M	S
CO3	S	M	S	S	S	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	L	M	S
CO5	S	S	S	S	M	S	L	S	S	M	M	S

S- Strong; M-Medium; L-Low

23222DSC24A	Cyber Security	5	0	0	4
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Course Objectives:

- To understand the basics of Cybercrime and Computer forensics with protecting mechanism
- To explore the working principles of WLAN, Email and Smartphone along with security mechanism and guidelines

Unit – I

Introduction to cybercrime: Classification of cybercrimes – reasons for commission of cybercrime – malware and its type – kinds of cybercrime – authentication – encryption – digital signatures – antivirus – firewall – steganography – computer forensics – why should we report cybercrime – introduction counter cyber security initiatives in India – generating secure password – using password manager-enabling two-step verification – security computer using free antivirus.

Unit – II

Tips for buying online: Clearing cache for browsers – wireless LAN-major issues with WLAN-safe browsing guidelines for social networking sites – email security tips – introduction-smartphone security guidelines – purses, wallets, smart phones – platforms, setup and installation-communicating securely with a smartphone.

Unit – III

Cyber investigation roles: Introduction – role as a cybercrime investigator – the role of law enforcement officers – the role of the prosecuting attorney – incident response: introduction-post mortem versus live forensics – computer analysis for the hacker defender program-network analysis – legal issues of intercepting Wi-Fi transmission – Wi-Fi technology – Wi-Fi RF-scanning RF – eavesdropping on Wi-Fi – fourth amendment expectation of privacy in WLAN

Unit – IV

Seizure of digital information: introduction – defining digital evidence – digital evidence seizure methodology – factors limiting the wholesale seizure of hardware – other options for seizing digital evidence – common threads within digital evidence seizure – determining the most appropriate seizure method– conducting cyber investigations–demystifying computer/cyber crime – IP addresses – the explosion of networking – interpersonal communication.

Unit – V

Digital forensics and analyzing data: introduction – the evolution of computer forensics–phases of digital forensics-collection – examination-analysis – reporting – Cyber crime prevention: Introduction – crime targeted at a government agency.

Text books:

1. Dr.JeetendraPande, “Introduction to Cyber Security” Published by Uttarakhand Open University, 2017.(Chapter: 1.2-6.4,9.3-12.2)
2. Anthony reyes, Kevin o’shea, Jim steele, Jon R. Hansen, Captain Benjamin R. Jean Thomas Ralph, “Cyber-crime investigations” - bridging the gaps between security professionals, law enforcement, and prosecutors, 2007.(Chapter: 4, 5, 6, 7, 8, 9,10)

Reference Books:

1. Sebastian Klipper, “Cyber Security” EinEinblickfurWirtschaftswissenschaftlerFachmedien Wiesbaden,2015
2. John G.Voller Black and Veatch, “Cyber Security” Published by John Wiley & Sons, Inc., Hoboken, New Jersey Published simultaneously in Canada ©2014.

Course Outcomes

On the successful completion of the course, students will be able to

CO1:	Understand, describe, analyze and examine the basics of Cyber security concepts and its implementation in India	K1- K6
CO2:	Comprehend and demonstrate the security tips in browsers, WLAN, social networks, Email security and Smart phone. Apply the investigations in post mortem andForensics	K1- K6
CO3:	Understand, apply and evaluate the various investigation roles and Wi Fi protecting mechanisms.	K1- K6
CO4:	Understand, illustrate and evaluate the method of seize the digital information and evidences forensics data and evaluate the forensics reports	K1- K6
CO5:	Comprehend, apply and appraise the methods digital forensics with cybercrime prevention techniques	K1- K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	L	-	L	M	L	M	M	-	M	-	-
CO2	M	S	-	L	M	L	M	M	-	M	-	-
CO3	M	S	L	L	M	L	M	M	-	M	M	L
CO4	S	M	L	S	M	L	S	M	-	M	-	-
CO5	M	S	M	L	S	L	M	S	-	S	-	-

S- Strong; M-Medium; L-Low

23222DSC24B	Cyber Security Lab	5	0	0	4
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COURSE OBJECTIVES

- To learn and implement to Change the wireless device mode as monitor mode
- To develop in multiple vulnerabilities webserver
- To understand and implement the open ports in the network
- To acquire programming skills in Implement various wireless device modes
- To comprehend related to find the sub domains of webpage

Implement the following using any cyber security tools

1. Install virtual box (kali Linux)
2. Generate a secure password using keepass
3. Change the wireless device mode as monitor mode
4. Find the known and open vulnerabilities of system using metasploit
5. Identify the multiple vulnerabilities webserver using nikto tool
6. Identify the open ports in the network using nmap tools
7. List all the network around us and display the information about the networks
8. Sniff and capture the packet sent over HTTP requests
9. Find the owners of internet resources using Whois Lookup tool
10. Find the subdomains of webpage using knock tool

Course Outcomes

On the successful completion of the course, students will be able to

CO1:	Comprehend the programming skills in Change the wireless device mode as monitor mode	K1-K6
CO2:	Understand and implement multiple vulnerabilities webserver	K1-K6
CO3:	Evaluate the use of different wireless device modes	K1-K6
CO4:	Design to Solve related to find the subdomains of webpage	K1-K6
CO5:	Create and apply open ports in the network	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaluate, K6- Create

Mapping Course outcomes with Programme outcomes

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	S	-	-	-	-	L	-	-	-	-	-	-
CO2	S	-	M	-	M	L	-	-	-	-	-	-
CO3	S	-	S	-	S	L	-	-	-	S	S	S
CO4	S	-	S	-	S	L	-	-	-	S	S	S
CO5	S	-	S	-	S	L	-	-	-	S	S	S

S- Strong; M-Medium; L-Low

23222DSC24C	Block chain Technologies	5	0	0	4
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COURSE OBJECTIVES

- To understand about Block chain is an emerging technology platform for developing decentralized applications and data storage.
- To comprehend fundamentals of Public Key Cryptography technology and Consensus Algorithms.

Unit I: Block chain, Decentralization

Block chain: The growth of block chain technology - Distributed systems - The history of block chain and Bit coin – Block chain - Consensus - CAP theorem and block chain. **Decentralization:** Decentralization using block chain - Methods of decentralization -Routes to decentralization – Block chain and full ecosystem decentralization - Pertinent terminology - Platforms for decentralization - Innovative trends.

Unit II: Public Key Cryptography, Consensus Algorithms and Smart Contracts

Public Key Cryptography: Asymmetric cryptography - Cryptographic constructs and block chain technology. **Consensus Algorithms:** Introducing the consensus problem -Analysis and design - Classification - Algorithms - Choosing an algorithm. **Smart Contracts:** History - Definition - Ricardian contracts - Smart contract templates – Oracles - Deploying smart contracts - DAO

Unit III: Bit coin

Bit coin: Bit coin—an overview - Cryptographic keys - Transactions – Block chain – Mining. **Bit coin Network and Payments:** The Bit coin network - Wallets – Bi tcoin payments -Innovation in Bit coin - Advanced protocols - Bitcoin investment and buying and selling Bitcoin. **Bit coin Clients and APIs:** Bitcoin client installation - Experimenting further with bit coin-cli – Bit coin programming.

Unit IV: Alternative Coins

Alternative Coins: Theoretical foundations - Difficulty adjustment and retargeting algorithms - Bitcoin limitations - Extended protocols on top of Bitcoin -Development of altcoins.**Ethereum:** **Ethereum** – an overview - Ethereum network - Components of the Ethereum ecosystem - EthereumVirtual Machine (EVM) - Smart contracts. - Blocks and block chain - Wallets and client - Nodes and miners - APIs, tools, and DApps - Supporting protocols - Programming languages.

Unit V: Development Tools and Frameworks, Use Cases & Security

Development Tools and Frameworks: Languages - Compilers - Tools and libraries - Frameworks - Contract development and deployment - Layout of a Solidity source code file - Solidity language. **Use Cases:** IoT – Government - Health -Finance – Media. **Scalability and Other Challenges:** Scalability - Privacy - Security - Other challenges.

TEXT BOOKS

Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder. Bitcoin and Cryptocurrency Technologies. Princeton University Press, 2016. ISBN 978-0691171692

REFERENCES

Andreas Antonopoulos. Mastering Bitcoin: Programming the open block chain. Oreilly Publishers, 2017. ISBN 978-9352135745

Course Outcomes On the successful completion of the course, students will be able to

CO1	Understand, apply and examine the characteristics of block chain, bit coin and consensus algorithm in centralized and decentralized methods.	K1-K6
CO2:	Comprehend and demonstrate the application of hashing and public key cryptography in protecting the block chain.	K1-K6
CO3:	Understand and analyses the elements of trust in a Block chain: validation, verification, and consensus.	K1-K6
CO4	Comprehend and evaluate the alternate coin, Ethereum and smart contract.	K1-K6
CO5	Grasp and apply the knowledge of Tools and languages for applications	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaluate, K6- Create

Mapping Course outcomes with Programme outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	-	-	-	-	L	-	-	-	-	-	-
CO2	S	-	M	-	M	L	-	-	-	-	-	-
CO3	S	-	S	-	S	L	-	-	-	S	S	S
CO4	S	-	S	-	S	L	-	-	-	S	S	S
CO5	S	-	S	-	S	L	-	-	-	S	S	S

23222SEC27	NME Fundamentals of Human Rights	2	0	0	2
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Unit I: Introduction:

Meaning and Definitions of Human Rights – Characteristics and Importance of Human Rights – Evolution of Human Rights – Formation, Structure and Functions of the UNO - Universal Declaration of Human Rights – International Covenants – Violations of Human Rights in the Contemporary Era.

Unit II: Human Rights in India:

Development of Human Rights in India – Constituent Assembly and Indian Constitution – Fundamental Rights and its Classification – Directive Principles of State Policy – Fundamental Duties.

Unit III:

Rights of Marginalized and other Disadvantaged People: Rights of Women – Rights of Children – Rights of Differently Abled – Rights of Elderly - Rights of Scheduled Castes – Rights of Scheduled Tribes – Rights of Minorities – – Rights of Prisoners – Rights of Persons Living with HIVAIDS – Rights of LGBT.

Unit IV:

Human Rights Movements: Peasant Movements (Tebhaga and Telangana) – Scheduled Caste Movements (Mahar and Ad-Dharimi) – Scheduled Tribes Movements (Santhal and Munda) – Environmental Movements (Chipko and Narmada BachaoAndolan) – Social Reform Movements (Vaikom and Self Respect).

Unit V:

Redressal Mechanisms: Protection of Human Rights Act, 1993 (Amendment 2019) – Structure and Functions of National and State Human Rights Commissions – National Commission for SCs – National Commission for STs – National Commission for Women – National Commission for Minorities – Characteristics and Objectives of Human Rights Education.

References

1. Sudarshanam Gankidi, Human Rights in India: Prospective and Retrospective, Rawat Publications, Jaipur, 2019.
2. SatvinderJuss, Human Rights in India, Routledge, New Delhi, 2020.
3. Namita Gupta, Social Justice and Human Rights in India, Rawat Publications, Jaipur, 2021.
4. Mark Frezo, the Sociology of Human Rights, John Willy & Sons, U.K. 2014.

23222AEC31	Advanced Java Programming	4	1	-	4
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Course Objectives

- To gain knowledge of Object Oriented Programming Concept in Java
- To understand usages of String functions in Java
- To familiarize with the applet and swing
- To grasp the concepts on Java Beans
- To comprehend the connection between Relational Database and Java.

Unit – I

An Overview of Java: Object Oriented Programming- Data Types, Variables, and Arrays: Primitive Types-Literals Variables - Type Conversion and Casting- Arrays-Operators: Control Statements-Classes and Methods – Inheritance- Exception Handling.

Unit – II

String Handling: The String Constructors - String Length - Special String Operations - Character Extraction - String Comparison - Searching Strings - Modifying a String - Input/Output: The I/O Classes and Interfaces – File - Byte Streams - Character Streams.

Unit – III

The Applet Class: Basic Architecture - Applet Skeleton - Display methods - Status Window – Passing Parameters. Introducing GUI Programming with Swing– Introducing Swing - Swing Is Built on the AWT- Two Key Swing Features - The MVC Connection - Components and Containers - The Swing Packages - A Simple Swing Application - Exploring Swing.

Unit- IV

Java Beans: Introduction - Advantages of Beans – Introspection - The JavaBeans API - A Bean Example. Servlets: Life Cycle Simple Servlet-Servlet API-Packages-Cookies session tracking.

Unit – V

Network Programming: Working with URLs- Working with Sockets - Remote Method Invocation. Introduction to Database Management Systems - Tables, Rows, and Columns - Introduction to the SQL SELECT Statement - Inserting Rows - Updating and Deleting Existing Rows - Creating and Deleting Tables - Creating a New Database with JDBC - Scrollable Result Sets.

Text Books:

1. Herbert Schildt, “Java the Complete Reference”, 10th edition, McGraw Hill Publishing Company Ltd, New Delhi, 2017.
2. Tony Goddis, “Starting out with Java from Control Structures Through Objects” 6th Edition, Pearson Education Limited, 2016

Reference books:

1. Herbert Schildt, Dale Skrien, “Java Fundamentals – A Comprehensive Introduction”, TMGH Publishing Company Ltd, New Delhi, 2013
2. John Dean, Raymond Dean, “Introduction to Programming with JAVA – A Problem Solving Approach”, TMGH Publishing Company Ltd, New Delhi, 2012.

Course Outcomes On the successful completion of the course, students will be able

CO1:	Understand the Object Oriented Program including classes and methods; inheritance and exception handling	K1-K6
CO2:	Complete comprehension of String functions and I/O Streams	K1-K6
CO3:	Creation of graphical representation using Applet	K1-K6
CO4:	Application of Servlets for designing Web based applications	K1- K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	-	M	S	-	-	-	S	M	-
CO2	S	S	S	-	M	S	-	-	-	L	M	-
CO3	S	S	M	-	L	S	-	-	-	M	M	-
CO4	M	S	M	-	S	S	-	-	-	M	S	-
CO5	S	M	M	-	M	L	-	-	-	M	M	-

S- Strong; M-Medium; L-Low

23222AEC32	Web Technology	5	2	0	6
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COURSE OBJECTIVES:

- Understand the fundamentals of the web and thereby develop web applications using various development languages and tools.
- Enrich knowledge about XHTML control and Cascading Style Sheets.
- Provide in- depth knowledge about JavaScript.

UNIT –I

WEB FUNDAMENTALS AND HTML: A Brief Introduction to the Internet - The World Wide Web - Web Browsers - Web Servers -URLs, MIME, HTTP, Security- Introduction to HTML- Origins and Evolution of HTML and HTML - Basic Syntax - Standard HTML Document Structure - Basic Text Markup - Images- Hypertext Links - Lists, Tables, Forms, The Audio Element, The Video Element - Organization Elements, The Time Element

UNIT – II

INTRODUCTION TO XHTML AND CSS: Basic syntax, Standard structure, Basic text-markup, Images, Hypertext Links. Lists, Tables, Forms, Frames, syntactic differences between HTML and XHTML-Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and <div>tags, Conflict resolution.

UNIT - III

THE BASICS OF JAVASCRIPT: Overview of JavaScript, Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts. JAVASCRIPT AND XHTML DOCUMENTS: The JavaScript Execution Environment, The Document Object Model, Elements Access in Java Script, Events and Event Handling, Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model

UNIT- IV

DYNAMIC DOCUMENTS WITH JAVASCRIPT AND XML: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Color and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements. Introduction to XML, Syntax of XML, XML Document Structure, Document type definitions, Namespaces, XML schemas, displaying raw XML documents, Displaying XML documents with CSS, XSLT Style Sheets, Web services.

UNIT - V

PHP, ANGULAR JS AND JQUERY: Introduction to PHP: Overview of PHP -General Syntactic Characteristics - Primitives, Operations, and Expressions - Output - Control Statements - Arrays - Functions - Pattern Matching - Form Handling - Cookies - Session Tracking - Introduction to JQuery, Syntax, selectors, events, JQuery HTML, JQuery Effects, JQuery CSS. Introduction to Angular JS, Directives, Expressions, Controllers, Filters, Services, Events, Forms, Validations, Examples.

TEXT BOOKS:

1. Robert W. Sebesta: Programming the World Wide Web, Eighth Edition, Pearson education, 2015. **UNITS:** 1,2,3,4
2. Dayley Brad, Dayley Brendan ,”AngularJS, JavaScript, and jQuery All in One”, Sams Teach Yourself 1st Edition, Kindle Edition, 2015.**UNIT:** 5

REFERENCE BOOKS:

1. M. Srinivasan: Web Programming Building Internet Applications, 3rdEdition, Wiley India, 2009.
2. Jeffrey C. Jackson: Web Technologies-A Computer Science Perspective, Pearson Education, 7thImpression,2012.
3. Chris Bates: Web Technology Theory and Practice, Pearson Education, 2012.
4. Raj Kamal: Internet and Web Technologies, McGraw Hill Education.

COURSE OUTCOMES:

On the successful completion of the course, students will be able

CO1	Design dynamic web pages using JavaScript, JQuery and Angular Java script	K1	LO
CO2	Develop Web pages using HTML, CSS and XML	K2	IO
CO3	Create web application using PHP and MySQL	K3, K4	HO
CO4	To design dynamic web pages using Angular JavaScript	K2,K3	HO
CO5	Develop interactive web pages using JQuery	K4,K5	HO

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S	S	S	M	M	S	M	M	S	S
CO2	S	S	M	S	S	S	M	S	S	S	S	S
CO3	S	S	S	M	S	S	M	M	S	M	M	S
CO4	S	S	S	M	S	M	M	S	S	M	S	M
CO5	S	S	S	M	S	S	M	S	M	S	S	M

S- STRONG; M-MEDIUM; L-LOW

23222AEC33	Advanced Machine Learning (AML)	5	2	0	5
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Course Objectives

- To understand the concepts of Machine Learning.
- To understand the theoretical and practical aspects of types of machine learning
- To teach and get familiarized with supervised learning and their applications.
- To teach and get familiarized with the concepts and algorithms of unsupervised learning.
- To appreciate the concepts and algorithms of deep learning.

Unit I:

Introducing Machine Learning: The Origins of Machine Learning, Uses and Abuses of Machine learning _ Basics of Machine Learning Algorithm Model Works - Steps to apply Machine Learning - Choosing a Machine Learning Algorithm - Using Machine Learning concepts. Managing and Understanding Data: Data Structures, Vectors and Factors: Lists, Data frames, Matrixes and arrays - Managing Data - Exploring and Understanding Data: Exploring the Structure of Data, Exploring Numeric variables - Exploring Categorical Variables- Exploring Relationships between Variables.

Unit II:

Lazy Learning – Classification Using Nearest Neighbors: The kNN Algorithm- Diagnosing Breast Cancer with the kNN Algorithm- Probabilistic Learning – **Classification Using Naive Bayes:** Basic concepts of Bayesian Methods- The Naïve Bayes Algorithm- Example – filtering Mobile Phone Spam with the Naive Bayes Algorithm. Divide and Conquer – **Classification Using Decision Trees and Rules:** Understanding Decision Trees- Example – Identifying Risky Bank Loans using C5.0 Decision Trees- Understanding Classification Rules- Example – Identifying Poisonous Mushrooms with Rule Learners.

Unit III:

Forecasting Numeric Data – **Regression Methods:** Understanding Regression- Example – Predicting Medical Expenses using Linear Regression- Understanding Regression Trees and Model Trees- Example – Estimating the Quality of Wines with Regression Trees and Model Trees. Black Box Methods Neural Networks and Support Vector Machines: Understanding Neural Networks, from Biological to Artificial Neurons, Activation Functions, Network Topology, Training Neural Networks with Back propagation - Modeling the Strength of Concrete with ANNs- Understanding Support Vector Machines- Performing OCR with SVMs- Finding Patterns – Market Basket Analysis Using Association Rules: Understanding Association Rules- Example – Identifying Frequently Purchased Groceries with Association Rules.

Unit IV:

Finding Groups of Data – **Clustering with K-Means:** Understanding Clustering- The k-means Algorithm for clustering- Finding teen market segments using k-means Clustering- Evaluating Model Performance: Measuring Performance for Classification- beyond Accuracy – other Measures of Performance, Visualizing Performance Tradeoffs.

Improving Model Performance: Tuning Stock Models for Better Performance-Using Caret for Automated Parameter Tuning- Creating a simple Tuned Model- Customizing the Tuning Process-Improving Model Performance with meta-learning- Understanding Ensembles- Bagging- Boosting- Random forests.

Unit V:

Introduction to Deep Learning: Introduction to Deep Learning, Single Layer Perceptron Model (SLP), Multilayer Perceptron Model (MLP), Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Restricted Boltzmann Machines (RBMs).

Convolutional Neural Networks (CNNs): Structure and Properties of CNNs - Components of CNN Architectures- Convolutional Layer, Pooling Layer, Rectified Linear Units (ReLU) Layer, Fully Connected (FC) Layer, Loss Layer - Tuning Parameters ,Notable CNN Architectures, Regularization- Recurrent Neural Networks (RNNs): Fully Recurrent Networks, Training RNNs with Back-Propagation Through Time (BPPT)- Elman Neural Networks, Neural History Compressor, Long Short-Term Memory (LSTM), Traditional and Training LSTMs - Structural Damping Within RNNs, Tuning Parameter Update Algorithm.

Text Books:

1. Brett Lantz, “Machine Learning with R”, Addison-Wesley Packt Publishing, 2013.
2. TawehBeysolow, “Introduction to Deep Learning Using R: A Step-by-Step Guide to Learning and Implementing Deep Learning Models Using R”, San Francisco, California, USA, 2017.

Reference Books:

1. Daniel T. Larose, Chantal D. Larose, “Data mining and Predictive analytics”, Second Ed., Wiley Publication, 2015.
2. Bertt Lantz, “Machine Learning with R: Expert techniques for predictive modeling”, 3rd Edition, April 15,2019,
3. Jason Bell, “Machine Learning: Hands-On for Developers and Technical Professionals”, Wiley Publication,2015.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	To understand, impart and analyze the concepts and of Machine Learning Techniques and types of data	K1-K6
CO2	To comprehend, apply and evaluate the classification techniques for real-world applications	K1-K6
CO3	To understand, use and perform evaluation of Regression methods	K1-K6
CO4	To recognize, implement and analyse the unsupervised techniques for real-world applications	K1-K6
CO5	To understand, identify, implement and review the deep learning techniques for real-time applications	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
CO1	S	S	-	-	S	L	-	S	-	-	-	-
CO2	S	S	M	-	S	L	-	S	-	-	-	-
CO3	S	S	S	-	S	L	-	S	-	S	S	S
CO4	S	S	M	-	S	L	-	S	-	-	-	-
CO5	S	S	S	-	S	L	-	S	-	S	S	S

S- Strong; M-Medium; L-Low

23222SEC34L	Advanced Java Programming lab	0	0	3	3
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COURSE OBJECTIVES:

- To implement object oriented concepts in JAVA
- Develop the program using concepts Network programme
- Learn how to create a program in java beans.
- Learn how to connect relational database to Java
- Develop the program using concepts Applet

List of Experiments:

1. Implementation of and Exception handling concepts with different type of Exception.
2. Build a Swing application to implement metric conversion.
3. Use Grid Layout to design a calculator and simulate the functions of a simple calculator.
4. Create a Color palette with a matrix of buttons using Applet.
5. To invoke a servlet from HTML forms.
6. To invoke servlet from Applets.
7. To invoke servlet from JSP.
8. Implement message communication using Network Programming.
9. Write a program to connect databases using JDBC.
10. Implementation of Java Beans.

Course Outcomes

On the successful completion of the course, students will be able to

CO1:	Implement classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem	K1, K2	LO
CO2:	Apply Applets and Swing programs	K3	IO
CO3:	Develop Servlets and JSP for creating Web based applications using JDBC	K4, K5	HO

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S	S	S	M	M	S	M	M	S	S
CO2	S	S	M	S	S	S	M	S	S	S	S	S
CO3	S	S	S	M	S	S	M	M	S	M	M	S

S- Strong; M-Medium; L-Low

23222SEC35L	Web Technology Lab	0	0	3	3
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COURSE OBJECTIVES:

At the end of the course, the student should be able to do:

- Learn how to create web pages using HTML, CSS and Java script.
- Implement dynamic web pages using Java script, J query and Angular Java script
- To create web applications using PHP and MySQL
- Create web pages using XML and Cascading Style Sheets
- Create XML documents and Schemas.

PROGRAM LIST

1. Develop a web page to display your education details in a tabular format. 2. Develop a web page to display your CV on a web page.
3. Design a Homepage having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.
4. Design a web page to demonstrate the usage of inline CSS, internal CSS And external CSS.
5. Design an XML document and create a style sheet in CSS & display the Document in the browser.
6. Develop a web page to Create image maps.
7. Design a web page to perform input validation using Angular Java script.
8. Develop a web page in PHP to fetch details from the database.
9. Design a web page to hide paragraph using J Query
10. Create a web page and add Java script to handle mouse events and form events

COURSE OUTCOMES:

On the successful completion of the course, students will be able

CO1	Design dynamic web pages using JavaScript, J query and Angular Java script	K1	LO
CO2	Develop Web pages using HTML, CSS and XML	K2	IO
CO3	Create web application using PHP and MySQL	K3, K4	HO
CO4	Develop interactive web pages using J query	K2,K3	HO
CO5	To design dynamic web pages using Angular java script	K4,K5	HO

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S	S	S	M	M	S	M	M	S	M
CO2	S	S	M	S	S	S	M	S	S	S	M	S
CO3	S	S	S	M	M	S	M	M	S	M	M	S
CO4	S	M	S	M	S	M	M	S	S	M	S	M
CO5	M	M	S	M	S	S	M	S	M	M	S	M

S- STRONG; M-MEDIUM; L-LOW

23222AEC41	Data Visualization Tools	5	1	0	4
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COURSE OBJECTIVES

Today's fast world requires the data to be presented in an abstract and appealing way to attract the audience. Most of the websites like social media, ecommerce use info graphics and dashboards to engages their visitors. The use of different data visualization techniques make all these requirements possible through this four weeks Data Visualization Course. This course predominantly uses Python libraries for creating charts, interactive figures and animations.

COURSE OUTCOMES:

- By the end of this course, the learners will be able to
- Use python libraries for data visualization
- Conduct exploratory data analysis using Python
- Interpret results of exploratory data analysis
- Paraphrase the results for documentation

COURSE CONTENTS:

Module 1

Basic Plotting Line plot - Bar plot - Pie Chart - Scatter Plot - Histogram - Stacked Bar Charts - Sub Plots - Matplotlib, Searborn, Plotly - Seaborn Styles

Module 2

Applied Visualizations Box plot - Density Plot - Area Chart - Heat map - Tree map - Graph Networks

Module 3

Interactive Visualizations and Animations Dynamic charts - Dynamic maps - Animation types - 2D, 3D, Motion Animation - Animation Principles - Altair Package - Statistical Visualizations

Module4

Principles of Information Visualization Visual Perception and Cognition - Gestalt's Principles - Tuf's Principles - Applications of Principles of Information Visualization - Dashboard Design

Reference Books:

1. "Information Dashboard Design" by Stephen Few
2. A Data Visualization Guide for Business Professionals" by Cole Nussbaum Knifelike

23222AEC42	Mobile Computing	5	1	0	4
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Course Objective:

- To introduce the concepts of wireless devices with signal, Antenna, Radio Frequencies, Signal Propagation.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, Wireless LAN, GSM, and CDMA.

Unit-I

Introduction – Applications – History of wireless communication – A Simplified reference model - Wireless transmission – Frequencies for radio transmission – Regulations – Signals –Antennas - Signal propagation: Path loss of radio signals - Additional signal propagation effects - Multi-path propagation – Multiplexing –Modulation Chapters: 1, 2.1 to 2.6

Unit-II

Spread spectrum – Direct sequence spread spectrum – Frequency hopping spread spectrum – Cellular systems. Medium access control: Hidden and exposed terminals – Near and far terminals – SDMA, FDMA, TDMA, Fixed TDM, Classical Aloha, slotted Aloha, Carrier sense multiple access – Reservation TDMA – Multiple access with collision avoidance – Polling – CDMA – Spread Aloha multiple access. Chapters: 3.1 to 3.3, 3.4.1 to 3.4.4, 3.4.7 to 3.4.9, 3.5.1

Unit-III

GSM - Mobile services – System architecture – Radio interface – Protocols – Localization and calling – Handover – Security – New Data services. UMTS and IMT-2000 - Satellite Systems: Applications – Basics – Routing – Localization – Handover. Chapters: 3.6, 4.1.1 to 4.1.8, 4.4, and 5.2 to 5.6

Unit-IV

Wireless LAN: Infra red vs. radio transmission – Infrastructure and ad-hoc network – IEEE 802.11 – System architecture – Protocol architecture – Physics layer – Medium access control layer – MAC management – Blue tooth. Mobile network layer: Mobile IP: Goals, assumptions and requirements – entities and terminology – packet delivery – Agent discovery – Registration – Tunneling and encapsulation Recent technologies Chapters: 7.1 to 7.3.5, 7.5, 8.1.1 to 8.1.6

Unit-V

WAP: Architecture – wireless datagram Protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Mobile ad-hoc networks – MANET Characteristics – Classification of MANETs, Routing of MANETs, Proactive Routing Protocol - DSDV, Reactive Routing Protocols – DSR, AODV.Chapter10.3.1 to 10.3.6 (Text Book 2- 6.1, 6.2, 6.4, 6.5, 6.6)

Course Outcomes:

- On the successful completion of the course, students will be able to:
- Understanding the basic concepts of Wireless Communication
- Understanding the basic concepts of Spread Spectrum
- Analyzing the concepts of Medium Access Control
- Analyzing the concepts of Global System for Mobile Communication

- Understanding the basic concepts of Wireless LAN
- Understanding the basic concepts of Mobile Network Layer

- Understanding the basic concepts of Wireless Application Protocol
- Analyzing the concepts of Routing Protocols in MANET

Text Book:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2013.
2. KumKumGarg, “Mobile Computing Theory and Practice”, Pearson Education, 2014.

Reference Books:

1. Rifaat A. Dayen, “Mobile Data & Wireless LAN Technologies”, Prentice Hall, 1997.
2. Steve Mann and Scoot Schibli, “The Wireless Application Protocol”, John Wiley & Inc., 2000.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1	Understanding the basic concepts of Mobile and Wireless Communication	K1, K2	LO
CO2	Understanding the basic concepts of Spread Spectrum. Analyzing the concepts of Medium Access Control.	K3	IO
CO3	Analyzing the concepts of Global System for Mobile Communication and Satellite Communications. Understanding the basic concepts of Wireless LAN	K4	HO
CO4	Understanding the basic concepts of Wireless LAN. Evaluate the performance of Mobile Network Layer	K2, K5	HO
CO5	Understanding the basic concepts of Wireless Application Protocol and create a MoileApp with real time application. Analyzing the concepts of Routing Protocols in MANET	K2, K4, K6	HO

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping Course outcomes with Programme outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	-	-	-	-	-	-	-	-	-	-	-
CO2	S	M	M	M	M	-	M	-	-	-	-	-
CO3	S	M	M	M	M	-	M	-	-	L	-	M
CO4	S	M	M	M	M	-	M	-	-	L	-	M
CO5	S	M	M	M	M	-	M	-	-	L	-	M

3. S- Strong; M-Medium; L-Low

23222DSC43A	Social Networks	5	1	0	4
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Course Objectives

- To learn about Social media, Social networking and Webcasts
- To understanding and building a Word Press Powered Website
- To analysis the Social Networking & Micro-Blogging.
- To learn and analysis the Widgets & Badges.
- To explore the importance of Website optimization.

UNIT I: Introduction: Social Media Strategy-Important First Decisions -Websites, Blogs - RSS Feeds Mapping -Preparation - Multimedia Items Gathering Content for Blog Posts RSS Feeds & Blogs-RSS Feeds-The Feed Reader-The Feed-Options for Creating an RSS Feed-Planning Feed-Blogs-Options for Starting. Blog and RSS Feed-Feed or Blog Content-Search Engine Optimization (SEO)-Feed Burner-RSS Feed and Blog Directories-An Optimization Plan for Blog or RSS Feed

UNIT II: Building a Word Press Powered Website: Word Press as A CMS - Diversity of Word Press Sites-The Anatomy of a Word Press Site -a Brief Look at the Word Press Dashboard Planning - Site Themes Plug-ins setting up Sidebars Building Pages- Posting Blog Entries. Podcasting, Vidcasting, & Webcasting- Publishing Options for Podcast- Creating and Uploading Podcast Episodes-Publishing Podcast Optimizing Podcast- Webcasting

UNIT III: Social Networking & Micro-Blogging: Facebook-The Facebook Profile -Myspace LinkedIn-Twitter-Niche Social Networking Sites-Creating Own Social Network-Promoting Social Networking Presence- Social Bookmarking & Crowd-Sourcing - Social Bookmarking-A Social Bookmarking Strategy- Crowd-Sourced News Sites- Preparation And Tracking Progress Media Communities-Image Sharing Sites-Image Sharing Strategy-Video Sharing Sites-Video Sharing Strategy-Searching And Search Engine Placement-Connecting With Others.

UNIT IV: Widgets & Badges: Highlighting Social Web Presence-Sharing And Syndicating Content Making Site More Interactive-Promoting Products And Making Money-Using Widgets In Word Press-Widget Communities And Directories- Working Widgets Into Strategy Social Media Newsrooms-Building Social Media Newsroom - Populating The Newsroom-Social Media News Releases-Social Media Newsroom Examples. More Social Tools-Social Calendars-Social Pages Wikis-Social Search Portals-Virtual Worlds.

Unit V: Website optimization: A Website Optimization Plan-Streamlining Web Presence-An Integration Plan- Looking to the Future-Life streaming: The Future of Blogging-Distributed Social Networking-Social Ranking, Relevancy, and —Defriending-Web 3.0 or The Semantic Web-Mobile Technology- Measuring Your Success-A Qualitative Framework-A Quantitative Framework-Tools to Help You Measure-Come To Your Own Conclusions

Text Book:

1. Deltina hay —A Survival Guide To social Media and Web 2.0 Optimization, Dalton Publishing, 2009

Reference Books:

1. Miriam Salpeter —Social networking for Career Success, Learning Express, 2011.
2. Miles, Peggy, —Internet world guide to webcasting, Wiley, 2008
Professionals”, Wiley Publication, 2015.

Course Outcomes On the successful completion of the course, students will be able to

CO1:	To understand, impart and summarize the concepts of Social media, Social networking and Webcasts	K1-K6
CO2:	To comprehend, design and develop a Word Press Powered Website	K1-K6
CO3:	To understand, implement and perform evaluation of Social Networking and Micro-Blogging	K1-K6
CO4	To collaborate, implement and analyze the Widgets and Badges in social networking environment	K1-K6
CO5	To understand, illustrate and perform evaluation of web optimization for social networks	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	-	S	L	-	S	-	S	S	S
CO2	S	S	S	-	S	L	-	S	-	S	S	S
CO3	S	S	S	-	S	L	-	S	-	S	S	S
CO4	S	S	S	-	S	L	-	S	-	S	S	S
CO5	S	S	S	-	S	L	-	S	-	S	S	S

S- Strong; M-Medium; L-Low

23222DSC43B	Social Networks Lab	0	0	3	3
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Course Objectives

- To familiarize the tools required to manage social network applications
- To analyze social networks like Facebook, LinkedIn, Google+, GitHub
- To teach the fundamental techniques and principles in achieving social networking environment.
- To enable students to have skills that will help them to solve real time applications.
- To get explore in the Github API.

List of Programs

1. Creating and Exploring Twitter's API

2. To analyzing and visualizing tweets and tweet entities with frequency analysis

3. Creating and Exploring Facebook's Social Graph API

4. To analyzing the Facebook's Social Graph connections

5. Creating and Exploring LinkedIn API

6. To downloading LinkedIn connections as a CSV file

7. Creating and Exploring Google+ API

8. To create and querying Human Language Data with TF-IDF

9. Creating and Exploring GitHub's API

10. To analyzing GitHub interest graph

Course Outcomes

On the successful completion of the course, students will be able to

CO1:	To understand, implement and review the fundamental techniques and principles for social networks.	K1-K6
CO2:	To design and develop the programs using the tools required to develop and manage social network like Facebook, LinkedIn, Google+, GitHub	K1-K6
CO3:	To create and explore the functionality of social networking tools such as GitHub	K1-K6
CO4	To understand, implement and review the fundamental principles for social network graph.	K1-K6
CO5	To comprehend and critically analyze the existing API for social networks	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M		M	S	-	-	-	S	-	-
CO2	S	M	S	S	S	M	-	-	-	S	-	-
CO3	S	S	S	S	S	S	-	-	-	S	S	S
CO4	S	M	S	S	S	M	-	-	-	S	-	-
CO5	S	S	S	S	S	S	-	-	-	S	S	S

S- Strong; M-Medium; L-Low

Course Objectives:

- To get a clear idea of High Performance Computing concept.
- To get brief knowledge about how to function the HPC systems.
- To get idea of what techniques used in HPC models.
- To understand a Parallel computing concepts.
- To get familiar with Open MP technology that is widely used in HPC technology.

Unit-I

Modern processors: Stored-program computer architecture-General purpose cache based microprocessor architecture-Memory hierarchies-Multicore processors-Multithreaded processors-Vector processors. **Basic optimization techniques for serial code:** Scalar profiling-Common sense optimizations-Simple measures, large impact-The role of compilers-C++ optimizations.

Unit-II

Data access optimization: Balance analysis and light speed estimates-Storage order-Algorithm classification and access optimizations-The Jacobi algorithm-Algorithm classification and access optimizations-Sparse matrix-vector multiply. **Parallel computers:** Taxonomy of parallel computing paradigms-Shared-memory computers-Distributed memory computers-Hierarchical systems-Networks.

Unit-III

Basics of parallelization: Introduction to Parallelism -Parallel scalability. **Shared memory parallel programming with Open MP:** Short introduction to Open MP-Open MP-parallel Jacobi algorithm.

Unit-IV

Efficient Open MP programming: Profiling Open MP programs-Performance pitfalls-Parallel sparse matrix-vector multiply. **Locality optimizations on ccNUMA architectures:** Locality of access on ccNUMA-ccNUMA optimization of sparse MVM-Placement pitfalls-ccNUMA issues with C++.

Unit-V

Distributed-memory parallel programming with MPI: Message passing-A short introduction to MPI-MPI parallelization of a Jacobi solver. **Efficient MPI programming:** MPI performance tools-Communication parameters-Synchronization, serialization, contention-Reducing communication overhead-Understanding internode point-to-point communication.

Text book:

1. Georg Hager, Gerhard Wellein “Introduction to High Performance Computing for Scientists and Engineers”, CRC Press, 2011. **Chapters:** 1 to 10.

Reference books:

1. Michael W. Berry, Kyle A. Gallivan, Efstratios Gallopoulos, Ananth Grama, Bernard Philippe, Yousef Saad, Faisal Saied, “High-performance scientific computing: algorithms and applications”, Springer, 2012.
2. Victor Eijkhout, “Introduction to High Performance Scientific Computing”, MIT Press, 2011.

Course Outcome:

On the successful completion of the course, students will be able to,

CO1	Understand of the HPC and ccNUMA concepts	K1 - K6
CO2	Design and develop a parallel programming with modern C, C++ and new version of FORTRAN	
CO3	Apply with parallel computing	
CO4	Develop an efficient Open MP programming	
CO5	Evaluate an efficient MPI programming	

K1- Remember, K2 - Understand, K3 - Apply, K4 - Analyze, K5 - Evaluate, K6 -Create

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	L	M	L	L	L	S	S	S	S	M	L
CO2	S	M	L	M	M	L	S	L	S	L	S	L
CO3	S	S	S	M	M	L	M	L	M	L	S	L
CO4	S	S	S	M	S	L	M	L	M	S	S	S
CO5	S	S	S	M	M	L	M	M	M	M	S	L

L - Low, M- Medium, S - Strong

23222PRW44	Project with Viva voce	0	0	10	4
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Each student will develop and implement individually developed application software based on any of the latest technologies.



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

M.Sc. COMPUTER SCIENCE

**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF COMPUTER SCIENCE**

PG CURRICULUM

FULL TIME

[Regulation 2023]

[Candidates admitted from the academic year 2023-2024 onwards]

**PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)
REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM
FRAMEWORK FOR POSTGRADUATE EDUCATION**

Programme	M.Sc., Computer Science
Programme Code	23PGCSCGE
Duration	PG - Two Years
Programme Outcomes (Pos)	<p>PO1: Problem Solving Skill Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.</p> <p>PO2: Decision Making Skill Foster analytical and critical thinking abilities for data-based decision-making.</p> <p>PO3: Ethical Value Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.</p> <p>PO4: Communication Skill Ability to develop communication, managerial and interpersonal skills.</p> <p>PO5: Individual and Team Leadership Skill Capability to lead themselves and the team to achieve organizational goals.</p> <p>PO6: Employability Skill Inculcate contemporary business practices to enhance employability skills in the competitive environment.</p> <p>PO7: Entrepreneurial Skill Equip with skills and competencies to become an entrepreneur.</p> <p>PO8: Contribution to Society Succeed in career endeavors and contribute significantly to society.</p> <p>PO 9 Multicultural competence Possess knowledge of the values and beliefs of multiple cultures and a global perspective.</p> <p>PO 10: Moral and ethical awareness/reasoning Ability to embrace moral/ethical values in conducting one's life.</p>

<p>Programme Specific Outcomes (PSOs)</p>	<p>PSO1 – Placement To prepare the students who will demonstrate respectful engagement with others’ ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions.</p> <p>PSO 2 - Entrepreneur To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.</p> <p>PSO3 – Research and Development Design and implement HR systems and practices grounded in research that complies with employment laws, leading the organization towards growth and development.</p> <p>PSO4 – Contribution to Business World To produce employable, ethical and innovative professionals to sustain in the dynamic business world.</p> <p>PSO 5 – Contribution to the Society To contribute to the development of the society by collaborating with stakeholders for mutual benefit.</p>
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1.1.3	color
EMPLOYABILITY	
SKILL DEVELOPMENT	
ENTREPRENEURSHIP	
EMPLOYABILITY,/ENTREPRENEURSHIP,/SKILL DEVELOPMENT	
EMPLOYABILITY,/SKILL DEVELOPMENT	
EMPLOYABILITY,/ENTREPRENEURSHIP	



**PONNAIYAH RAMAJAYAM INSTITUTE OF
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Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
M.Sc. (CS) COMPUTER SCIENCE
REGULATION 2023 – 2024
COURSE STRUCTURE**

SEMESTER – I

Course Code	Course Title – M.Sc.[CS]	L	T	P	C
THEORY & LAB					
23220AEC11	Analysis & Design of Algorithms	4	2	-	4
23220AEC12	Object Oriented Analysis and Design &C++	4	2	-	4
23220AEC13	Python Programming	5	2	-	5
23220DSC14_	Critical Thinking, Design Thinking and Problem Solving	5	1	-	5
23220SEC15L	Practical I: Algorithm and OOPS Lab	0	0	3	3
23220RMC16	Research Methodology	2	-	-	2
	Total	20	7	3	23

SEMESTER – II

Course Code	Course Title – M.Sc.[CS]	L	T	P	C
THEORY & LAB					
23220AEC21	Data Mining and Warehousing	5	1	-	4
23220AEC22	Advanced Operating Systems	5	1	-	4
23220AEC23	Advanced Java Programming	4	1	-	4
23220DSC24_	Artificial Intelligence & Machine Learning	4	1	-	4
23220SEC25L	Advanced Java Programming Lab	0	0	3	3
23220SEC26L	Data Mining Lab using R	0	0	3	3
23220BRC27	Participation in Bounded Research	2	0	0	2
23220SEC28	Internship Industrial Activity			0	2
	Total	20	4	6	26

SEMESTER – III

Course Code	Course Title – M.Sc.[CS]	L	T	P	C
THEORY & LAB					
23220AEC31	Digital Image Processing	5	1	-	5
23220AEC32	Cloud Computing	5	1	-	5
23220AEC33	Network Security and Cryptography	5	1	-	4
23220AEC34	Data Science & Analytics	5	1	-	4
23220SEC35L	Digital Image Processing Lab using MATLAB	0	0	3	3
23220SEC36L	NME: Cloud Computing Lab	0	0	3	3
23220SEC37	Industrial visit	-	-	-	2
	Total	20	4	6	26

SEMESTER – IV

Course Code	Course Title – M.Sc.[CS]	L	T	P	C
THEORY & LAB					
23220AEC41L	Python Programming Lab	0	1	3	3
23220AEC42	Web Application development & hosting Practical	6	2	0	5
23220PRW43	Project with Viva voce	0	2	10	4
23220SEC44	Skill Enhancement Professional Competency Skill	2	2	0	2
23220SEC45	Internship	-	-	2	2
	Total	8	7	15	16
	Total Credits for the Programme				91

Discipline Specific Electives

Semester	Discipline Specific Elective Courses-I
I	a) 23220DSC14A-Critical Thinking, Design Thinking and Problem Solving b) 23220DSC14B-Multimedia and its Applications c) 23220DSC14C-Internet of Things
	Discipline Specific Elective Courses-II
II	a) 23220DSC24A-Artificial Intelligence & Machine Learning b) 23220DSC24B- Mobile computing c) 23220DSC24C-Web Services

Credit Distribution for PG Programme Consolidated Semester wise Credit distribution M.Sc. Computer Science

SEM	AEC	SEC	DSC	RSB Courses	others	Total
I	13	3	5	2	-	23
II	12	8	4	2	-	26
III	18	8	-	-	-	26
IV	5	7	-	-	4	16
Total	48	26	9	4	4	91

I – SEMESTER

Course code	23220AEC11	ANALYSIS & DESIGN OF ALGORITHMS	L	T	P	C
Core/Elective/Supportive		Core	4	2	-	4
Pre-requisite		Basic Data Structures & Algorithms				
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none">1. Enable the students to learn the Elementary Data Structures and algorithms.2. Presents an introduction to the algorithms, their analysis and design3. Discuss various methods like Basic Traversal And Search Techniques, divide and conquer method, Dynamic programming, backtracking4. Understood the various design and analysis of the algorithms.						
Expected Course Outcomes:						

On the successful completion of the course, student will be able to:		
1	Get knowledge about algorithms and determines their time complexity. Demonstrate specific search and sort algorithms using divide and conquer technique.	K1,K2
2	Going to understanding of Greedy method and its algorithm.	K2,K3
3	Able to describe about graphs using dynamic programming technique.	K3,K4
4	Demonstrate the concept of backtracking & branch and bound technique.	K5,K6
5	Explore the traversal and searching technique and apply it for trees and graphs.	K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create		
Unit:1	INTRODUCTION	15hours
Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity-Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heap sort- Graph.		
Unit:2	TRAVERSAL AND SEARCH TECHNIQUES	15hours
Basic Traversal And Search Techniques: Techniques for Binary Trees-Techniques for Graphs - Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.		
Unit:3	GREEDY METHOD	15hours
TheGreedyMethod:-GeneralMethod–KnapsackProblem–MinimumCostSpanningTree– Single Source Shortest Path.		
Unit:4	DYNAMIC PROGRAMMING	15hours
Dynamic Programming –General Method–Multi stage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.		
Unit:5	BACK TRACKING	13hours
Backtracking:-General Method–8 – Queens Problem–Sum Of Subsets–Graph Coloring– Hamiltonian Cycles – Branch And Bound: - The Method – Traveling Salesperson.		
Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars– webinars		
Total Lecture hours		75hours
Text Books		
1	Ellis Horowitz, “Computer Algorithms”, Galgotia Publications.	
2	Alfred VAho, JohnE.Hopcroft, JeffreyD.Ullman, "Data Structures and Algorithms".	
Reference Books		
1	Goodrich, “Data Structures & Algorithms in Java”, Wiley 3rd edition.	

2	Skiena,"TheAlgorithmDesignManual",SecondEdition,Springer,2008
3	AnanyLevith,"Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
4	Robert Sedgewick, Phillipe Flajolet,"An Introduction to the Analysis of Algorithms", Addison-Wesley Publishing Company, 1996.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/106/106106131/
2	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3	https://www.javatpoint.com/daa-tutorial

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	L	M	L	S	M
CO2	S	S	S	S	S	M	S	M	S	M
CO3	S	S	S	S	S	M	S	M	S	M
CO4	S	S	S	S	S	M	S	M	S	M
CO5	S	S	S	S	S	M	S	M	S	M

*S-Strong; M-Medium; L-Low

I – SEMESTER

Course code	23220AEC12	OBJECT ORIENTED ANALYSIS AND DESIGN & C++	L	T	P	C
Core/Elective/Supportive	Core		4	2	-	4
Pre-requisite	Basics of C++ and Object Oriented Concepts					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Present the object model, classes and objects, object orientation, machine view and model management view. 2. Enables the students to learn the basic functions, principles and concepts of object oriented analysis and design. 3. Enable the students to understand C++ language with respect to OOAD 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the concept of Object –Oriented development and modeling techniques				K1,K2	
2	Gain knowledge about the various steps performed during object design				K2,K3	
3	Abstract object – based views for generic software systems				K3	
4	Link OOAD with C++ language				K4,K5	
5	Apply the basic concept of OOPs and familiarize to write C++ program				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	OBJECT MODEL				15hours	
The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects.						
Unit:2	CLASSES AND OBJECTS				15hours	
Classes and Object: Nature of Class – Relationship Among classes – The Interplay of classes and Objects. Classification: The importance of Proper Classification –identifying classes and objects – Key Abstractions and Mechanism.						
Unit:3	C++ INTRODUCTION				15hours	
Introduction to C++ -Input and output statements in C++- Declarations-control structures– Functions in C++.						
Unit:4	INHERITANCE AND OVERLOADING				13hours	

Classes and Objects–Constructors and Destructors–operators overloading–Type Conversion-
Inheritance – Pointers and Arrays.

Unit:5	POLYMORPHISM AND FILES	15hours
Memory Management Operators-Polymorphism–Virtual functions–Files–Exception Handling – String Handling -Templates.		
Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars –webinars		
Total Lecture hours		75hours
Text Books		
1	“Object Oriented Analysis and Design with Applications”, Grady Booch, Second Edition, Pearson Education.	
2	“Object-Oriented Programming with ANSI & Turbo C++”, AshokN.Kamthane, First Indian Print -2003, Pearson Education.	
Reference Books		
1	Balagurusamy“Object Oriented Programming with C++”, TMH, Second Edition, 2003.	
Related Online Contents[MOOC, SWAYAM ,NPTEL, Websites etc.]		
1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview	
2	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/	
3	https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm	

Mapping with Programming Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	M	S	S
CO2	S	S	S	M	S	M	S	M	S	S
CO3	S	S	S	M	S	M	S	M	S	S
CO4	S	S	S	M	S	M	S	M	S	S
CO5	S	S	S	M	S	M	S	M	S	S

*S-Strong; M-Medium; L-Low

I – SEMESTER

Course code	23220AEC13	PYTHON PROGRAMMING	L	T	P	C
Core/Elective/Supportive	Core		5	2	-	5
Pre-requisite	Basics of any OOPS Programming Language					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Presents an introduction to Python creation of web applications, network applications and working in the clouds 2. Use functions for structuring Python programs 3. Understand different Data Structures of Python 4. Represent compound data using Python lists, tuples and dictionaries 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic concepts of Python Programming					K1,K2
2	Understand File operations, Classes and Objects					K2,K3
3	Acquire Object Oriented Skills in Python					K3,K4
4	Develop web applications using Python					K5
5	Develop Client Server Networking applications					K5,K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION				15hours	
Python: Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets– Comparison.						
Unit:2	CODE STRUCTURES				15hours	
Code Structures: if, else if, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions.						
Unit:3	MODULES, PACKAGES AND CLASSES				15hours	
Modules, Packages, and Programs: Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. Objects and Classes: Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super–In self Defense –Get and Set Attribute Values with Properties –Name Mangling for Privacy – Method Types – Duck Typing – Special Methods –Composition.						
Unit:4	DATA TYPES AND WEB				13hours	
Data Types: Text Strings–Binary Data. Storing and Retrieving Data: File Input/Output–Structured Text Files – Structured Binary Files - Relational Databases – No SQL Data Stores.						
Web: Web Clients –Web Servers–Web Services and Automation						

Unit:5	SYSTEMS AND NETWORKS	15hours
Systems: Files–Directories–Programs and Processes–Calendars and Clocks.		
Concurrency: Queues– Processes–Threads–Green Threads and event–twisted–Reds.		
Networks: Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – Zero MQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Working in the Clouds.		
Unit:6	contemporary Issues	2 hours
Expert lectures, online seminars –webinars		
Total Lecture hours		75hours
Text Books		
1	BillLubanovic, “Introducing Python”, O’Reilly, First Edition-Second Release, 2014.	
2	Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.	
Reference Books		
1	David M. Beazley, “Python Essential Reference”, Developer’s Library, Fourth Edition, 2009.	
2	Sheetal Taneja, Naveen Kumar, “Python Programming - A Modular Approach”, Pearson Publications.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.programiz.com/python-programming/	
2	https://www.tutorialspoint.com/python/index.htm	
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview	

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	S	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code	23220DSC14A	CRITICAL THINKING, DESIGN THINKING AND PROBLEM SOLVING	I	T	P	C
Core/Elective/Supportive		Elective	5	2	-	5
Pre-requisite		Basics of Logical & Reasoning Skills				
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Learn critical thinking and its related concepts 2. Learn design thinking and its related concepts 3. Develop Thinking patterns, Problem solving & Reasoning 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the concepts of Critical thinking and its related technology					K1,K2
2	Focus on the explicit development to critical thinking and problem solving skills					K2,K3
3	Apply design thinking in problems					K3,K4
4	Make a decision and take actions based on analysis					K4,K5
5	Analyze the concepts of Thinking patterns, Problem solving & Reasoning in real time applications					K5,K6
K1-Remember;K2-Understand;K3-Apply; K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	CRITICAL THINKING					12hours
Critical Thinking: Definition, Conclusions and Decisions, Beliefs and Claims, Evidence –finding, evaluation, Inferences, Facts – opinion, probable truth, probably false, Venn diagram. Applied critical thinking: Inference, Explanation, Evidence, Credibility, Two Case Studies, critical thinking and science, critical evaluation, self-assessment.						
Unit:2	DESIGN THINKING					12hours
Design Thinking: Introduction, Need of Design Thinking, problem to question - design thinking process, Traditional Problem Solving versus Design Thinking, phases of Design Thinking, problem exploration, Stake holder assessment, design thinking for manufacturers, smart Idea to implementation.						
Unit:3	CASE STUDY					12hours
Thinking to confidence, fear management, duty Vs. passion, Team management, Tools for Thinking, prototype design, Relevance of Design and Design Thinking in engineering, human centered design, case study: apply design thinking in problem.						
Unit:4	PROBLEMSOLVING					10hours
Problem solving: problem definition, problem solving methods, selecting and using information, data processing, solution methods, solving problems by searching, recognizing patterns, spatial						

Reasoning, necessity and sufficiency, choosing and using models, making choices and decisions.										
Unit:5		REASONING							12hours	
Reasoning: Deductive and hypothetical reasoning, computational problem solving; generating, implementing, and evaluating solutions, interpersonal problem solving. Advanced problem solving: Combining skills – using imagination, developing models, Carrying out investigations, Data analysis and inference. Graphical methods of solution, Probability, tree diagrams and decision trees										
Unit:6		Contemporary Issues							2 hours	
Expert lectures, online seminars –webinars										
							Total Lecture hours		60hours	
Text Books										
1	JohnButterworth and Geoff Thwaites, Thinking skills: Critical Thinking and Problem Solving, Cambridge University Press, 2013.									
2	H.S.FoglerandS.E.LeBlanc, Strategies for Creative Problem Solving, 2ndedition, Pearson, Upper Saddle River, NJ, 2008.									
Reference Books										
1	A. Whimbey and J. Lochhead, Problem Solving & Comprehension, 6th edition, Lawrence Erlbaum, Mahwah, NJ, 1999.									
2	M. Levine, Effective Problem Solving, 2nd edition, Prentice Hall, Upper Saddle River, NJ, 1994.									
3	Michael Baker, The Basic of Critical Thinking, The Critical Thinking Copress, 2015.									
4	David Kelley and Tom Kelley, Creative Confidence, 2013.									
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]										
1	https://www.tutorialspoint.com/critical_thinking/index.htm									
2	https://www.tutorialspoint.com/design_thinking/design_thinking_quick_guide.htm									
3	https://nptel.ac.in/courses/109/104/109104109/									
Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	S	S	S
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	23220DSC14B	MULTIMEDIA AND ITS APPLICATIONS	L	T	P	C
Core/Elective/Supportive		Elective	5	1	-	4
Pre-requisite	Basics of Multimedia					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. To introduce the students the concepts of Multimedia Images & Animation. 2. To introduce Multimedia authoring tools 3. To understand the role of Multimedia in Internet 4. To know about High Definition Television and Desktop Computing–Knowledge based Multimedia systems 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic concepts of Multimedia					K1,K2
2	Demonstrate Multimedia authoring tools					K2,K3
3	Analyze the concepts of Sound, Images, Video & Animation					K4
4	Apply and Analyze the role of Multimedia in Internet and real time applications					K4,K5
5	Analyze multimedia applications using HDTV					K5,K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION				12hours	
What is Multimedia?–Introduction to making Multimedia–Macintosh and Windows Production platforms – Basic Software tools.						
Unit:2	MULTIMEDIA TOOLS				12hours	
Making Instant Multimedia–Multimedia authoring tools–Multimedia building blocks–Text– Sound.						
Unit:3	ANIMATION				10hours	
Images–Animation–Video.						
Unit:4	INTERNET				12hours	
Multimedia and the Internet–The Internet and how it works–Tools for World Wide Web– Designing for the World Wide Web.						
Unit:5	MULTIMEDIA SYSTEMS				12hours	
High Definition Television and Desktop Computing –Knowledge based Multimedia systems.						

Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars - webinars		
Total Lecture hours		60hours
Text Books		
1	Tay Vaughan, “Multimedia making it work”, Fifth Edition, Tata McGraw Hill.	
2	John F.Koegel Bufford, “Multimedia Systems”, Pearson Education.	
Reference Books		
1	JudithJeffloate, “Multi Mediain Practice (Technology and Applications)”,PHI,2003.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.tutorialspoint.com/multimedia/index.htm	
2	https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_multimedia.htm	
3	https://nptel.ac.in/courses/117/105/117105083/	

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	S	M	M	M	S
CO2	S	S	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	23220DSC14C	INTERNET OF THINGS	L	T	P	C
Core/Elective/Supportive		Elective	5	1	-	4
Pre-requisite		Basics of Sensors & its Applications				
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> About Internet of Things where various communicating entities are controlled and managed for decision making in the application domain. Enable students to learn the Architecture of IOT and IOT Technologies Developing IOT applications and Security in IOT, Basic Electronics for IOT, Arduino IDE, Sensors and Actuators Programming NODEMCU using Arduino IDE. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand about IOT, its Architecture and its Applications					K1,K2
2	Understand basic electronics used in IOT& its role					K2,K3
3	Develop applications with C using Arduino IDE					K4
4	Analyze about sensors and actuators					K5,K6
5	Design IOT in real time applications using today's internet & wireless technologies					K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION					12hours
Introduction to IOT: Evolution of IOT – Definition & Characteristics of IOT - Architecture of IOT– Technologies for IOT – Developing IOT Applications – Applications of IOT – Industrial IOT – Security in IOT						
Unit:2	BASIC ELECTRONICS FOR IOT					12hours
Basic Electronics for IOT: Electric Charge, Resistance, Current and Voltage – Binary Calculations – Logic Chips – Microcontrollers – Multipurpose Computers – Electronic Signals – A/D and D/A Conversion – Pulse Width Modulation.						
Unit:3	PROGRAMMING USING ARDUINO					12hours
Programming Fundamentals with C using Arduino IDE: Installing and Setting up the Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators – Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions – Strings and Mathematics Library Functions.						
Unit:4	SENSORS AND ACTUATORS					10hours

Sensors and Actuators: Analog and Digital Sensors–Interfacing temperature sensor, ultrasound		
Sensor and infrared (IR) sensor with Arduino– Interfacing LED and Buzzer with Arduino.		
Unit:5	SENSOR DATA IN INTERNET	12hours
Sending Sensor Data Over Internet: Introduction to ESP8266 NODEMCU WIFI Module – Programming NODEMCU using Arduino IDE – Using WIFI and NODEMCU to transmit data from temperature sensor to Open Source IOT cloud platform (ThingSpeak).		
Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars –webinars		
	Total Lecture hours	hours
Text Books		
1	ArshdeepBahga, Vijay Madiseti, “InternetofThings:AHands – OnApproach”,2014. ISBN: 978-0996025515	
2	Boris Adryan, Dominik Obermaier, Paul Fremantle, “The Technical Foundations of IOT”, Artech Houser Publishers, 2017.	
Reference Books		
1	MichaelMargolis, “ArduinoCookbook”, O’Reilly, 2011	
2	MarcoSchwartz, “InternetofThingswithESP8266”, PacktPublishing, 2016.	
3	DhivyaBala, “ESP8266:StepbyStepTutorialforESP8266IoT, ArduinoNODEMCU Dev. Kit”, 2018.	
Related Online Contents[MOOC, SWAYAM ,NPTEL, Websites etc.]		
1	https://onlinecourses.nptel.ac.in/noc20_cs66/preview	
2	https://www.javatpoint.com/iot-internet-of-things	
3	https://www.tutorialspoint.com/internet_of_things/index.htm	

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	M	S	M	S	M	M	S	M
CO2	M	S	M	S	M	S	M	S	S	S
CO3	S	S	S	S	M	S	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	23220SEC15L	PRACTICAL:ALGORITHM AND OOPS LAB	L	T	P	C
Core/Elective/Supportive	Core		0	0	3	3
Pre-requisite	Basic Programming of C++language					
Course Objectives:						
The main objectives of this course are to:						
1. This course covers the basic data structures like Stack, Queue, Tree, and List.						
2. This course enables the students to learn the applications of the data structures using various techniques						
3. It also enable the students to understand C++ language with respect to OOAD concepts						
4. Application of OOPS concepts.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the concepts of object oriented with respect to C++				K1,K2	
2	Able to understand and implement OOPS concepts				K3,K4	
3	Implementation of data structures like Stack, Queue, Tree, List using C++				K4,K5	
4	Application of the data structures for Sorting, Searching using different techniques.				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LISTOF PROGRAMS						75hours
1) Write a program to solve the were of Hanoi using recursion. 2) Write a program to traverse through binary search tree using traversals. 3) Write a program to perform various operations on stack using linked list. 4) Write a program to perform various operation in circular queue. 5) Write a program to sort an array of an elements using quick sort. 6) Write a program to solve number of elements in ascending order using heap sort. 7) Write a program to solve the knapsack problem using greedy method 8) Write a program to search for an element in a tree using divide& conquer strategy. 9) Write a program to place the8 queen son an8X8matrixso that no two queens Attack. 10) Write a C++program to perform Virtual Function 11) Write a C++ program to perform Parameterized constructor 12) Write a C++ program open form Friend Function 13) Write a C++ program to perform Function Overloading 14) Write a C++ program to perform Single Inheritance 15) Write a C++ program to perform Employee Details using files.						
Expert lectures, online seminars –webinars						

Total Lecture hours		75hours
Text Books		
1	Goodrich, “Data Structures & Algorithms in Java”, Wiley 3rd edition.	
2	Skiena,”The Algorithm Design Manual”, Second Edition, Springer, 2008	
Reference Books		
1	Anany Levith,”Introduction to the Design and Analysis of algorithm”, Pearson Education Asia, 2003.	
2	Robert Sedgewick, Phillipe Flajolet,”An Introduction to the Analysis of Algorithms”, Addison-Wesley Publishing Company, 1996.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview	
2	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/	
3	https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm	

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

23220RMC16	Research Methodology	2	-	-	2
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AIM:

To give an exposure to development of research questions and the various statistical methods suitable to address them through available literature, with basic computational operators.

OBJECTIVES:

- To understand the approaches towards and constraints in good research.
- To identify various statistical tools used in research methodology
- To appreciate and compose the manuscript for publication
- To train in MATLAB platform for basic computational Programming and analysis.

OUTCOME:

Ability to develop research questions and the various research strategies and compile research results in terms of journal manual scripts.

PREREQUISITES:

Research methodology course in UG level or equivalent knowledge.

UNIT-I Introduction to research methodology

Objectives of research – type of research – Significance of research. Research methodology – Research and scientific method – Criteria of good research – Problems encountered by research in India.

UNIT-II Data base and Literature Survey

Articles – Thesis – Journals – Patents – Primary sources of journals and patens – Secondary sources – Listing of titles – Abstracts –Chemical Abstract Service – Reviews – Monographs – Literature search.

UNIT-III Data Analysis:

Precision and accuracy – Reliability – Determinate and random errors – Distribution of random errors –normal distribution curve – Statistical treatment of finite samples – T test and F test (ANOVA) co – Variance (ANCOVA) correlation and multiple regression.

UNIT-IV Thesis and paper writing:

Conventions in writing – General format – Page and chapter format – Use of quotations and footnotes – Preparations of tables and figures – Reference and Appendices.

UNIT-V Application on MATLAB:

Numerical Integration – Numerical integration, ordinary differential equations, partial differential equations, and boundary value problems - Fourier analysis – Fourier transforms, convolution.

References:

1. C.R. Kothari, Research Methodology, New Age International publishers. New Delhi, 2224.
2. R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 1999.
3. R. Gopalan, This is writing, Vijay Nicole Imprints Private Ltd., 2225.
4. A Guide to MATLAB: For Beginners and experienced Users by Brian R. Hunt (Editor), Ronald L. Lipsman, J. Rosenberg
5. Introduction to MATLAB for Engineers by William J. Palm III.

II – SEMESTER

Course code	23220AEC21	DATA MINING AND WAREHOUSING	L	T	P	C
Core/Elective/Supportive	Core		5	1	-	4
Pre-requisite	Basics of RDBMS & Algorithms					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing. 2. Develop skills of using recent data mining software for solving practical problems. 3. Develop and apply critical thinking, problem-solving, and decision-making skills. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic data mining techniques and algorithms					K1,K2
2	Understand the Association rules, Clustering techniques and Data warehousing contents					K2,K3
3	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining					K4,K5
4	Design data ware house with dimensional modeling and apply OLAP operations					K5,K6
5	Identify appropriate data mining algorithms to solve real world problems					K6
K1-Remember;K2-Understand;K3-Apply; K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	BASICS AND TECHNIQUES					12hours
Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.						
Unit:2	ALGORITHMS					12hours
Classification: Introduction –Statistical –based algorithms -distance–based algorithms-decision tree-basedalgorithms-neuralnetwork–basedalgorithms–rule-basedalgorithms–combining Techniques.						
Unit:3	CLUSTERING AND ASSOCIATION					12hours
Clustering: Introduction–Similarity and Distance Measures–Outliers–Hierarchical Algorithms -Partitional Algorithms. Association rules: Introduction - large item sets - basic algorithms – parallel &distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.						
Unit:4	DATA WAREHOUSING AND MODELING					11hours

Data warehousing: introduction- characteristics of a data warehouse–data marts–other aspects		
Of data mart .Online analytical processing: introduction –OLTP & OLAP systems		
Data modeling –star schema for multidimensional view –data modeling – multi factor schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.		
Unit:5	APPLICATIONS OF DATA WAREHOUSE	11 hours
Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse.		
Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.		
Unit:6	Contemporary Issues	2 hours
Expert lectures ,online seminars –webinars		
	Total Lecture hours	60hours
Text Books		
1	MargaretH.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson education, 2003.	
2	C.S.R. Prabhu, “Data Warehousing Concepts, Techniques, Products and Applications”, PHI, Second Edition.	
Reference Books		
1	ArunK.Pujari, “Data Mining Techniques”, Universities Press(India)Pvt. Ltd.2003.	
2	Alex Berson, StephenJ.Smith, “Data Warehousing, Data Mining and OLAP”, TMCH, 2001.	
3	JiaweiHan & Micheline Kamber, “Data Mining Concepts &Techniques”, 2001, Academic press.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.javatpoint.com/data-warehouse	
2	https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/	
3	https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html	

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	M	M	M	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

II – SEMESTER

Course code	23220AEC22	ADVANCED OPERATING SYSTEMS	L	T	P	C
Core/Elective/Supportive	Core		5	1	-	4
Pre-requisite	Basics of O S& its functioning					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Enable the student to learn the different types of operating systems and their functioning. 2. Gain knowledge on Distributed Operating Systems 3. Gain insight into the components and management aspects of real time and mobile operating systems. 4. Learn case studies in Linux Operating Systems 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the design issues associated with operating systems				K1,K2	
2	Master various process management concepts including scheduling, deadlocks and distributed file systems				K3,K4	
3	Prepare Real Time Task Scheduling				K4,K5	
4	Analyze Operating Systems for Handheld Systems				K5	
5	Analyze Operating Systems like LINUX and IOS				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	BASICS OF OPERATING SYSTEMS				12hours	
Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments -Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks –Prevention – Avoidance – Detection – Recovery.						
Unit:2	DISTRIBUTED OPERATING SYSTEMS				12hours	
Distributed Operating Systems: Issues – Communication Primitives – Lamport’s Logical Clocks – Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems –design issues – Case studies – The Sun Network File System-Coda.						
Unit:3	REALTIME OPERATING SYSTEM				10hours	
Real time Operating Systems : Introduction – Applications of Real Time Systems – Basic Model of Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling						
Unit:4	HANDHELD SYSTEM				12hours	

Operating Systems for Hand held Systems: Requirements–Handheld Operating Systems–Palm OS- Symbol an Operating System-Android–Architecture of android– Securing handheld systems

Unit:5	CASE STUDIES	12hours
Case Studies : Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- IOS : Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.		
Unit:6	Contemporary Issues	2 hours
Expert lectures online seminars–webinars		
Total Lecture hours		60hours
Text Books		
1	Abraham Silbers chatz; Greg Gagne, “Operating System Concepts”, Seventh Edition, John Wiley & Sons, 2004.	
2	MukeshSinghal and Niranjan G. Shivaratri, “Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems”, Tata McGraw-Hill, 2001.	
Reference Books		
1	RajibMall, “Real-Time Systems: Theory and Practice”, Pearson Education India, 2006.	
2	Pramod Chandra Bhatt, An introduction to operating systems, concept and practice, PHI, Third edition, 2010.	
3	Daniel.P.Bovet&MarcoCesati,“UnderstandingtheLinuxkernel”,3 rd edition,O“Reilly,2005	
4	NeilSmyth, “I Phone iOS4 Development Essentials–Xcode”, Fourth Edition, Pay load media, 2011.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://onlinecourses.nptel.ac.in/noc20_cs04/preview	
2	https://www.udacity.com/course/advanced-operating-systems--ud189	
3	https://minnie.tuhs.org/CompArch/Resources/os-notes.pdf	

Mapping with Programming Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	M	M	M	M
CO2	S	M	S	S	S	S	S	M	S	M
CO3	S	M	S	S	S	S	S	M	S	M
CO4	S	M	S	S	S	S	S	M	S	M
CO5	S	M	S	S	S	S	S	M	S	M

*S-Strong; M-Medium; L-Low

II – SEMESTER

Course code	23220AEC23	ADVANCED JAVA PROGRAMMING	L	T	P	C
Core/Elective/Supportive	Core		4	1	-	4
Pre-requisite	Basics of Java & its Usage					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Enable the students to learn the basic functions, principles and concepts of advanced java programming. 2. Provide knowledge on concepts needed for distributed Application Architecture. 3. Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the advanced concepts of Java Programming					K1,K2
2	Understand JDBC and RMI concepts					K2,K3
3	Apply and analyze Java in Database					K3,K4
4	Handle different event in java using the delegation event model, event listener and class					K5
5	Design interactive applications using Java Servlet, JSP and JDBC					K5,K6
K1-Remember;K2-Understand;K3-Apply; K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	BASICS OF JAVA				12hours	
Java Basics Review: Components and event handling–Threading concepts–Networking features – Media techniques						
Unit:2	REMOTEMETHOD INVOCATION				12hours	
Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons- Defining Remote objects- Remote Object Activation-Object Serialization-Java Spaces						
Unit:3	DATABASE				10hours	
Java in Databases-JDBC principles–database access-Interacting-database search–Creating multimedia databases – Database support in web applications						
Unit:4	SERVLETS				12hours	
Java Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java Servlet-Reading data from a client-Reading http request header-sending data to a client and writing the http response header-working with cookies Java Server Pages: JSP Overview-Installation-JSP tags-Components of a JSP page-Expressions-Script lets-Directives-Declarations-A complete example						
Unit:5	ADVANCED TECHNIQUES				12hours	

JAR file format creation–Internationalization–Swing Programming–Advanced java techniques		
Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars –webinars		
	Total Lecture hours	60hours
Text Books		
1	Jamie Jaworski, “Java Unleashed”, SAMS Tec media Publications, 1999.	
2	Campione, Walrath and Huml, “The Java Tutorial”, Addison Wesley, 1999.	
Reference Books		
1	JimKeogh,”TheCompleteReferenceJ2EE”, Tata McGraw Hill Publishing Company Ltd, 2010.	
2	DavidSawyer McFarland,“JavaScript And JQuery – The Missing Manual”,Oreilly Publications, 3rd Edition,2011.	
3	Deiteland Deitel, “Java Howto Program”, Third Edition, PHI/Pearson Education Asia.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.javatpoint.com/servlet-tutorial	
2	https://www.tutorialspoint.com/java/index.htm	
3	https://onlinecourses.nptel.ac.in/noc19_cs84/preview	

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	M	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Course code	23220DSC24A	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	L	T	P	C
Core/Elective/Supportive	Core		4	1	-	4
Pre-requisite	Basics of AI & an Introduction about ML					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Enable the students to learn the basic functions of AI, Heuristic Search Techniques. 2. Provide knowledge on concepts of Representations and Mappings and Predicate Logic. 3. Introduce Machine Learning with respect Data Mining, Big Data and Cloud. 4. Study about Applications & Impact of ML. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Demonstrate AI problems and techniques				K1,K2	
2	Understand machine learning concepts				K2,K3	
3	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning				K3,K4	
4	Analyze the impact of machine learning on applications				K4,K5	
5	Analyze and design area world problem for implementation and understand the dynamic behavior of a system				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION				12hours	
Introduction: AI Problems - AI techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search.						
Unit:2	SEARCH TECHNIQUES				12hours	
Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.						
Unit:3	PREDICATE LOGIC				12hours	
Using Predicate logic: Representing simple facts in logic - Representing Instance and Isa relationships - Computable functions and predicates - Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming -Forward Vs Backward reasoning -Matching-Control knowledge.						
Unit:4	MACHINE LEARNING				12hours	

Understanding Machine Learning: What Is Machine Learning?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud –Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.

Unit:5	APPLICATIONS OF MACHINE LEARNING	10hours
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Looking Inside Machine Learning: The Impact of Machine Learning on Applications-Data Preparation-The Machine Learning Cycle.

Unit:6	Contemporary Issues	2 hours
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Expert lectures, online seminars –webinars

	Total Lecture hours	60hours
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Text Books

- | | |
|---|--|
| 1 | Elaine Richand Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991. |
| 2 | George F Luger," Artificial Intelligence", 4thEdition, Pearson Education Pub, 2002. |

Reference Books

- | | |
|---|---|
| 1 | Machine Learning For Dummies ®, IBM Limited Edition by Judith Hurwitz, Daniel Kirsch. |
|---|---|

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

- | | |
|---|---|
| 1 | https://www.ibm.com/downloads/cas/GB8ZMQZ3 |
| 2 | https://www.javatpoint.com/artificial-intelligence-tutorial |
| 3 | https://nptel.ac.in/courses/106/105/106105077/ |

Mapping with Programming Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Course code	23220DSC24B	MOBILE COMPUTING	L	T	P	C
Core/Elective/Supportive		Elective	4	1	-	4
Pre-requisite	Basics of Mobile Communication					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Present the overview of Mobile computing, Applications and Architectures. 2. Describe the futuristic computing challenges. 3. Enable the students to learn the concept of mobile computing. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the need and requirements of mobile communication					K1,K2
2	Focus on mobile computing applications and techniques					K2,K3
3	Demonstrate satellite communication in mobile computing					K4
4	Analyze about wireless local loop architecture					K5,K6
5	Analyze various mobile communication technologies					K6
K1-Remember;K2-Understand;K3-Apply; K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION					12hours
Introduction: Advantages of Digital Information - Introduction to Telephone Systems –Mobile communication: Need for Mobile Communication – Requirements of Mobile Communication – History of Mobile Communication.						
Unit:2	MOBILE COMMUNICATION					12hours
Introduction to Cellular Mobile Communication – Mobile Communication Standards –Mobility Management – Frequency Management – Cordless Mobile Communication Systems.						
Unit:3	MOBILE COMPUTING					12hours
Mobile Computing: History of data networks – Classification of Mobile data networks - CDPD System – Satellites in Mobile Communication: Satellite classification – Global Satellite Communication – Changeover from one satellite to other – Global Mobile Communication – Interferences in Cellular Mobile Communication.						
Unit:4	MOBILE COMMUNICATION SYSTEM					11hours
Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problems in WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service – Wireless Application Protocol.						

Unit:5	COMMUNICATION TECHNOLOGY	11hours
WCDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Intelligent Mobile Communication system – Fourth Generation Mobile Communication systems.		
Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars–webinars		
Total Lecture hours		60hours

Text Books

1	T.G.Palanivelu, R Nakkeeran, “Wireless and Mobile Communication”, PHI Limited, 2009.
2	Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2007.

Reference Books

1	AsokeK Talukder, Hasan Ahmed, Roopa Yavagal, “Mobile Computing”, TMH, 2010.
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Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	https://www.tutorialspoint.com/mobile_computing/index.htm
2	https://www.javatpoint.com/mobile-computing
3	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/

Mapping with Programming Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	L	L	M	S	M	M	M	M
CO2	S	S	S	M	M	S	M	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	23220DSC24C	WEB SERVICES	L	T	P	C
Core/Elective/Supportive		Elective	4	1	-	4
Pre-requisite	Basics of Distributed Computing					
Course Objectives:						
The main objectives of this course are to:						
1. Present the Web Services , Building real world Enterprise applications using Web Services with Technologies XML, SOAP , WSDL , UDDI						
2. Get overview of Distributed Computing ,XML, and its technologies						
3. Update with QoS and its features						
4. Develop Standards and future of Web Services						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand web services and its related technologies					K1,K2
2	Understand XML concepts					K2,K3
3	Analyze on SOAP and UDDI model					K4,K5
4	Demonstrate the road map for the standard sand future of web services					K5
5	Analyze QoS enabled applications in web services					K5,K6
K1-Remember;K2-Understand;K3-Apply;K4- Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION					12hours
Introduction to web services – Overview of Distributed Computing- Evolution and importance of web services-Industry standards, Technologies and concepts underlying web services-Web services and enterprises-web services standards organization-web services platforms.						
Unit:2	XML FUNDAMENTALS					12hours
XMLFundamentals–XMLdocuments-XMLNamespaces-XMLSchema–ProcessingXML.						
Unit:3	SOAP MODEL					12hours
SOAP: The SOAP model- SOAP messages-SOAP encoding- WSDL: WSDL structure- interface definitions-bindings-services-Using SOAP and WSDL-UDDI: About UDDI- UDDI registry Specification- Core data structures-Accessing UDDI						
Unit:4	TECHNOLOGIES AND STANDARDS					12hours
Advanced web services technologies and standards: Conversations overview-web services conversation language-WSCL interface components. Workflow: business process management-workflows and workflow management systems Security: Basics-data handling and forwarding- data storage-errors-Web services security issues.						

Unit:5	QUALITY OF SERVICE	10hours
Quality of Service: Importance of QoS for web services-QoS metrics-holes-design patterns-QoS enabled web services-QoS enabled applications. Web services management-web services standards and future trends.		
Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars –webinars		
	Total Lecture hours	60hours
Text Books		
1	Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services: An Architects Guide”, Prentice Hall, Nov 2003.	
2	Keith Ballinger, “NET Web services: Architecture and Implementation with .Net”, Pearson Education, First Edition, Feb 2003.	
Reference Books		
1	Ramesh Nagappan, “Developing Java Web Services: Architecting and developing secure Web Services Using Java”, John Wiley and Sons, first Edition Feb 2003.	
2	Eric A Marks and Mark J Werrell, “Executive Guide to Web services”, John Wiley and sons, March 2003.	
3	Anne Thomas Manes, “Web Services: Amanagers Guide”, Addison Wesley, June 2003.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.tutorialspoint.com/webservices/index.htm	
2	https://www.javatpoint.com/web-services-tutorial	
3	https://www.btechguru.com/training--programming--xml--web-services--web-services-part-1-video-lecture--11801--24--147.html	

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	S	M	M	M	S
CO2	S	S	S	M	M	S	M	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	23220SEC25L	PRACTICALIV:ADVANCED JAVAPROGRAMMING LAB	I	T	P	C
Core/Elective/Supportive	Core		0	0	3	3
Pre-requisite	Basics in Java Programming					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1.To enable the students to implement the simple programs using JSP, JAR 2.To provide knowledge on using Servlets, Applets 3.To introduce JDBC and navigation of records 4.To understand RMI& its implementation 5.To introduce to Socket programming 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand to the implement concepts of Java using HTML forms, JSP & JAR				K1,K2	
2	Must be capable of implementing JDBC and RMI concepts				K3,K4	
3	Able to write Applets with Event handling mechanism				K4,K5	
4	To Create interactive web based applications using servlets and jsp				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LISTOF PROGRAMS					75hours	
<ol style="list-style-type: none"> 1. Display a welcome message using Servlet. 2. Design a Purchase Order form using Html form and Servlet. 3. Develop a program for calculating the percentage of marks of ast using JSP. 4. Design a Purchase Order form using Html form and JSP. 5. Prepare a Employee pay slip using JSP. 6. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records. 7. Write a program using Java servlet to handle form data. 8. Write a simple Servlet program to create a table of all the headers it receives a long with their associated values. 9. Write a programing JSP by using session object. 10. Write a program to build a simple Client Server application using RMI. 11. Create an applet for a calculator application. 12. Program to send a text message to another system and receive the text message from the system (use socket programming). 						
Expert lectures, online seminars –webinars						
Total Lecture hours					75hours	

Text Books	
1	Jamie Jaworski, “Java Unleashed”, SAMS Tech media Publications, 1999.
2	Campione, Walrath and Huml, “The Java Tutorial”, Addison Wesley, 1999.
Reference Books	
1	Jim Keogh,”The Complete Reference J2EE”, Tata McGraw Hill Publishing Company Ltd, 2010.
2	David Sawyer McFarland, “Java Script And JQuery – The Missing Manual”,O Reilly Publications, 3rd Edition,2011.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/servlet-tutorial
2	https://www.tutorialspoint.com/java/index.htm
3	https://onlinecourses.nptel.ac.in/noc19_cs84/preview

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	23220SEC26L	PRACTICAL III: DATAMINING USING R	L	T	P	C
Core/Elective/Supportive	Core		0	0	3	3
Pre-requisite	Basics of DM Algorithms & R Programming					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> To enable the students to learn the concepts of Data Mining algorithms namely classification, clustering, regression.... To understand & write programs using the DM algorithms To apply statistical interpretations for the solutions Able to use visualizations techniques for interpretations 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Able to write programs using R for Association rules, Clustering techniques				K1,K2	
2	To implement data mining techniques like classification, prediction				K2,K3	
3	Able to use different visualizations techniques using R				K4,K5	
4	To apply different data mining algorithms to solve real world applications				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LISTOF PROGRAMS					75hours	
<ol style="list-style-type: none"> Implement a priority algorithm to extract association rule of data mining. Implement k-means clustering technique. Implement any one Hierarchal Clustering. Implement Classification algorithm. Implement Decision Tree. Linear Regression. Data Visualization. 						
Total Lecture hours					75hours	
Text Books						
1	Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education,2003.					
2	C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition					
Reference Books						
1	ArunK. Pujari, "Data Mining Techniques", Universities Press (India) Pvt. Ltd., 2003.					
2	Alex Berson StephenJ. Smith, "Data Warehousing, Data Mining and OLAP", TMCH, 2001.					

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/data-warehouse
2	https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/
3	https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

III SEMESTER

Course code	23220AEC31	DIGITAL IMAGE PROCESSING	L	T	P	C
Core/Elective/Supportive	Core		5	1	-	5
Pre-requisite	Basics of Image Processing					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Learn basic image processing techniques for solving real problems. 2. Gain knowledge in image transformation and Image enhancement techniques. 3. Learn Image compression and Segmentation procedures. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the fundament also Digital Image Processing				K1,K2	
2	Understand the mathematical foundations for digital image representation, image acquisition, image transformation, and image enhancement				K2,K3	
3	Apply, Design and Implement and get solutions for digital image processing problems				K3,K4	
4	Apply the concepts of filtering and segmentation for digital image retrieval				K4,K5	
5	Explore the concepts of Multi-resolution process and recognize the objects in an efficient manner				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION				12hours	
Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels – Linear & Nonlinear operations.						
Unit:2	IMAGE ENHANCEMENT				12hours	
Image Enhancement in the spatial domain: - Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Combining spatial enhancement methods.						
Unit:3	IMAGE RESTORATION				12hours	

Image Restoration: A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering – Linear, Portion – Invariant Degradations – Estimating the degradation function – Inverse filtering – Minimum mean square Error Filtering – Constrained least squares filtering – Geometric mean filter – Geometric Transformations.

Unit:4	IMAGE COMPRESSION	11hours
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Image Compression: Fundamentals–Image compression models–Elements of Information Theory – Error Free compression – Lossy compression – Image compression standards.

Unit:5	IMAGE SEGMENTATION	11hours
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Image Segmentation: Detection and Discontinuities – Edge Linking and Boundary deduction – Thresholding – Region-Based segmentation – Segmentation by Morphological watersheds – The use of motion in segmentation.

Unit:6	Contemporary Issues	2 hours
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Expert lectures, online seminars –webinars

	Total Lecture hours	60hours
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Text Books

- | | |
|---|---|
| 1 | RafaelC.Gonzalez,RichardE.Woods,“DigitalImageProcessing”,SecondEdition,PHI/Pearson Education. |
| 2 | B.Chanda, D.Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2003. |

Reference Books

- | | |
|---|---|
| 1 | NickEfford, “Digital Image Processing a practical introducing using Java”, Pearson Education, 2004. |
|---|---|

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

- | | |
|---|---|
| 1 | https://nptel.ac.in/courses/117/105/117105135/ |
| 2 | https://www.tutorialspoint.com/dip/index.htm |
| 3 | https://www.javatpoint.com/digital-image-processing-tutorial |

Mapping with Programming Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	M	S	M	M	S
CO2	S	S	S	S	S	M	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Course code	23220AEC32	CLOUD COMPUTING	L	T	P	C
Core/Elective/Supportive		Core	5	1	-	5
Pre-requisite	Basics of Cloud & its Applications					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Gain knowledge on cloud computing, cloud services, architectures and applications. 2. Enable the students to learn the basics of cloud computing with real time usage 3. How to store and share, in and from cloud? 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the concepts of Cloud and its services					K1,K2
2	Collaborate Cloud for Event & Project Management					K3,K4
3	Analyze on cloud in–Word Processing, Spread Sheets, Mail, Calendar, Database					K4,K5
4	Analyze cloud in social networks					K5,K6
5	Explore cloud storage and sharing					K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION				12hours	
INTRODUCTION Cloud Computing Introduction, From, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services.						
Unit:2	CLOUD COMPUTING				12hours	
CLOUD COMPUTING FOR EVERYONE Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping, schedules, managing projects, presenting on road.						
Unit:3	CLOUD SERVICES				12hours	
USING CLOUD SERVICES Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.						
Unit:4	OUTSIDE THE CLOUD				12hours	
OUTSIDE THE CLOUD Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating online						

Groupware, collaborating via blogs and wikis.		
Unit:5	STORING AND SHARING	10hours
STORING AND SHARING Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops.		
Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars –webinars		
	Total Lecture hours	60hours
Text Books		
1	Michael Miller, “Cloud Computing”, Pearson Education, New Delhi, 2009.	
Reference Books		
1	Anthony T. Velte, “Cloud Computing: A Practical Approach”, 1st Edition, Tata McGraw-Hill Education Private Limited, 2009.	
Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://nptel.ac.in/courses/106/105/106105167/	
2	https://www.tutorialspoint.com/cloud_computing/index.htm	
3	https://www.javatpoint.com/cloud-computing-tutorial	

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	S	M	S	M	S	M	M	M	S
CO2	M	S	M	S	S	S	M	M	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	M	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	23220AEC33	NETWORK SECURITY AND CRYPTOGRAPHY	L	T	P	C
Core/Elective/Supportive	Core		5	1	-	4
Pre-requisite	Basics of Networks & its Security					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Enable students to learn the Introduction to Cryptography, Web Security and Case studies in Cryptography. 2. To gain knowledge on classical encryption techniques and concepts of modular arithmetic and number theory. 3. To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms. 4. To explore the design issues and working principles of various authentication Applications and various secure communication standards including Kerberos, IPsec, and SSL/TLS and email. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the process of the cryptographic algorithms				K1,K2	
2	Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication				K2,K3	
3	Apply and analyze appropriate security techniques to solve network security problem				K3,K4	
4	Explore suitable cryptographic algorithms				K4,K5	
5	Analyze different digital signature algorithms to achieve authentication and design secure applications				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION				12hours	
Introduction to Cryptography – Security Attacks – Security Services –Security Algorithm- Stream cipher and Block cipher - Symmetric and Asymmetric-key Cryptosystem Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5.						
Unit:2	CRYPTO SYSTEM				12hours	
Public-key Cryptosystem: Introduction to Number Theory- RSA Algorithm–Key Management - Diffie-Hellman Key exchange–Elliptic Curve Cryptography Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.						
Unit:3	NETWORK SECURITY				12hours	
Network Security Practice: Authentication Applications–Kerberos–X.509Authentication services and Encryption Techniques. E-mail Security – PGP – S / MIME – IP Security.						

Unit:4	WEB SECURITY	10hours
Web Security-Secure Socket Layer–Secure Electronic Transaction. System Security-Intruders and Viruses – Firewalls– Password Security.		
Unit:5	CASE STUDY	12hours
Case Study: Implementation of Cryptographic Algorithms–RSA–DSA–ECC(C/JAVA Programming).Network Forensic – Security Audit - Other Security Mechanism: Introduction to: Stenography –Quantum Cryptography – Water Marking - DNA Cryptography		
Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars–webinars		
Total Lecture hours		60hours
Text Books		
1	William Stallings, “Cryptography and Network Security”, PHI/Pearson Education.	
2	BruceSchneir, “Applied Cryptography”,CRC Press.	
Reference Books		
1	A.Menezes, P Van Oorschot and Vanstone, “Hand Book of Applied Cryptography”, CRC Press, 1997	
2	AnkitFadia,”Network Security”, Macmillan.	
Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://nptel.ac.in/courses/106/105/106105031/	
2	http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html	
3	https://www.tutorialspoint.com/cryptography/index.htm	

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	L	S	M	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	23220AEC34	DATA SCIENCE & ANALYTICS	L	T	P	C
Core/Elective/Supportive		Core	5	1	-	4
Pre-requisite		Basics of Data Science& its Applications				
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Introduce the students to data science, big data & its ecosystem. 2. Learn data analytics & its life cycle. 3. To explore the programming languages, with respect to the data mining algorithms. 4. Relate the relationship between artificial intelligence, machine learning and data science. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the concept of data science and its techniques					K1,K2
2	Review data analytics					K2,K3
3	Apply and determine appropriate Data Mining techniques using to real time applications					K3,K4
4	Analyze on clustering algorithms					K4,K5
5	Analyze on regression methods in AI					K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6-Create						
Unit:1	INTRODUCTION					12hours
Introduction of Data Science: data science and big data–facets of data-data science process- Ecosystem- The Data Science process – six steps- Machine Learning.						
Unit:2	BASICS OF DATA ANALYTICS					12hours
Data Analytics lifecycle – review of data analytics – Advanced data Analytics – technology and tools.						
Unit:3	DATA ANALYTICS USING R					12hours
Basic Data Analytics using R : R Graphical User Interfaces – Data Import and Export – Attribute and Data Types –Descriptive Statistics – Exploratory Data Analysis –Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables – Data Exploration Versus Presentation.						
Unit:4	CLUSTERING					12hours
Overview of Clustering : K-means – Use Cases – Overview of the Method – Perform a K-means Analysis using R –Classification – Decision Trees – Overview of a Decision Tree – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Tree in R – Bayes’ Theorem – Naïve Bayes Classifier – Smoothing – Naïve Bayes in R.						

Unit:5	ARTIFICIAL INTELLIGENCE	10hours
Artificial intelligence: Machine Learning and deep learning in data science-Clustering, association rules. Linear regression-logistic regression-Additional regression methods.		
Unit:6	Contemporary Issues	2 hours
Expert lectures ,online seminars –webinars		
	Total Lecture hours	60hours
Text Books		
1	Introducing – Data – Science – Big – Data – Machine – Learning – and – more-using-Python – tools-2016. Pdf	
2	Data science in big data analytics-Wiley2015JohnWiley&Sons	
Reference Books		
1	As introduction Data Science – LarsNielsen2015	
2	Introducing Data Science Davy Cielen, Arno D.B.Meysman, Mohamed Ali 2016 Manning Publication	
3	RProgramming for Data Science-RogerD.Peng 2015LeanPublication	
4	DataScience&BigDataAnalytics:Discovering,Analyzing,VisualizingandPresenting Data	
Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.tutorialspoint.com/python_data_science/index.htm	
2	https://www.javatpoint.com/data-science	
3	https://nptel.ac.in/courses/106/106/106106179/	

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Course code	23220SEC35L	PRACTICALV: DIGITAL IMAGE PROCESSING Using MATLAB	L	T	P	C
Core/Elective/Supportive	Core		0	0	3	3
Pre-requisite	Basic Programming of Image Processing & an intro to MATLAB					
Course Objectives:						
The main objectives of this course are to:						
1. To understand the basics of Digital Image Processing fundamentals, image enhancement and image restoration techniques						
2. To enable the students to learn the fundamentals of image compression and segmentation						
3. To understand Image Restoration & Filtering Techniques						
4. Implementation of the above using MATLAB						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	To write programs in MATLAB for image processing using the techniques				K1, K2	
2	To able to implement Image Enhancements & Restoration techniques				K2, K3	
3	Capable of using Compression techniques in an Image				K3, K4	
4	Must be able to manipulate the image and Segment it				K5, K6	
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
LIST OF PROGRAMS					60hours	
1. Implement Image enhancement Technique.						
2. Histogram Equalization						
3. Image Restoration.						
4. Implement Image Filtering.						
5. Edge detection using Operators (Roberts, Prewitts and Sobels operators)						
6. Implement image compression.						
7. Image Subtraction						
8. Boundary Extraction using morphology.						
9. Image Segmentation						
Total Lecture hours					60hours	

Text Books	
1	RafaelC.Gonzalez, Richard E.Woods, “Digital Image Processing”, Second Edition, PHI/Pearson Education.
2	B.Chanda, D.Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2003.
Reference Books	
1	Nick Efford, “Digital Image Processing a practical introducing using Java”, Pearson Education, 2004.
Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/117/105/117105135/
2	https://www.tutorialspoint.com/dip/index.htm
3	https://www.javatpoint.com/digital-image-processing-tutorial

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Course code	23220SEC36L	PRACTICAL VI: CLOUD COMPUTING LAB	L	T	P	C
Core/Elective/Supportive	Core		0	0	3	3
Pre-requisite	Basic Programming using Cloud					
Course Objectives:						
The main objectives of this course are to:						
1. This course covers the basic data structures like Stack, Queue, Tree, and List.						
2. This course enables the students to learn the applications of the data structures using various techniques						
3. It also enable the students to understand C++ language with respect to OOAD concepts						
4. Application of OOPS concepts						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand and the concepts of object oriented with respect to C++				K1,K2	
2	Able to understand and implement OOPS concepts				K3,K4	
3	Implementation of data structures like Stack, Queue, Tree, List using C++				K4,K5	
4	Application of the data structures for sorting, Searching using different techniques.				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LISTOF PROGRAMS					60hours	
1. Working with Google Drive to make spreadsheet and notes.						
2. Launch a Linux Virtual machine.						
3. Toho statistic website						
4. Exploring Google cloud for the following a)Storage b)Sharing of data c)manage your calendar, to-do lists, d) a document editing tool						
5. Working and installation of Google App Engine						
6. Working and installation of Microsoft Azure						
7. To Connect Amazon RedshiftwithS3bucket						
8. To Create and Query a No SQL Table						
Expert lectures, online seminars–webinars						
Total Lecture hours					60hours	
Text Books						
1	Michael Miller, “Cloud Computing”, Pearson Education, New Delhi, 2009.					

Reference Books	
1	Anthony T. Velte, “Cloud Computing: A Practical Approach”, 1st Edition, Tata McGraw-Hill Education Private Limited, 2009.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/105/106105167/
2	https://www.tutorialspoint.com/cloud_computing/index.htm
3	https://www.javatpoint.com/cloud-computing-tutorial

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

IV – SEMESTER

Course code	23220AEC41L	PRACTICAL II:PYTHON PROGRAMMING LAB	L	T	P	C
Core/Elective/Supportive	Core		0	1	3	3
Pre-requisite	Basics of any OOP Programming Language					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. This course presents an overview of elementary data items, lists, dictionaries, sets and tuples 2. To understand and write simple Python programs 3. To Understand the OOPS concepts of Python 4. To develop web applications using Python 						
Expected, Course Outcomes:						
On the successful completion of the course ,student will be able to:						
1	Able to write programs in Python using OOPS concepts				K1,K2	
2	To understand the concepts of File operations and Modules in Python				K2,K3	
3	Implementation of lists, dictionaries, sets and tuples as programs				K3,K4	
4	To develop web applications using Python				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LISTOF PROGRAMS						75hours
Implement the following in Python: <ol style="list-style-type: none"> 1. Programs using elementary data items, lists, dictionaries and tuples 2. Programs using conditional branches, 3. Programs using loops. 4. Programs using functions 5. Programs using exception handling 6. Programs using inheritance 7. Programs using polymorphism 8. Programs to implement file operations. 9. Programs using modules. 10. Programs for creating dynamic and interactive webpages using forms. 						
Total Lecture hours						75hours
Text Books						
1	BillLubanovic, “Introducing Python”, O’Reilly, First Edition-Second Release, 2014.					
2	Mar klutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.					

Reference Books	
1	David M. Beazley, "Python Essential Reference", Developer's Library, Fourth Edition, 2009.
2	Sheetal Taneja, Naveen Kumar, "Python Programming- A Modular Approach", Pearson Publications.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.programiz.com/python-programming/
2	https://www.tutorialspoint.com/python/index.htm
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Course code	23220AEC42	PRACTICAL VII : WEB APPLICATION DEVELOPMENT AND HOSTING	L	T	P	C
Core/Elective/Supportive	Core		6	2	0	5
Pre-requisite	Basic Programming using HTML tags					
Course Objectives:						
The main objectives of this course are to:						
1. Able to design a webpage using HTML tags						
2. To enable the students to use Framesets, hyperlinks and different formatting features of HTML tags						
3. Enable the students to use Forms & other controls in a webpage						
4. To create interactive applications using PHP						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand & implement the basic HTML tags to create static web pages				K1,K2	
2	Capable of using hyperlinks, frames, images, tables,..... in a webpage				K2,K3	
3	Able to write dynamic web applications using HTML forms				K4,K5	
4	Must be able to write dynamic web applications in PHP & HTML tags using XAMPP.				K5,K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LISTOF PROGRAMS					30hours	
1. Develop website for your college using advanced tags of HTML.						
2. Write names of several countries in a paragraph and store it as an HTML document, world.html. Each country name must be a hot text. When you click India (for example), it must open india.html and it should provide a brief introduction about India.						
3. Develop a HTML document to display Text with Bullets / Numbers - Using Lists ii) to display the Table Format Data						
4. Develop a Complete Web Page using Frames and Framesets which gives the Information about a Hospital using HTML.						
5. Write a HTML document to print your Bio-Data in any at format using several components.						
6. Develop a HTML document to display a Registration Form for an inter-collegiate function.						
7. Using HTML form accept Customer details like Name, City, Pin code, Phone number and Email address and validate the data and display appropriate messages for violations using PHP (Eg. Name is Mandatory field; Pin code must be 6 digits, etc.).						
8. Write a program to accept two numbers n1 and n2 using HTML format and display the Prime						

Numbers between n1 and n2 using PHP.	
Total Lecture hours	30hours
Text Books	
1	Ivan Bayross, “Web Enabled Commercial Applications Development Using HTML, JavaScript, DHTML and PHP”, BPB Publications, 4th Revised Edition, 2010.
Reference Books	
2	A.K.Saini and Sumint Tuli, “Mastering XML”, First Edition, New Delhi, 2002.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/xml/index.htm
2	https://www.tutorialspoint.com/internet_technologies/websites_development.htm
3	https://www.youtube.com/watch?v=PlxWf493en4

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

23220PRW43	Project with Viva voce	0	2	10	4
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Each student will develop and implement individually developed application software based on any of the latest technologies.

23220SEC44	Skill Enhancement Professional Competency Skill	2	2	0	2
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Pre-requisite

Professional competencies are abilities bringing together soft and hard skills. These abilities enable an employee to competently manage tasks assigned to them as part of their role.

Course Objectives:

- Improved Job Performance. ...
- Increased Employee Satisfaction and Retention. ...
- Enhanced Innovation. ...
- Improved Organizational Agility. ...
- Communication. ...
- Time Management. ...

Expected Course Outcomes:

Expected learning outcomes define the totality of information, knowledge, understanding, attitudes, values, skills, competencies, or behaviors a learner should master upon the successful completion of the curriculum.

Unit- I: Office

What is a Business Enterprise? What is an Office? Who are Office Staff? What are the most Common Forms of Business Organization? What are the Advantages of Office Work? What are the Categories of Office Career and Job Classifications under Each Category? What are the Specific Skill Requirements for Office Jobs? Duties and Responsibilities of Office Staff.

Unit-II: Records Management

Objectives of Record Keeping; what is Filing? What are the Different Kinds of Filing System? Steps in Filing; Indexing; Selecting the Appropriate Filing System; How to handle Incoming & Outgoing Mails

Unit –III: Document/Report Writing Key points to write a document: The 5w-h plan for writing; Steps in writing workplace documents; Important things to remember when editing seven layout mistakes to avoid; Quick tips for report Writing; Basics of Meetings.

Unit-IV: Supervisory Skills

What are the Skills of the Supervisor and How to Acquire Them? Functions of Supervisor
Communication Meaning; Process; Communicating Tools; Types, Barriers Leadership &
Motivation Meaning and Concept; Importance of Leadership; Qualities of a Leader;
Relationship & Differences.

Unit-V: Leadership and Motivation

Organizational Leadership; Leadership Ethics - Traits of an Ethical Leader; Leadership Styles
- Important Leadership Styles- Situational Leadership – Emotional Intelligence of Leader;
Which Leadership Style to Follow? Influence of Situational Leadership Styles on Subordinate
Development;

References:–

1. Office Management

By Ankita Bhatia

Dr. R. K. Chopra

2. Office Management

By Dr. P. Rizwan Ahmed

3. Office Management

By R S N Pillai



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
B.Sc., COMPUTER SCIENCE CURRICULUM**

FULL TIME

[Regulation 2023]

[Candidates admitted from the academic year 2023-2024 onwards]

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REGULATIONS ON LEARNING OUTCOMES BASED CURRICULUM FRAME WORK FOR UNDERGRADUATE EDUCATION

1. Preamble

Education is the key to development of any society. Role of higher education is crucial for securing right kind of employment and also to pursue further studies in best available world class institutes elsewhere within and outside India. Quality education in general and higher education in particular deserves high priority to enable the young and future generation of students to acquire skill, training and knowledge in order to enhance their thinking, creativity, comprehension and application abilities and prepare them to compete, succeed and excel globally. Learning Outcomes-based Curriculum Framework (LO CF) which makes it student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. LOCF also aims at ensuring uniform education standard and content delivery across the state which will help the students to ensure similar quality of education irrespective of the institute and location.

Computer Science is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer science is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Science can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer science also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain. Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Computer Science is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

Programme Outcome, Programme Specific Outcome and Course Outcome

Computer Science is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics. The Students completing this programme will be able to present Software application clearly and precisely, make abstract ideas precise by formulating them in the Computer languages. Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)
LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED
REGULATIONS FOR UNDER GRADUATE PROGRAMME

Programme:	B.Sc. Computer Science
Programme Code:	23UGCSCGE
Duration:	3 years [UG]
Programme Outcomes:	<p>PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study</p> <p>PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.</p> <p>PO3:Critical thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p>PO4: Problem solving: Capacity to extrapolate from what one has learned and applies their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real life situations.</p> <p>PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.</p> <p>PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation</p>

PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

PO8: Scientific reasoning: Ability to analyze interprets and draws conclusions from quantitative/qualitative data; and critically evaluates ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9: Reflective thinking: Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO 13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO 15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

**Programme
Specific
Outcomes:**

PSO1: To enable students to apply basic microeconomic, macroeconomic and monetary concepts and theories in real life and decision making.

PSO 2: To sensitize students to various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment.

PSO 3: To familiarize students to the concepts and theories related to Finance, Investments and Modern Marketing.

PSO 4: Evaluate various social and economic problems in the society and develop answer to the problems as global citizens.

PSO 5: Enhance skills of analytical and critical thinking to analyze effectiveness of economic policies.

PROGRAM OUTCOMES

PO1	➤ Scientific aptitude will be developed in Students
PO2	➤ Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the Computer Science & humanities stream.
PO3	➤ Students will become employable; Students will be eligible for career opportunities in education field, Industry, or will be able to opt for entrepreneurship.
PO4	➤ Students will possess basic subject knowledge required for higher studies, professional and applied courses.
PO5	➤ Students will be aware of and able to develop solution oriented approach towards various Social and Environmental issues.
PO6	➤ Ability to acquire in-depth knowledge of several branches of Computer Science and aligned areas. This Programme helps learners in building a solid foundation for higher studies in Computer Science and applications.
PO7	➤ The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modeling and solving real life problems.
PO8	➤ Utilize computer programming skills to solve theoretical and applied problems by critical understanding, analysis and synthesis.
PO9	➤ To recognize patterns and to identify essential and relevant aspects of problems.
PO10	➤ Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others.
PO11	➤ The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modeling and solving real life problems.

PROGRAM SPECIFIC OUTCOMES

PSO1	Think in a critical and logical based manner.
PSO2	Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or Statistics and real-time application related sciences.
PSO3	Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
PSO4	Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.
PSO5	Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.
PSO6	Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.
PSO7	Equip with Computer science technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.
PSO8	Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of Computing sciences.
PSO9	Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of Computing sciences.

PROGRAMME EDUCATIONAL OBJECTIVE (PEO)

PEO1	To study about I/O management, storage management.
PEO2	To know the methods of connecting them to the peripheral devices
PEO3	- To learn Software design and Implementation
PEO5	To learn the basic principles of database and database design
PEO6	To understand dynamic memory allocation, structure and pointers
PEO7	To understand computational development of graphics with mathematics
PEO8	Design and implement reliable and maintainable object-oriented applications of Moderate complexity composed of several classes

Eligibility for admission

To be eligible to enroll in for the B. Sc. in computer science degree courses you need to clear the following eligibility criteria.

- Students need to have graduated their 12th standard in the science stream with physics, chemistry and mathematics (PCM),
- Students who have science with physics, chemistry and biology (PCB).

Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final
- Semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.

- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome/ Benefits
I	<p>Foundation Course To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning Literature and analyzing the world through the literary lens Give rise to a new perspective.</p>	<ul style="list-style-type: none"> ➤ Instill confidence among students ➤ Create interest for the subject
I,II,III,IV	<p>Skill Enhancement papers(Discipline centric /Generic/Entrepreneurial)</p>	<ul style="list-style-type: none"> ➤ Industry ready graduates ➤ Skilled human resource ➤ Students are equipped with essential skills to Make them employable
		<ul style="list-style-type: none"> ➤ Training on language and communication skills enable the students gain knowledge and Exposure in the competitive world.
		<ul style="list-style-type: none"> ➤ Discipline centric skill will improve the Technical knowhow of solving real life Problems.
III,IV,V & VI	<p>Elective papers</p>	<ul style="list-style-type: none"> ➤ Strengthening the domain knowledge ➤ Introducing the stakeholders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter-disciplinary nature ➤ Emerging topics in higher education/industry/communicationnetwork/health sector etc. are introduced with hands-on-training.

IV	Elective Papers	<ul style="list-style-type: none"> ➤ Exposure to industry moulds students in to solution providers ➤ Generates Industry ready graduates ➤ Employment opportunities enhanced
V Semester	Elective papers	<ul style="list-style-type: none"> ➤ Self-learning is enhanced ➤ Application of the concept to real situation is conceived resulting intangible outcome
VI Semester	Elective papers	<ul style="list-style-type: none"> ➤ Enriches the study beyond the course. ➤ Developing are search framework and presenting their independent and intellectual ideas effectively.
Extra Credits: For Advanced Learners /Honors degree		1. To cater other needs of peer learners/research aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

1.1.3	colour
EMPLOYABILITY	
SKILL DEVELOPMENT	
ENTREPRENEURSHIP	
EMPLOYABILITY,/ENTREPRENEURSHIP,/SKILL DEVELOPMENT	
EMPLOYABILITY,/SKILL DEVELOPMENT	
EMPLOYABILITY,/ENTREPRENEURSHIP	



SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
B.Sc. COMPUTER SCIENCE
REGULATION 2023 – 2024
COURSE STRUCTURE
SEMESTER-I

Course Code	Course Title - B.Sc.(cs)	L	T	P	C
THEORY					
23110AEC11/ 23111AEC11/ 23132AEC11/ 23135AEC11	Tamil – I/Advanced English-I/Hindi-I/ French – I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23120AEC13	Python Programming	4	1	0	3
23120GEC14	Numerical Methods	3	1	0	3
23120GEC15	Statistics	3	1	0	3
PRACTICAL					
23120SEC16L	Python Programming Lab	0	0	3	3
SKILL ENHANCEMENT COURSE					
23120SEC17	Fundamentals of Information Technology	2	0	0	2
23120SEC18	Problem Solving Techniques	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
231AECCINC	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	-	-	-	1
Total		22	5	3	25

SEMESTER – II

Course Code	Course Title - B.Sc.(cs)	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Tamil – II/Advanced English-II/Hindi-II/ French - II	3	1	0	3
23111AEC22	English-II	3	1	0	3
23120AEC23	Data Structure & Algorithms	4	1	0	3
23120GEC24	Operations Research	3	1	0	3
23120GEC25	Discrete Mathematics	3	1	0	3
PRACTICAL					
23120SEC26L	Data Structure and Algorithms lab	0	0	3	3
SKILL ENHANCEMENT COURSE					
23120SEC27	Quantitative Aptitude	2	0	0	2
23120SEC28	Advanced Excel	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
231AECCCMS	Communication Skills	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioural Etiquette	-	-	-	1
	Total	22	5	3	25

SEMESTER – III

Course Code	Course Title - B.Sc.(cs)	L	T	P	C
THEORY					
23110AEC31/ 23111AEC31/ 23132AEC31/ 23135AEC31	Tamil – III/Advanced English-III/Hindi-III/ French – III	3	1	0	3
23111AEC32	English-III	3	1	0	3
23120AEC33	Microprocessor and Microcontroller	5	1	0	4
23120DSC34_	Discipline Specific Elective-I	5	1	0	3
PRACTICAL					
23120SEC35L	Microprocessor and Microcontroller lab	0	0	3	3
SKILL ENHANCEMENT COURSE					
23120SEC36	Introduction to HTML	3	0	0	2
23120SEC37	Cloud Computing	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
23120RMC38	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	-	-	-	1
	Total	23	4	3	23

SEMESTER – IV

Course Code	Course Title - B.Sc.(cs)	L	T	P	C
THEORY					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tamil – IV/Advanced English-IV/Hindi-IV/ French – IV	3	0	0	3
23111AEC42	English-IV	3	0	0	3
23120AEC43	Java Programming	5	1	0	3
23120DSC44_	Discipline Specific Elective-II	5	1	0	3
PRACTICAL					
23120SEC45L	Java Programming lab	0	0	3	3
SKILL ENHANCEMENT COURSE					
23120SEC46	PHP Programming	3	0	0	2
23120SEC47	Software Testing	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE(AECC1)					
23120BRC48	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	-	-	2
AUDIT COURSE					
231LCSCLS	Leadership and Management Skills	-	-	-	1
	Total	25	2	3	24

SEMESTER – V

Course Code	Course Title - B.Sc.(cs)	L	T	P	C
THEORY					
23120AEC51	Software Engineering	5	1	0	4
23120AEC52	Database Management System	5	1	0	3
23120AEC53	IOT and its Applications	5	0	0	4
23120DSC54_	Discipline Specific Elective-III	4	0	0	4
23120DSC55_	Discipline Specific Elective-IV	4	0	0	4
PRACTICAL					
23120SEC56L	Database Management System lab	0	0	3	3
23120SEC58	Internship / Industrial Training				2
AUDIT COURSE					
231ACLSPSL	Professional Skills	-	-	-	1
231AECCVED	Value Education	2	-	-	2
	Total	25	2	3	27

SEMESTER – VI

Course Code	Course Title - B.Sc.(cs)	L	T	P	C
THEORY					
23120AEC61	Computer Networks	5	1	0	4
23120AEC62	Data Analytics Using R	5	1	0	4
23120DSC63_	Discipline Specific Elective-V	5	0	0	3
PRACTICAL					
23120SEC64L	Data Analytics Using R lab	0	0	3	3
PRACTICAL					
23120PRW65	Project	8	0	0	4
23120SEC66	Professional Competency Skill General awareness for competitive examination	2	0	0	2
23120EXACT	Extension Activity	-	-	-	1
AUDIT COURSE					
231ACSIKWS	Indian Knowledge System	-	-	-	2
	Total	25	2	3	23
Total Credits-Programme					140
Total Credits-Audit Courses					07
Total Credits					147

Discipline Specific Electives

Semester	Discipline Specific Elective Courses-I
III	a) 23120DSC34A- Image Processing b)23120DSC34B- Big Data Analytics c)23120DSC34C-Natural Language Processing
	Discipline Specific Elective Courses-II
IV	a)23120DSC44A- Agile Project Management b)23120DSC44B- Analytics for Service Industry c)23120DSC44C-Computational Intelligence
V	Discipline Specific Elective Courses-III
	a)23120DSC54A-Introduction to Data science b)23120DSC54B- RDBMS with PL/SQL c)23120DSC54C- Cloud Computing
	Discipline Specific Elective Courses-IV
	a)23120DSC55A-Disaster Management b)23120DSC55B- Artificial Neural Network c)23120DSC55C-Cryptography
	Discipline Specific Elective Courses-V
VI	a)23120DSC63A-Robotics and its Applications b)23120DSC63B- Virtual Reality c)23120DSC63C-Mobile Adhoc Network



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

Credit Distribution for UG Programme

Consolidated Semester wise Credit distribution

SEM	AEC	SEC	GEC	DSC	AECC	Research	others	Total
I	9	7	6	-	2	-	1	25
II	9	7	6	-	2	-	1	25
III	10	7	-	3	-	2	1	23
IV	9	7	-	3	2	2	1	24
V	11	5	-	8	-	-	3	27
VI	8	5	-	3	-	4	3	23
Total	56	38	12	17	6	8	10	147

AUDIT COURSE CREDIT DISTRIBUTION

Sem	Audit
I	1
II	1
III	1
IV	1
V	1
VI	2
Total	7

HOD

DEAN

இக்கால இலக்கியம்

23110AEC11

முதல் பருவம்

பாட நோக்கங்கள்

1. இக்காலதமிழ்இலக்கியவகைகளின்மாதிரிகளைகற்பித்தல்.
2. தமிழின்இனிமையைஉணரச்செய்தல்
3. தமிழின்ஈடுபாட்டையும்சுவைக்கும்திறனையும்ஏற்படுத்துதல்.
4. கவிதை எழுதும் திறனை உருவாக்குதல்
5. படைப்பாளர்களாக உருவாக்கும் திறனை ஏற்படுத்துதல்.

பயன்கள்

- மொழி ஆளுமைத்திறன் பெறுதல்.
- சமூக சிந்தனையை வளர்த்துக் கொள்ளுதல்.
- படைப்பாளர்களாக உருவாகும் திறனைப் பெறுதல்.
- இலக்கியங்களின் அறிவை மேம்படுத்துதல்.
- கவிதைஎழுதும் முறையை புரிந்துக்கொள்ளுதல்

அலகு -1 மரபுக்கவிதை

1. பாரதியார்--விடுதலை, வந்தே மாதரம் ,காற்று
- 2.பாரதிதாசன் - அழகின்சிரிப்பு , தமிழனுக்கு வீழ்ச்சி இல்லை
- 3.கவிமணிதேசியவிநாயகம்பிள்ளை—தொழிலாளியின் முறையீடு
- 4.நாமக்கல்கவிஞர்—தருணம் இதுவே ,
- 5.கண்ணதாசன்-- அனுபவம்

அலகு -2புதுக்கவிதைகள்

- 1.அப்துல்ரகுமான் -வெற்றி
- 2.அறிவுமதி-நட்புக்காலம்
- 3.வைரமுத்து- ருசி, சிற்பி- ஓடுஓடுசங்கிலி
- 4.மு.மேத்தா- வெளிச்சம் வெளியே இல்லை

அலகு -3நாட்டுப்புறவியல்

- 1.பழமொழிகள்

2. விடுகதைகள்
3. தொழில்பாடல்

அலகு- 4 சிறுகதை

1. தடயம்- மா. ஜெயபிரகாசம்
2. எதார்த்தம் - சு. தமிழ்ச்செல்வி
- 3.நீதி-- பூமணி

அலகு- 5இலக்கியவரலாறு

1. கவிதை
2. சிறுகதை
3. நாட்டுப்புறவியல்

பொதுக்கட்டுரை -மனிதநேயம், வாழ்வியல்அறங்கள்

மனப்பாடப்பகுதி : பாரதியார் கவிதை- வேண்டும்,பாரதிதாசன் கவிதை- செந்தாமரை

பார்வை நூல்கள் :

1. பாரதியார் கவிதைகள் - மணிவாசகர் பதிப்பகம் சென்னை
- 2.பாரதிதாசன்கவிதைகள் - பாரிநிலையம், சென்னை
3. தமிழ் இலக்கிய வரலாறு - முவரதராஜன் சாகித்திய அகாடெமி,சென்னை.
4. நாட்டுப்புறவியல் - முனைவர். ஆறு. ராமநாதன் ,மணிவாசகர்பதிப்பகம், சென்னை.
- 5.தமிழ்சிறுகதையும்தோற்றம்வளர்ச்சி - தமிழ் புத்தக நிலையம், சென்னை.

இணையதளம் -www.tamilvu.org

www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

FIRST YEAR - SEMESTER I
PAPER II – GENERAL ENGLISH

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23111AEC12	Part II	3	1	-	3	6	25	75	100

Learning Objectives

LO1	To enable learners to acquire the linguistic competence necessarily required in various life situations.							
LO2	To help them understand the written text and able to use skimming, scanning skills							
LO3	To assist them in creative thinking abilities							
LO4	To enable them become better readers and writers							
LO5	To assist them in developing correct reading habits, silently, extensively and intensively							
Unit No.	Unit Title & Text							No. of Periods for the Unit
I	Poetry 1.1 A Patch of Land - Subramania Bharati 1.3 A Nation's Strength – Ralph Waldo Emerson 1.4 Love Cycle - Chinua Achebe							20
II	Prose 2.1 JRD - Harish Bhatt 2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim							20
III	Short Stories 3.1 The Faltering Pendulum- Bhabani Bhattacharya 3.2 How I Taught my Grandmother to Read- Sudha Murthy 3.3 The Gold Frame- R.K. Laxman							20
IV	Language Competency 4.1 Vocabulary : Synonyms, Antonyms, Word							15

	Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction	
V	English for Workplace 5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions	15
Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	PO1
CO2	Understand the total content and underlying meaning in the context.	PO1,PO2
CO3	Form the habit of reading for pleasure and for information	PO4,PO6
CO4	Comprehend material other than the prescribed text	PO4,PO5,PO 6
CO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	PO3,PO8

Text books (Latest Editions)	
1	Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi: Sahitya Academy, 1967
2	How I taught my Grandmother to Read and other Stories, Murthy, Sudha, Penguin Books, India, 2004

Web Resources	
1	A patch of land by Subramania Bharati translated by Usha Rajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
2	The Sparrow by Paul Laurence Dunbar https://poets.org/poem/sparrow-0
3	A Nation's Strength by Emerson https://poets.org/poem/nations-strength
4	Love cycle by Chinua Achebe : https://www.best-poems.net/chinua-achebe/love-cycle.html
5	JRD by Harish Bhatt https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories
6	Us and Them by David Sedaris From Dress Your Family in Corduroy and Denim https://legacy.npr.org/programs/morning/features/2004/jun/sedaris/usandthem.html
7	Uncle Podgier Hangs a Picture: http://rosyhunt.blogspot.com/2013/01/uncle-podger-hangs-picture.html
8	The Gold Frame: https://fybaenglish.blogspot.com/2018/12/the-gold-frame-r-k-laxman.html

Reference Books

(Latest Editions, and the style given must be strictly adhered to)

1.	English in use - A textbook for College Students (English, Paper back, - T.Vijay Kumar, K Durga Bhavani, YL Srinivas.
2	Practical English Usage - 4th Edition By Michael Swan
3.	The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace -Shepherd, Penny, Sharon Hogan, 2005.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

CORE PAPER

Subject Code	Subject Name	Category	L	T	P	C	Marks		
							CIA	Exter	Total
23120A EC13	Python programming	Core	4	1	0	3	25	75	100
Learning Objectives									
LO1	To make students understand the concepts of Python programming.								
LO2	To apply the OOPs concept in PYTHON programming.								
LO3	To impart knowledge on demand and supply concepts								
LO4	To make the students learn best practices in PYTHON programming								
LO5	To know the costs and profit maximization								
UNIT	Contents								No. of Hours
I	Basics of Python Programming: History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays – Array methods.								15
II	Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-if-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.								15
III	Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. Python Strings: String operations-Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.								15
IV	Lists: Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.								15
V	Python File Handling: Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods-append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.								15
TOTAL HOURS								75	

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	ReemaThareja, “Python Programming using problem solving approach”, First Edition, 2017, Oxford University Press.	
2	Dr. R. NageswaraRao, “Core Python Programming”, First Edition, 2017, Dream tech Publishers.	
Reference Books		
1.	VamsiKurama, “Python Programming: A Modern Approach”, Pearson Education.	
2.	Mark Lutz, “Learning Python”, Orielly.	
3.	Adam Stewarts, “Python Programming”, Online.	
4.	Fabio Nelli, “Python Data Analytics”, APress.	
5.	Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication.	
Web Resources		
1.	https://www.programiz.com/python-programming	
2.	https://www.guru99.com/python-tutorials.html	
3.	https://www.w3schools.com/python/python_intro.asp	
4.	https://www.geeksforgeeks.org/python-programming-language/	
5.	https://en.wikipedia.org/wiki/Python_(programming_language)	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	14	15	15	13	14

FIRST YEAR - SEMESTER I

COMPUTER SCIENCE-ALLIED MATHEMATICS
PAPER-1 **NUMERICAL METHODS**

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23120GEC14		3	1	0	3		25	75	100
Learning Objectives									
LO1	To introduce the various topics in Numerical methods.								
LO2	To make understand the fundamentals of algebraic equations.								
LO3	To apply interpolation and approximation on examples.								
LO4	To solve problems using numerical differentiation and integration.								
LO5	To solve linear systems, numerical solution of ordinary differential equations								
UNIT	DETAILS								
I	FUNDAMENTALS OF ALGEBRAIC EQUATION: Solution of algebraic and transcendental equations–Bisection method – Fixed point iteration method – Newton Raphson method –linear system of equations – Gauss elimination method – Gauss Jordan method .								
II	ITERATIVE, INTERPOLATION AND APPROXIMATION: Iterative methods - Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi’s method for symmetric matrices. Interpolation with unequal intervals – Lagrange’s interpolation – Newton’s divided difference interpolation								
III	INTERPOLATION WITH EQUAL INTERVAL: Difference operators and relations. -Interpolation with equal intervals – Newton’s forward and backward difference formulae.								
IV	NUMERICAL DIFFERENTIATION AND INTEGRATION: Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson’s 1/3 rule								
V	INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS: Single step methods – Taylor’s series method – Euler’s method – Modified Euler’s method – Runge-Kutta method for solving(first, second , Third and 4th) order equations – Multi step methods								

Course Outcomes		
CO1	Know how to solve various problems on numerical methods	PO1
CO2	Use approximation to solve problems	PO1,PO2
CO3	Differentiation and integration concept are applied	PO4,PO6
CO4	Apply , direct methods for solving linear systems	PO4,PO5, PO6
CO5	Numerical solution of ordinary differential equations	PO3,PO8

Text Books (Latest Editions)	
1	Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.
2	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition.
2	Timothy A. Budd, “Exploring Python”, Tata MCGraw Hill Education Private Limited 2011, 1 st Edition.
Web Resources	
1	https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Mapping with Programme

Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

COMPUTER SCIENCE-ALLIED MATHEMATICS
PAPER-2 STATISTICS

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23120GEC15		3	1	0	3		25	75	100
Learning Objectives									
LO1	Distinguish among different scales of measurement and their implications for solving problems								
LO2	Create tables and graphs to format, organize, and interpret data; summarize and present data								
LO3	Calculate and analyze numerical descriptive measures for a given data set								
LO4	Apply concepts of sample space and probability to solving problems								
LO5	Calculate measures of central tendency and variation; use statistical software to analyze								
UNIT	DETAILS								
I	Data: quantitative and qualitative, attributes, variables, Scales of measurement: nominal, ordinal, interval and ratio, Measures of Central Value: Meaning, Need for measuring central value. Characteristics of an ideal measure of central value. Types of averages - mean, median, mode, harmonic mean and geometric mean. Merits, Limitations and Suitability of averages.								
II	Correlation Analysis: Meaning and significance. Correlation and Causation, Types of correlation, Methods of studying simple correlation - Scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient.								
III	Regression Analysis: Meaning and significance, Regression vs. Correlation, Simple Regression model: Linear Regression, Conditions for simple linear regression								
IV	Time Series : Analysis of Time Series, Methods of measuring trend and seasonal variations								
V	Index Numbers: Consumers price index and cost of living indices								
Course Outcomes									
CO1	The learners will apprehend the basics of data science and data analysis like Averages and forecasting techniques.							PO1	
CO2	The learners will comprehend the basics of data science and data analysis like Averages and forecasting techniques.							PO1,PO2	
CO3	The learners will understand use of Time series and Index numbers in management decisions.							PO4,PO6	
CO4	The learners will be able to understand the business implications and probabilities of every decision being made.							PO4,PO5, PO6	
CO5	Gain entrance into careers as well as in graduate or professional school.							PO3,PO8	

Text Books (Latest Editions)

1	P A Navanitham (2006): Business Mathematics and Statistics
2	Gupta S.P. (2017) : Statistical Methods, Sultan Chand & Sons, 45h Revised Edition
	Levin, R. and Rubin, D. (2017). Statistics for Management. 8thed. New Delhi: Pearson

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Harald Cramér <i>Mathematical Methods of Statistics</i> , Princeton Mathematical Series, vol. 9. Princeton University Press, Princeton, N. J., 1946. xvi+575 pp
2	S.C.Gupta, Business Statistics
Web Resources	
1	https://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/Business-Statistics-by-Gupta.pdf

Mapping with Programme

Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Subject Code	Subject Name	Category	L	T	P		C	Marks		
								CIA	External	Total
23120SEC16 L	Python Programming Lab	Core	0	0	3		3	25	75	100
Learning Objectives										
LO1	Be able to design and program Python applications.									
LO2	Be able to create loops and decision statements in Python.									
LO3	Be able to work with functions and pass arguments in Python.									
LO4	Be able to build and package Python modules for reusability.									
LO5	Be able to read and write files in Python.									
LAB EXERCISES									Required Hours	
<ol style="list-style-type: none"> 1. Program using variables, constants, I/O statements in Python. 2. Program using Operators in Python. 3. Program using Conditional Statements. 4. Program using Loops. 5. Program using Jump Statements. 6. Program using Functions. 7. Program using Recursion. 8. Program using Arrays. 9. Program using Strings. 10. Program using Modules. 11. Program using Lists. 12. Program using Tuples. 13. Program using Dictionaries. 14. Program for File Handling. 									60	
Course Outcomes										
On completion of this course, students will										
CO1	Demonstrate the understanding of syntax and semantics of PYTHON language									
CO2	Identify the problem and solve using PYTHON programming techniques.									
CO3	Identify suitable programming constructs for problem solving.									
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.									
CO5	Develop a PYTHON program for a given problem and test for its correctness.									

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	1	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	15	13	15	13	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. hours	Marks		
								CIA	External	Total
23120SE C17	Fundamentals of Information Technology	Skill Enha. Course (SEC)	2	0	0	2	2	25	75	100
Learning Objectives										
LO1	Understand basic concepts and terminology of information technology.									
LO2	Have a basic understanding of personal computers and their operation									
LO3	Be able to identify data storage and its usage									
LO4	Get great knowledge of software and its functionalities									
LO5	Understand about operating system and their uses									
UNIT	Contents								No. Of. Hours	
I	Introduction to Computers: Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer								6	
II	Basic Computer Organization: Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.								6	
III	Storage Fundamentals: Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives								6	
IV	Software: Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w								6	
V	Operating System: Functions, Measuring System Performance, Assemblers, Compilers and Interpreters .Batch Processing, Multiprogramming, MultiN Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.								6	
TOTAL HOURS								30		

	Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
O1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	PO1, PO2, PO3, PO4, PO5, PO6
O2	Develop organizational structure using for the devices present currently under input or output unit.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1, PO2, PO3, PO4, PO5, PO6
O4	Work with different software, Write program in the software and applications of software.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks

1	Anoop Mathew, S. KavithaMurugesan (2009), "Fundamental of Information Technology", Majestic Books.
2	Alexis Leon, Mathews Leon," Fundamental of Information Technology", 2 nd Edition.
3	S. K Bansal, "Fundamental of Information Technology".

Reference Books

1.	Bhardwaj Sushil Puneet Kumar, "Fundamental of Information Technology"
2.	GG WILKINSON, "Fundamentals of Information Technology", Wiley-Blackwell
3.	A Ravichandran , "Fundamentals of Information Technology", Khanna Book Publishing

Web Resources

1.	https://testbook.com/learn/computer-fundamentals
2.	https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html
3.	https://www.javatpoint.com/computer-fundamentals-tutorial
4.	https://www.tutorialspoint.com/computer_fundamentals/index.htm
5.	https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	2	3
CO 5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	15	14	15	14	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120SEC18	Problem Solving Techniques	FC	2	-	-	2	2	25	75	100
Learning Objectives										
LO1	Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.									
LO2	Implement different programming constructs and decomposition of problems into functions.									
LO3	Use data flow diagram, Pseudo code to implement solutions.									
LO4	Define and use of arrays with simple applications									
LO5	Understand about operating system and their uses									
UNIT	Contents								No. Of. Hours	
I	Introduction: History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. Programming Languages: Machine language, Assembly language, High-level language, 4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.								6	
II	Data: Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC). Structured Programming: Algorithm: Features of good algorithm, Benefits and drawbacks of algorithm. Flowcharts: Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. Pseudocode: Writing a pseudo code. Coding, documenting and testing a program: Comment lines and types of errors. Program design: Modular Programming.								6	
III	Selection Structures: Relational and Logical Operators - Selecting from Several Alternatives – Applications of Selection Structures. Repetition Structures: Counter Controlled Loops –Nested Loops– Applications of Repetition Structures.								6	
IV	Data: Numeric Data and Character Based Data. Arrays: One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.								6	

V	Data Flow Diagrams: Definition, DFD symbols and types of DFDs. Program Modules: Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. Files: File Basics-Creating and reading a sequential file- Modifying Sequential Files.	6
TOTAL HOURS		30
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Study the basic knowledge of Computers. Analyze the programming languages.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Study the data types and arithmetic operations. Know about the algorithms. Develop program using flow chart and pseudo code.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Determine the various operators. Explain about the structures. Illustrate the concept of Loops	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Study about Numeric data and character-based data. Analyze about Arrays.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Explain about DFD Illustrate program modules. Creating and reading Files	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	Stewart Venit , “Introduction to Programming: Concepts and Design”, Fourth Edition, 2010, Dream Tech Publishers.	
Web Resources		
1.	https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm	
2.	http://www.nptel.iitm.ac.in/video.php?subjectId=106102067	
3.	http://utubersity.com/?page_id=876	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	2	3	3	3	3
CO 4	3	3	2	3	3	3
CO 5	3	3	3	3	3	2
Weightage of course contributed to each PSO	15	14	14	15	15	14

S-Strong-3 M-Medium-2 L-Low-1

Ability Enhancement Compulsory Course
INDIAN CONSTITUTION

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
231AECCINC	AECC	2	0	0	2	2	25	75	100
Learning Objectives									
LO1	To make the students understand about the democratic rule and parliamentary administration								
LO2	To appreciate the salient features of the Indian constitution								
LO3	To know the fundamental rights and constitutional remedies								
LO4	To make familiar with powers and positions of the union executive, union parliament and the Supreme Court								
LO5	To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy								
UNIT	DETAILS								
I	The making of Indian constitution: The constitution assembly organization - character - work salient features of the constitution- written and detailed constitution - socialism -secularism-democracy and republic.								
II	Fundamental rights and fundamental duties of the citizens: Right of equality - right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies -fundamental duties.								
III	Directive principles of state policy: Socialistic principles - Gandhi an principles-liberal and general principles -differences between fundamental rights and directive principles								
IV	The union executive, union parliament and Supreme Court : Powers and positions of the president - qualification - method of election of president and vice president -prime minister - Rajya Sabah - Lok Sabah .the supreme court - high court -functions and position of supreme court and high court								
V	State council -election system and parliamentary democracy in India: State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.								

Course Outcomes		
CO1	Students can know about constitution our fundamental rights and duties	PO1
CO2	Students can get knowledge of the Indian administrative systems.	PO1,PO2
CO3	Students will be able to understand the Nature of Indian Politics	PO4,PO6
CO4	Students will be able to understand the Indian constitution and Fundamental rights and Duties.	PO4,PO5, PO6
CO5	Integrate knowledge of the diversity of cultures and peoples.	PO3,PO8

Text Books (Latest Editions)	
1	India's Constitution by M.V.Pylee., 16 th edt.,S.Chand & Company Ltd, Ram Nagar, New Delhi-110055.
2	Introduction to the Constitution of India by Durga Das Basu · 2015,. LexisNexis publication,SBN:9789351434467, 935143446X.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Palekar.s.a. Indian constitution government and politics, ABD publications, India
2	Aiyer, alladikrishnaswami, Constitution and fundamental rights 1955.
3	Markandan. K.c.directive Principles in the Indian constitution 1966.
Web Resources	
	https://www.google.co.in/books/edition/India_s_Constitution_16th_Edition/yjJIDwAAQBAJ?hl=en&gbpv=1&dq=indian+constitution+pdf&printsec=frontcover

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR - SEMESTER I

Part-IV

Audit Course

UNIVERSAL HUMAN VALUES

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
231LSCUV	AC	-	-	-	1	-	25	75	100
Learning Objectives									
LO1	The present course deals with meaning, purpose, and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials								
UNIT	DETAILS								
I	<p>Introduction: What is love? Forms of love for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living</p> <p>Love and compassion and inter-relatedness Love, compassion, empathy, sympathy and non-violence Individuals who are remembered in history for practicing compassion and love. Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing love and compassion: What will learners learn gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?</p> <p>Sharing learner's individual and/or group experience(s)</p> <p>Simulated Situations Case studies</p>								
II	<p>Introduction: What is truth? Universal truth, truth as value, truth as fact(veracity, Sincerity, honesty among others)</p> <p>Individuals who are remembered in history for practicing this value</p> <p>Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?</p> <p>Learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Case studies</p>								
III	<p>Introduction: What is nonviolence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non-violence</p> <p>Ahimsa as non-violence and non-killing</p> <p>Individuals and organizations that are known for their commitment to non-violence</p> <p>Narratives and anecdotes about non-violence from history, and literature including local folklore</p> <p>Practicing on-violence: What will learners learn/gain if they practice non- violence? What will</p>								

	<p>learners lose if they don't practice it?</p> <p>Sharing learner's individual and/or group experience(s) about non-violence</p> <p>Simulated situations</p> <p>Case studies</p>
IV	<p>Introduction: What is righteousness?</p> <p>Righteousness and <i>dharma</i>, Righteousness and Propriety</p> <p>Individuals who are remembered in history for practicing righteousness</p> <p>Narratives and anecdotes from history, literature including local folklore</p> <p>Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?</p> <p>Sharing learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Case studies</p>
V	<p>Introduction: What is peace? Its need, relation with harmony and balance</p> <p>Individuals and organizations that are known for their commitment to peace</p> <p>Narratives and Anecdotes about peace from history, and literature including local folklore</p> <p>Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?</p> <p>Sharing learner's individual and/or group experience(s) about peace</p> <p>Simulated situations</p> <p>Case studies</p>
VI	<p>Introduction: What is service? Forms of service, for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.</p> <p>Individuals who are remembered in history for practicing this value.</p> <p>Narratives and anecdotes dealing with instances of service from history, literature including local folklore</p> <p>Practicing service: What will learners learn/gain if they practice service? What will learners lose if they don't practice it?</p> <p>Sharing learners' individual and/or group experience(s) regarding service</p> <p>Simulated situations</p> <p>Case studies</p>

VII	<p>Introduction: What is renunciation? Renunciation and sacrifice. Self-restrain and Ways of overcoming greed. Renunciation with action as true renunciation</p> <p>Individuals who are remembered in history for practicing this value.</p> <p>Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.</p> <p>Practicing renunciation and sacrifice: What will learners learn/gain if they practice Renunciation and sacrifice? What will learners lose if they don't practice it?</p> <p>Sharing learners' individual and/or group experience(s)</p> <p>Simulated situations</p> <p>Casestudies</p>
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Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	2	2
CO2	3	3	3	2	3	3	3	2	3	2
CO3	2	3	3	3	2	3	3	2	2	2
CO4	3	3	3	3	3	3	3	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

II -SEMESTER

பக்தி இலக்கியம் - 23110AEC21 **இரண்டாம்பருவம்**

பாட நோக்கங்கள்

- காலந்தோறும் பக்தி இலக்கியம் வளர்ந்துள்ள தன்மையைக் கற்பித்தல்.
- நாயன்மார்கள், ஆழ்வார்களின் பக்திச்சிறப்பை அறிய செய்தல்.
- ஆழ்வார்களின் பக்தி உணர்வை ஊட்டுதல்
- பாடல்களில் இசை இன்பம், ஓசை நயம் ஆகியவற்றை உணரச் செய்தல்
- குழந்தைப் பருவத்தின் தன்மையை உணர்த்துதல்

பயன்கள்

- நாயன்மார்கள் பக்திச்சிறப்பை அறிதல்.
- ஆழ்வார்களின் பக்திநெறியை உணர்தல்.
- பக்தி இலக்கியம்காலம் தோறும் வளர்ந்ததை அறிதல்.
- பாடல்களில் இசை இன்பம், ஓசை நயம் அறிதல்.
- குழந்தைப் பருவத்தின் தன்மையை உணர்தல்.

அலகு- 1 பன்னிருதிருமுறைகள்

1. திருஞானசம்பந்தர்- திருத்தில்லைப்பதிகம்
2. திருநாவுக்கரசர் - திருநீற்றுப்பதிகம்
3. சுந்தரர் - திருவெண்ணைநல்லூர்
4. திருமூலர்- திருமந்திரம்(இளமைநிலையாமை)

அலகு- 2 பன்னிருஆழ்வார்கள்

1. ஆண்டாள் - திருப்பாவை
2. பெரியாழ்வார்- மூன்றாம்திருமுறை(பத்துபாடல்கள்)
3. மதுரகவியாழ்வார் - கண்ணின்ருண்சிறுதாம்பு

அலகு- 3 சிற்றிலக்கியங்கள்

1. மீனாட்சியம்மைப்பிள்ளைத்தமிழ்- செங்கீரைபருவம், அம்புலிபருவம்
2. நந்திக்கலம்பகம்
3. குற்றாலகுறவஞ்சி- குறத்திநகர்வளம்கூறுதல்
4. காளமேகப் புலவர் பாடல்கள்

அலகு- 4 புதினம்

1. நா .பார்த்தசாரதியின்- குறிஞ்சிமலர்

அலகு-5 தமிழ் இலக்கிய வரலாறு

1. பக்திஇலக்கியங்கள்
2. சைவமும்தமிழும்
3. வைணவசமயம்போற்றிவளர்த்ததமிழ்
4. சிற்றிலக்கியங்கள்
5. நாவல்இலக்கியம்

பார்வைநூல்கள் :

1. தேவாரம் - மணிவாசகர்பதிப்பகம்சென்னை
 2. நாலாயிரதிவ்ய பிரபந்தம் - வர்த்தமான பதிப்பகம் சென்னை.
 3. தமிழ்இலக்கியவரலாறு - முனைவர்சசுபாஷ்சந்திரபோஸ், இயல்வெளியீடு ,தஞ்சாவூர்
 4. தமிழ் நாவல் இலக்கியம் -காலைலாசபதி- தமிழ் புத்தக,நிலையம், சென்னை
- இணையதளம் -www.tamilvu.org , www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

FIRST YEAR - SEMESTER II
PAPER II – GENERAL ENGLISH

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23111AEC22	Part II	3	1	0	3	6	25	75	100
Learning Objectives									
LO1	To introduce learners to the essential skills of communication in English								
LO2	To enable them use these skills effectively in academic and non-academic contexts								
LO3	To help them identify and eliminate common mistakes in writing and speaking								
LO4	To enable them use various business communication strategies and to use advanced vocabulary								
LO5	To familiarize them in writing descriptive essays and respond to arguments orally and in writing								
Unit No.	Unit Title & Text								No. of Periods for the Unit
I	Poetry 1.1 Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3 On Killing a Tree - Gieve Patel								20
II	Prose 2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please - Shashi Tharoor 2.3 The Spoon-fed Age- W.R. Inge								20
III	Fiction Alchemist - Paulo Coelho								20
IV	Language Competency 4.1 Homonyms, Homophones, Homographs Portmanteau words 4.2 Subject Verb Agreement								15
V	English in the Workplace 5.1 Reading for General and Specific information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes								15

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
C01	Learn to introduce themselves and talk about everyday activities confidently	PO1
C02	Be able to write short paragraphs on people, places and events	PO1, PO2
C03	Identify the purpose of using various tenses and effectively employ them in speaking and writing	PO4, PO6
C04	Gain knowledge to write subjective and objective descriptions	PO4, PO5, PO6
C05	Identify and use their skills effectively in formal contexts.	PO3, PO8

Textbooks(Latest Editions)	
1	The Alchemist - Paulo Coelho Harper – 2005
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2	Descriptive English. <u>SP Bakshi, Richa Sharma</u> · 2019, Arihant Publications (India) Ltd.
3	The Reading Book: A Complete Guide to Teaching Reading. <u>Sheena Cameron, Louise Dempsey</u> , S & L. Publishing, 2019.
4	Skimming and Scanning Techniques, <u>Barbara Sherman</u> , Liberty University Press, 2014
5	Brilliant Speed Reading: Whatever you need to read, however ... <u>Phil Chambers</u> , Pearson, 2013.
6	The Archer, <u>Paulo Coelho</u> . Penguin Viking, 2020.
Web Resources	
1	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40_%20_2020103001102714.pdf
2	Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise
3	The Flower by Tennyson: https://www.poemhunter.com/poem/the-flower-2/
4	On Killing a tree by Gieve Patel: https://www.poemhunter.com/poem/on-killing-a-tree/

5	If you are wrong, admit it: https://www.tbr.fun/if-youre-wrong-admit-it/
6	Kindly Adjust please - Shashi Tharoor https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3IhtdXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKgiNKKwdkeSg3qWp-U/
7	The Spoon Fed Age: https://www.nrkademy.com/2016/04/spoon-feeding-by-wringe.html
8	The Alchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU

Mapping with Programme

Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO / PO	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Semester II

Title of the Course/ Paper	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120AEC23	DATA STRUCTURE AND ALGORITHMS	Core	4	1	0	3	5	25	75	100
Learning Objectives										
LO1	To understand the concepts of ADTs									
LO2	To learn linear data structures-lists, stacks, queues									
LO3	To learn Tree structures and application of trees									
LO4	To learn graph structures and application of graphs									
LO5	To understand various sorting and searching									
UNIT	Contents									No. of Hours
I	Abstract Data Types (ADTs) - List ADT-array-based implementation-linked list implementation singly linked lists-circular linked lists-doubly-linked lists-applications of lists-Polynomial Manipulation- All operations-Insertion-Deletion-Merge-Traversal.									15
II	Stack ADT-Operations- Applications- Evaluating arithmetic expressions – Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue- Priority Queue- deQueue applications of queues.									15
III	Tree ADT-tree traversals-Binary Tree ADT-expression trees-applications of trees-binary search tree ADT- Threaded Binary Trees-AVL Trees- B-Tree-B+ Tree – Heap-Applications of heap.									15
IV	Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal-Topological sort- Bi-connectivity – Cut vertex- Euler circuits-Applications of graphs.									15
V	Searching- Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort-Shell sort-Radix sort-Hashing-Hash functions-Separate chaining- Open Addressing-Rehashing Extendible Hashing.									15
Total									75	

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO6
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO2
CO3	Describe the hash function and concepts of collision and its resolution methods	PO2,PO4
CO4	Solve problem involving graphs, trees and heaps	PO4,PO6
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO5,PO6
Text Book		
1	1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education 2014, 4th Edition.	
2	Reema Thareja, “Data Structures Using C”, Oxford Universities Press 2014, 2nd Edition	
Reference Books		
1.	Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, “Introduction to Algorithms”, McGraw Hill 2009, 3rd Edition.	
2.	Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education 2003	
Web Resources		
1.	https://www.programiz.com/dsa	
2.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	1	3	3	3
CO 3	3	3	3	2	3	2
CO 4	3	2	3	2	3	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each	15	14	13	13	15	14

FIRST YEAR - SEMESTER II
COMPUTER SCIENCE-ALLIED MATHEMATICS
PAPER-III OPERATIONS RESEARCH

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23120GEC24		3	1	0	3		25	75	100
Learning Objectives									
LO1	To understand the methodology of OR problem solving and formulate linear programming problem.								
LO2	To develop formulation skills in transportation models and finding solutions								
LO3	To understand the basics in the field of game theory and assignment problems								
LO4	To know how project management techniques help in planning and scheduling a project								
LO5	To know the basics of dynamic programming and simulation								
UNIT	DETAILS								
I	Definition of operations research, models of operations research, scientific methodology of operations research, scope of operations research, importance of operations research in decision making, role of operations management, limitations of OR								
II	Linear Programming: Introduction – Mathematical formulation of a problem – Graphical solutions, standard forms the simplex method for maximization and minimization problems. Method application to management decisions.								
III	Transportation problem – Introduction – Initial basic feasible solution - NWC method – Least cost method – Vogel’s method – MODI – moving towards optimality – solution procedure without degeneracy								
IV	Assignment problem – Algorithm – Hungarian method – simple problems.								
V	Network models and simulation. Network models for project analysis CPM; Network construction and time analysis; cost time trade off, PERT – problems								
Course Outcomes									
CO1	To recognize the importance and value of Operations Research and linear programming in solving practical problems in industry							PO1	
CO2	Interpret the transportation models' solutions and infer solutions to the real-world problems..							PO1,PO2	
CO3	To know, how to transport a thing in minimum cost.							PO4,PO6	
CO4	Gain knowledge about the assigning process							PO4,PO5, PO6	
CO5	Gain knowledge of drawing project networks for							PO3,PO8	

Text Books (Latest Editions)	
1	Kalavathy, Operations Research
References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	Kanti Swarup, Gupta.P.K. & Man Mohan, operations Research, S.Chand & Sons
2	Taha.H.A, operation Research: An Introduction, McMillan publishing Co., 1982. 7 th ed.
Web Resources	
https://rccmindore.com/wp-content/uploads/2015/06/Operations-Research.pdf	

Mapping with Programme

Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low
Mapping with Programme

Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

FIRST YEAR - SEMESTER II
COMPUTER SCIENCE-ALLIED MATHEMATICS
PAPER-IV **DISCRETE MATHEMATICS**

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23120GEC25		3	1	0	3		25	75	100
Learning Objectives									
LO1	Use mathematically correct terminology and notation.								
LO2	Apply logical reasoning to solve a variety of problems.								
LO3	Construct correct direct and indirect proofs								
LO4	Use division into cases in a proof.								
LO5	Use counterexamples.								
UNIT	DETAILS								
I	SET THEORY: Introduction- set and Its Element – Set Description (Roster, Set Builder and cardinal number method) Types of Sets- Set Operations and Laws of set Theory. Partition of sets. Countable and uncountable set. Algebra of sets and Duality								
II	MATHEMATICAL LOGIC: Basic Logic and Proof, logical operations – Logic Propositional equivalence, Predicates and Quantities, Tautology-Contradiction-Methods of proofs (Direct and Indirect) - Function- Definition-Notation- Types of Function- Composition of Functions								
III	NUMBER THEORY: The Integers and Division, Integers and Algorithms, (Multiplication, Addition and Division -Sequences and Summations, Recursive algorithms, Program correctness								
IV	RELATIONS: Relations – Relations and their properties, Representing Relations, Closures of relations, Equivalence relations, Partial orderings-Recurrence Relations Binary Relations								
V	MATRIX, DETERMINANT OF MATRIX AND ITS APPLICATION: Introduction, definitions, Types of Matrix, Properties of matrix, operations on matrix, Inverse of matrix, Cayley Hamilton of matrix-applications								
Course Outcomes									
CO1	To gain knowledge on set theory							PO1	
CO2	Able to understand different mathematical logics and functions							PO1,PO2	
CO3	To get an idea on Permutations and Combinations							PO4,PO6	
CO4	Understanding the different form of number theory							PO4,PO5, PO6	
CO5	Able to understand Relations and its applications							PO3,PO8	

Text Books (Latest Editions)	
1	Rosen K.H. Discrete Mathematics and its Applications, 5th edition, Tata McGraw – Hills,2003
2	J.K Sharma “DISCRETE MATHEMATICS” 3 rd Edition Macmillan Reprint2011
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Johnson Baugh R, and Carman R, Discrete mathematics, 5th edition, Person Education, 2003.
2	Kolman B, Busoy R.C, and Ross S.C, Discrete Mathematical Structures, 5th edition, Pretitice – Hall, 2004.
Web Resources	
1	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	2	3	3	3	2	1	3
CO2	2	1	3	1	3	3	3	2	1	2
CO3	3	2	3	1	3	3	3	2	1	3
CO4	1	2	3	2	3	3	3	2	1	1
CO5	3	1	2	3	3	3	3	2	1	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution	3.0	3.0	3.0	3.0	3.0

Title of the Course/ Paper	Subject Name	Category	L	T	P	C		Inst. Hours	Marks		
									CIA	External	Total
23120AE C26L	DATA STRUCTURE AND ALGORITHMS LAB [Note: Practical's may be offered through C / C++ / Python]	Core	0	0	3	3		4	25	75	100

Learning Objectives

LO1	To understand the concepts of ADTs
LO2	To learn linear data structures-lists, stacks, queues
LO3	To learn Tree structures and application of trees
LO4	To learn graph structures and application of graphs
LO5	To understand various sorting and searching

Sl. No	Contents	No. of Hours
1.	Write a program to implement the List ADT using arrays and linked lists.	60
2.	Write a programs to implement the following using a singly linked list. <ul style="list-style-type: none"> • Stack ADT • Queue ADT 	
3.	Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).	
4.	Write a program to implement priority queue ADT.	
5.	Write a program to perform the following operations: <ul style="list-style-type: none"> • Insert an element into a binary search tree • Delete an element from a binary search tree. • Search for a key element in a binary search tree. 	
6.	Write a program to perform the following operations <ul style="list-style-type: none"> • Insertion into an AVL-tree • Deletion from an AVL-tree 	
7.	Write a programs for the implementation of BFS and DFS for a given graph.	

8	Write a programs for implementing the following searching methods: <ul style="list-style-type: none"> • Linear search • Binary search. 	
9.	Write a programs for implementing the following sorting methods: <ul style="list-style-type: none"> • Bubble sort Selection sort Insertion sort Radix sort. 	
Total		60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO4,PO5
2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO1, PO4,PO6
3	Describe the hash function and concepts of collision and its resolution methods	PO1,PO3,PO6
4	Solve problem involving graphs, trees and heaps	PO3,PO4
5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO1,PO5,PO6
Text Book		
1	Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education 2014, 4th Edition.	
2	ReemaThareja, “Data Structures Using C”, Oxford Universities Press 2014, 2nd Edition	
Reference Books		
1	Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, “Introduction to Algorithms”, McGraw Hill 2009, 3rd Edition	
2.	Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education 2003	
Web Resources		
1.	https://www.programiz.com/dsa	
2.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	1	3	2	3
CO 3	3	3	3	3	2	3
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each Ps	15	15	13	15	13	15

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120SEC27	Quantitative Aptitude	Skill Enha. Course (SEC)	2	-	-	2	2	25	75	100
Learning Objectives										
LO1	To understand the basic concepts of numbers									
LO2	Understand and apply the concept of percentage, profit & loss									
LO3	To study the basic concepts of time and work, interests									
LO4	To learn the concepts of permutation, probability, discounts									
LO5	To study about the concepts of data representation, graphs									
UNIT	Contents								No. of Hours	
I	Numbers-HCF and LCM of numbers-Decimal fractions-Simplification-Square root and cube roots - Average-problems on Numbers.								6	
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion-partnership-Chain rule.								6	
III	Time and work - pipes and cisterns - Time and Distance - problems on trains -Boats and streams - simple interest - compound interest - Logarithms - Area-Volume and surface area -races and Games of skill.								6	
IV	Permutation and combination-probability-True Discount-Bankers Discount – Height and Distances-Odd man out & Series.								6	
V	Calendar - Clocks - stocks and shares - Data representation - Tabulation – Bar Graphs- Pie charts-Line graphs.								6	
	Total								60	
										Programme Outcome

Course Outcomes		
CO	On completion of this course, students will	
CO1	understand the concepts, application and the problems of numbers	PO1
CO2	To have basic knowledge and understanding about percentage, profit & loss related processing.	PO1, PO2
CO3	To understand the concepts of time and work	PO4, PO6
CO4	Speaks about the concepts of probability, discount	PO4, PO5
CO5	Understanding the concept of problem solving involved in stocks & shares, graphs	PO3, PO6
Text Book		
1	“Quantitative Aptitude”, R.S.AGGARWAL.,S.Chand & Company Ltd.,	
Reference Books		
1.		
Web Resources		
1.	https://www.javatpoint.com/aptitude/quantitative	
2.	https://www.toppr.com/guides/quantitative-aptitude/	

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	1	2	2	2
CO2	2	3	1	3	2	2
CO3	1	3	1	1	3	1
CO4	1	2	1	1	3	1
CO5	1	2	1	1	3	3
Weightage of course contributed to each PSO	8	12	5	8	13	9

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C		Inst. Hours	Marks		
									CIA	External	Total
23120SEC28	Advanced Excel	Skill Enha. Course (SEC)	2	0	0	2		2	25	75	100
Learning Objectives											
LO1	Handle large amounts of data										
LO2	Aggregate numeric data and summarize into categories and subcategories										
LO3	Filtering, sorting, and grouping data or subsets of data										
LO4	Create pivot tables to consolidate data from multiple files										
LO5	Presenting data in the form of charts and graphs										
UNIT	Contents										No. of Hours
I	Basics of Excel- Customizing common options- Absolute and relative cells- Protecting and un-protecting worksheets and cells- Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions- VlookUP with Exact Match, Approximate Match- Nested VlookUP with Exact Match- VlookUP with Tables, Dynamic Ranges- Nested VlookUP with Exact Match- Using VLookUP to consolidate Data from Multiple Sheets										6
II	Data Validations - Specifying a valid range of values - Specifying a list of valid values- Specifying custom validations based on formula - Working with Templates Designing the structure of a template- templates for standardization of worksheets - Sorting and Filtering Data -Sorting tables- multiple-level sorting- custom sorting- Filtering data for selected view - advanced filter options- Working with Reports										6
III	Creating Pivot tables Formatting and customizing Pivot tables- advanced options of Pivot tables- Pivot charts- Consolidating data from multiple sheets and files using Pivot tables- external data sources- data consolidation feature to consolidate data- Show Value As % of Row, % of Column, Running Total, Compare with Specific Field- Viewing Subtotal under Pivot- Creating Slicers.										6

IV	More Functions Date and time functions- Text functions- Database functions- Power Functions - Formatting Using auto formatting option for worksheets- Using conditional formatting option for rows, columns and cells- What If Analysis - Goal Seek- Data Tables- Scenario Manager.	6
V	Charts - Formatting Charts- 3D Graphs- Bar and Line Chart together- Secondary Axis in Graphs- Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Spark lines, Inline Charts, data Charts- Overview of all the new features.	6
Total		30
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6
CO5	Learn No-SQL databases and management.	PO3, PO8
Text Book		
1	Excel 2019 All	
2	Microsoft Excel 2019 Pivot Table Data Crunching	
Reference Books		
1	Excel 2019 All-in-One for Dummies, Greg Harvey, 1st edition	
Web Resources		
1.	https://www.simplilearn.com	

2	https://www.javatpoint.com
3	https://www.w3schools.com

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	3	3	3
CO2	3	2	2	3	3	3
CO3	3	3	2	3	3	3
CO4	3	2	2	3	3	3
CO5	3	2	2	3	3	3
Weightage of course contributed to each PSO	15	12	10	15	15	15

Strong-3 M-Medium-2 L-Low-1

SEMESTER II
Part-IV
Ability Enhancement Compulsory Course
SOFT SKILL -2- COMMUNICATION SKILL

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
231AECCCMS	AECC	2	0	0	2	2	25	75	100
Learning Objectives									
LO1	Identify common communication problems that may be holding learners back.								
LO2	Identify what their non-verbal messages are communicating to others.								
LO3	Understand role of communication in teaching-learning process.								
LO4	Learning to communicate through the digital media.								
LO5	Understand the importance of empathetic listening.								
LO6	Explore communication beyond language.								
UNIT	DETAILS								
I	Listening <ul style="list-style-type: none"> • Techniques of effective listening. • Listening and comprehension. • Probing questions. • Barriers to listening. 								
II	Speaking <ul style="list-style-type: none"> • Pronunciation • Enunciation • Vocabulary • Fluency • Common Errors 								
III	Reading <ul style="list-style-type: none"> • Techniques of effective reading • Gathering ideas and information from a given text <ul style="list-style-type: none"> i Identify the main claim of the text ii Identify the purpose of the text iii Identify the context of the text 								

	<ul style="list-style-type: none"> iv. Identify the concepts mentioned • Evaluating these ideas and information <ul style="list-style-type: none"> i. Identify the arguments employed in the text ii. Identify the theories employed or assumed in the text • Interpret the text <ul style="list-style-type: none"> i. To understand what a text says ii. To understand what a text does iii. To understand what a text means
IV	<p>Writing and different modes of writing</p> <ul style="list-style-type: none"> • Clearly state the claims • Avoid ambiguity, vagueness, unwanted generalizations and oversimplification of issues • Provide background information • Effectively argue the claim • Provide evidence for the claims • Use examples to explain concepts • Follow convention • Be properly sequenced • Use proper signposting techniques • Be well structured <ul style="list-style-type: none"> i. Well-knit logical sequence ii. Narrative sequence iii. Category groupings • Different modes of Writing - <ul style="list-style-type: none"> i. E-mails ii. Proposal writing for Higher Studies iii. Recording the proceedings of meetings iv. Any other mode of writing relevant for learners
V	<p>Digital Literacy</p> <ul style="list-style-type: none"> • Role of Digital literacy in professional life • Trends and opportunities in using digital technology in workplace • Internet Basics • Introduction to MS Office tools <ul style="list-style-type: none"> i. Paint ii. Office iii. Excel iv. PowerPoint

VI	<p>Effective use of Social Media</p> <ul style="list-style-type: none"> • Introduction to social media websites • Advantages of social media • Ethics and etiquettes of social media • How to use Google search better • Effective ways of using Social Media • Introduction to Digital Marketing
VII	<p>Non-verbal communication</p> <ul style="list-style-type: none"> • Meaning of non-verbal communication • Introduction to modes of non-verbal communication • Breaking the misbelieves • Open and Closed Body language • Eye Contact and Facial Expression • Hand Gestures • Do's and Don'ts • Learning from experts • Activities-Based Learning

Course Outcomes

CO1	By the end of this program participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.	PO1
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References Books

(Latest editions, and the style as given below must be strictly adhered to)

1	Sen Madhuc chanda (2010), <i>An Introduction to Critical Thinking</i> , Pearson, Delhi
2	Silvia P. J. (2007), <i>How to Read a Lot</i> , American Psychological Association, Washington DC

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	2	2	2
CO3	2	3	3	3	2	3	3	2	2	2
CO4	3	3	3	2	3	3	3	2	3	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 – Low Mapping with Programme Specific Outcomes

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SEMESTER-III

காப்பிய இலக்கியம் - 23110AEC31

மூன்றாம் பருவம்

பாடநோக்கங்கள்

- ◆ தமிழ்க்காப்பியங்களை அறிமுகப்படுத்துதல்.
- ◆ காப்பியங்கள் கூறும் வாழ்வியல் அறங்களை உணர்த்துதல்.
- ◆ காப்பிய இலக்கியங்களில் இலக்கியச் சுவையை பயிற்றுவித்தல்.
- ◆ நாடக இலக்கியத்தின் தனித்துவத்தைக்கற்பித்தல்.
- ◆ புராணச் செய்திகளை மேம்படுத்திக்கொள்ளச்செய்நல்.

பயன்கள்

- ◆ இலக்கியங்களின் சிறப்புகளை அறிவர்.
- ◆ காப்பியக்கதைகள்வழி அறச்சிந்தனைபெறுவர்
- ◆ பல்வேறு காப்பியவடிவங்களை பற்றிய அறிவுபெறுவர் .
- ◆ நாடக படைப்பாக்கத்திற்கான தூண்டுதலைப் பெறுவர்
- ◆ புராணச் செய்திகள் வழி தமிழ்கலாச்சாரத்தை அறிவர்.

அலகு-1 காப்பியங்கள்

1. சிலப்பதிகாரம் - மதுரைகாண்டம் (வழக்குரைகாதை)

2. மணிமேகலை - விழாவறைகாதை

3. சீவகசிந்தாமணி - குணமாலையார்இலம்பகம்

அலகு-2 காவியங்கள்

1. கம்பராமாயணம்- மந்தரைசூழ்ச்சிபடலம்
2. மகாபாரதம் - ஆரண்யபருவம்

அலகு-3 புராணங்கள்

1. பெரியபுராணம்- இளையான்குடிமாறநாயனார்புராணம்
2. சீறாப்புராணம் - ஈத்தங்குழைவரவழைத்தப்படலம்
3. தேம்பாவணி- பிரிந்தமகனைகாண்படலம்

அலகு-4 நாடகம் - சாபம்? விமோசனம்

அலகு-5 இலக்கியவரலாறு

1. காப்பியங்கள்
2. இரட்டைக்காப்பியங்கள்

3. நாடகஇலக்கியம்

பார்வை நூல்கள் :

1. காப்பியத்திறன்- மணிவாசகர்நூலகம், சிதம்பரம்.
2. தமிழ்காப்பியங்கள் - கி. வா .ஜெகன்ஜெகநாதன் , அமுதநிலையம், சென்னை.
3. நவீனநாடகஉருவாக்கம் - கோபழனி , தமிழ்பல்கலைக்கழகம், தஞ்சாவூர்.
4. இணையதளம் - www.tamilvu.org , www.noolulagam.com
5. சாபம்? விமோசனம்

மு.இராமசுவாமி,

செண்பகம்இராமசுவாமி,

பாவைபதிப்பகம், ஜானிஜான்சாலை, சென்னை – 14

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

SECOND YEAR - SEMESTER III

PAPER II – GENERAL ENGLISH [23111AEC32]

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23111AEC32	Part II	3	1	0	3	6	25	75	100

Learning Objectives

LO1	To enhance the level of literary and aesthetic experience of students and to help them respond creatively.
LO2	To sensitize them to the major issues in the society and the world.
LO3	To provide them with an ability to build and enrich their communication skills
LO4	To equip them to utilize the digital knowledge resources effectively for their chosen fields of study
LO5	To help them think and write imaginatively and critically.

Unit No.	Unit Title & Text	No. of Periods for the Unit
I	Poetry: 1.1 The Voice of the Mountains - Mamang Dai 1.2 A Song of Hope - Oodgeroo Noonuccal 1.3 In an Artist's Studio - Christina Rossetti	20
II	Scenes From Shakespeare: 2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene	20
III	Speeches of Famous personalities 3.1 Yes, We Can-Barack Obama 3.2 You've Got to Find What You Love-Steve Jobs	20
IV	Language Competency 4.1 Writing letters and emails 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram.facebook. 4.3 Learning netiquette, email etiquette	15
V	English for Workplace 5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used	15

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	PO1
CO2	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society	PO1,PO2
CO3	Produce grammatically and idiomatically correct language.	PO4,PO6
CO4	Gain knowledge in writing techniques to meet academic and professional needs.	PO4,PO5, PO6
CO5	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	PO3,PO8

Text Books (Latest Editions)

1	Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011)
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References Books (Latest Editions, and the style as given below must be strictly adhered to)

1	The Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
3	Famous Speeches by Mahatma Gandhi, Create space Independent Publishing Platform, 2016
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish , Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse , Michigan Teacher Training, 2016.
6	Role Play-Theory and Practice. Kryisia M Yardley-Matwiejczuk , SAGE publications ltd, 1997

Web Resources	
1	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3	In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4	Sita by Toru Dutt: https://www.poetrynook.com/poem/s%E2%94%9C%C2%ABta
5	Tryst with Destiny: https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html#:~:text=Jawaharlal%20Nehru%2C%20delivering%20his%20Tryst%20with%20Destiny%20speech.&text=%22Long%20years%20ago%20we%20made,awake%20to%20life%20and%20freedom.
6	Yes, We Can: https://www.englishspeechchannel.com/english-speeches/barack-obama-speech/
7	You've got to find what you love: https://www.businessbusinessbusiness.com.au/steve-jobs-youve-got-to-find-what-you-love/#:~:text=Steve%20Jobs%2C%20in%20his%20commencement,emphasizes%20on%20believing%20in%20oneself.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SEMESTER III

Subject Code	Subject Name	Category	L	T	P	C	Inst.	Marks		
								CIA	External	Total
23120AEC 33	Microprocessor and Microcontroller	Core	5	1	0	4	5	25	75	100
Learning Objectives										
LO1	To introduce the internal organization of Intel 8085 Microprocessor.									
LO2	To know about various instruction sets and classifications									
LO3	To enable the students to write assembly language programs using 8085.									
LO4	To interface the peripheral devices to 8085 using Interrupt controller and DMA interface.									
LO5	To provide real-life applications using microcontroller.									
UNIT	Contents									No. of Hours
I	Digital Computers - Microcomputer Organization-Computer languages – Microprocessor Architecture and its operations – Microprocessor initiated operations and 8085 Bus organization – Internal Data operations and 8085 registers - Peripheral or External initiated operations.									15
II	8085 Microprocessor – Pin out and Signals – Functional block diagram - 8085 Instruction Set and Classifications.									15
III	BCD to Binary and Binary to BCD conversions - ASCII to BCD and BCD to ASCII conversions - Binary to ASCII and ASCII to Binary conversions. BCD Arithmetic - BCD addition and Subtraction – Multibyte Addition and Subtraction - Multiplication and Division.									15
IV	The 8085 Interrupts – RIM AND SIM instructions-8259 Programmable Interrupt Controller-Direct Memory Access (DMA) and 8257 DMA controller.									15
V	Introduction to Microcontroller - Microcontroller Vs Microprocessor - 8051 Microcontroller architecture - 8051 pin description. Timers and Counters – Operating Modes- Control Registers. Interrupts – Interrupts in 8051 -									15
Total									75	

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	Remember the Basic binary codes and their conversions. Binary concepts are used in Microprocessor programming and provide a good understanding of the architecture of 8085o introduce the internal organization of Intel 8085 Microprocessor.	PO1
CO2	Understanding the 8085 instruction set and their classifications, enables the students to write the programs easily on their own using different logic	PO1,PO2
CO3	Applying different types of instructions to convert binary codes and analyzing the outcome. The instruction set is applied to develop programs on multibyte arithmetic operations.	PO4,PO6
CO4	Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.	PO4,PO5,PO6
CO5	An exposure to create real time applications using microcontroller.	PO3,PO6
Text Book		
1	R. S. Gaonkar- "Microprocessor Architecture- Programming and Applications with 8085"- 5th Edition- Penram International Publications, 2009. [For unit I to unit IV]	
2	Soumitra Kumar Mandal -"Microprocessors and Microcontrollers – Architectures, Programming and Interfacing using 8085, 8086, 8051", Tata McGraw Hill Education Private Limited. [For unit V].	
Reference Books		
1.	Mathur- "Introduction to Microprocessor"- 3rd Edition- Tata McGraw-Hill -1993.	
2.	Raj Kamal - "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.	
3.	Krishna Kant, "Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096", PHI, 2008	
Web Resources		
1.	E-content from open source libraries	
2.	https://www.bing.com/ , https://theopennotes.in/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	2	3	2
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	3	3	2	3	2
Weightage of course contributed to each PSO	15	15	14	12	14	10

S-Strong-3 M-Medium-2 L-Low-1

Discipline Specific Elective-I

Subject Code	Subject Name	Category	L	T	P	C		Inst. Hours	Marks		
									CIA	External	Total
23120DS C34A	Image Processing	Elective	5	1	0	3		4	25	75	100
Learning Objective											
LO1	To learn fundamentals of digital image processing.										
LO2	To learn about various 2D Image transformations										
LO3	To learn about various image enhancement processing methods and filters										
LO4	To learn about various classification of Image segmentation techniques										
LO5	To learn about various image compression techniques										
UNIT	Contents										No. of Hours
I	Digital Image Fundamentals: Image representation - Basic relationship between pixels, Elements of DIP system -Applications of Digital Image Processing - 2D Systems - Classification of 2D Systems - Mathematical Morphology- Structuring Elements- Morphological Image Processing - 2D Convolution - 2D Convolution Through Graphical Method -2D Convolution Through Matrix Analysis										12
II	2D Image transforms: Properties of 2D-DFT - Walsh transform - Hadamard transform- Haar transform- Discrete Cosine Transform- Karhunen-Loeve Transform -Singular Value Decomposition										12
III	Image Enhancement: Spatial domain methods- Point processing- Intensity transformations - Histogram processing- Spatial filtering- smoothing filter- Sharpening filters - Frequency domain methods: low pass filtering, high pass Filtering- Homomorphic filter.										12
IV	Image segmentation: Classification of Image segmentation techniques - Region approach – Clustering techniques - Segmentation based on thresholding - Edge based segmentation - Classification of edges- Edge detection - Hough transform- Active contour.										12

V	Image Compression: Need for compression -Redundancy- Classification of image- Compression schemes- Huffman coding- Arithmetic coding- Dictionary based compression -Transform based compression,	12
Total		60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the fundamental concepts of digital image processing.	PO1
2	Understand various 2D Image transformations	PO1, PO2
3	Understand image enhancement processing techniques and filters	PO4, PO6
4	Understand the classification of Image segmentation techniques	PO4, PO5, PO6
5	Understand various image compression techniques	PO3, PO5
Text Book		
1	S Jayaraman, S Esakkirajan, T Veerakumar, Digital image processing ,Tata McGraw Hill, 2015	
2	Gonzalez Rafel C, Digital Image Processing, Pearson Education, 2009	
Reference Books		
1.	1. Jain Anil K , Fundamentals of digital image processing: , PHI,1988	
2.	Kenneth R Castleman , Digital image processing:, Pearson Education,2/e,2003	
3.	Pratt William K , Digital Image Processing: , John Wiley,4/e,2007	
Web Resources		
1.	https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing%20-Vijaya%20Raghavan.pdf	
2.	http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf	
3.	https://dl.acm.org/doi/10.5555/559707	
4.	https://www.ijert.org/image-processing-using-web-2-0-2	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	2	2
Weightage of course contributed to each PSO	15	14	11	15	10	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120DSC34B	Big Data Analytics	Elective	5	1	0	3	4	25	75	100
Course Objective										
C1	Understand the Big Data Platform and its Use cases, Map Reduce Jobs									
C2	To identify and understand the basics of cluster and decision tree									
C3	To study about the Association Rules, Recommendation System									
C4	To learn about the concept of stream									
C5	Understand the concepts of No SQL Databases									
UNIT	Contents						No. of Hours	Course Objective		
I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model						12			
II	Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .- Classification: Decision Trees — Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes Theorem — Naïve Bayes Classifier.						12			
III	Advanced Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of						12			

	Candidate Rules — Applications of Association Rules — Finding Association & finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.	
IV	Introduction to Streams Concepts — Stream Data Model and Architecture — Stream Computing, Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics	12
V	NoSQL Databases : Schema-less Models : Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores — Tabular Stores — Object Data Stores — Graph Databases Hive — Sharding — Hbase — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.	12
	Total	60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO5
4	Perform analytics on data streams.	PO3, PO5, PO6
5	Learn NoSQL databases and management.	PO3, PO4
Text Book		
1	AnandRajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge	

	University Press, 2012.
Reference Books	
1.	David Loshin, “Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph”, Morgan Kaufmann/El sevier Publishers, 2013
2.	EMC Education Services, “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley publishers, 2015.
Web Resources	
1.	https://www.simplilearn.com
2.	https://www.sas.com/en_us/insights/analytics/big-data-analytics.html

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	2	3	3	3
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	13

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Marks		
							CIA	External	Total
23120DSC34 C	NATURAL LANGUAGE PROCESSING	Elective	5	1	0	3	25	75	100
Learning Objectives									
LO1	To understand approaches to syntax and semantics in NLP.								
LO2	To learn natural language processing and to learn how to apply basic algorithms in this field.								
LO3	To understand approaches to discourse, generation, dialogue and summarization within NLP.								
LO4	To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics etc.								
LO5	To understand current methods for statistical approaches to machine translation.								
UNIT	Contents								No. Of. Hours
I	Introduction : Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics –Information theory – Collocations -N-gram Language Models – Estimating parameters and smoothing – Evaluating language models.								12
II	Word level and Syntactic Analysis: Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency-Parsing-Probabilistic Parsing.								12
III	Semantic analysis and Discourse Processing: Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution-Discourse Coherence and Structure.								12
IV	Natural Language Generation: Architecture of NLG Systems-Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.								12
V	Information retrieval and lexical resources: Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: WorldNet-Frame Net Stemmers- POS Tagger- Research								12

	Corpora SSAS.	
Total hours		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Describe the fundamental concepts and techniques of natural language processing. Explain the advantages and disadvantages of different NLP technologies and their applicability in different business situations.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each Use NLP technologies to explore and gain a broad understanding of text data.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions. Use NLP methods to analyse sentiment of a text document.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Analyze large volume text data generated from a range of real-world applications. Use NLP methods to perform topic modelling.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Develop robotic process automation to manage business processes and to increase and monitor their efficiency and effectiveness. Determine the framework in which artificial intelligence and the Internet of things may function, including interactions with people, enterprise functions, and environments.	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	Daniel Jurafsky, James H. Martin, "Speech & language processing", Pearson publications.	
2	Allen, James. Natural language understanding. Pearson, 1995.	
Reference Books		
1.	Pierre M. Nugues, "An Introduction to Language Processing with Perl and Prolog", Springer	
Web Resources		
1.	https://en.wikipedia.org/wiki/Natural_language_processing	
2.	https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP	

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120SEC35L	Microprocessor and microcontroller Lab	Core	0	0	3	3	4	25	75	100
Learning Objectives										
LO1	To introduce the internal organization of Intel 8085 Microprocessor.									
LO2	To know about various instruction sets and classifications									
LO3	To enable the students to write assembly language programs using 8085.									
LO4	To interface the peripheral devices to 8085 using interrupt controller and DMA interface.									
LO5	To provide real-life applications using microcontroller.									
Details									No. of Hours	
List of Exercises:										
Addition and Subtraction <ol style="list-style-type: none"> 1. 8 - bit addition 2. 16 - bit addition 3. 8 - bit subtraction 4. BCD subtraction II. Multiplication and Division <ol style="list-style-type: none"> 1. 8 - bit multiplication 2. BCD multiplication 3. 8 - bit division III. Sorting and Searching <ol style="list-style-type: none"> 1. Searching for an element in an array. 2. Sorting in Ascending and Descending order. 3. Finding the largest and smallest elements in an array. 4. Reversing array elements. 5. Block move. 									60	

	<p>IV. Code Conversion</p> <ol style="list-style-type: none"> 1. BCD to Hex and Hex to BCD 2. Binary to ASCII and ASCII to binary 3. ASCII to BCD and BCD to ASCII <p>V. Simple programs on 8051 Microcontroller</p> <ol style="list-style-type: none"> 1. Addition 2. Subtraction 3. Multiplication 4. Division 5. Interfacing Experiments using 8051 <ol style="list-style-type: none"> 1. Realisation of Boolean Expression through ports. 2. Time delay generation using subroutines. 3. Display LEDs through ports 	
	Total	60
Course Outcomes		Program me Outcome
CO	On completion of this course, students will	
CO1	Remember the Basic binary codes and their conversions. Binary concepts are used in Microprocessor programming and provide a good understanding of the architecture of 8085o introduce the internal organization of Intel 8085 Microprocessor..	PO1
CO2	Understanding the 8085 instruction set and their classifications, enables the students to write the programs easily on their own using different logic	PO1,PO2
CO3	Applying different types of instructions to convert binary codes and analyzing the outcome. The instruction set is applied to develop programs on multibyte arithmetic operations.	PO4,PO6
CO4	Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.	PO4,PO5, PO6
CO5	An exposure to create real time applications using microcontroller.	PO3,PO5

Text Book	
1	R. S. Gaonkar- "Microprocessor Architecture- Programming and Applications with 8085"- 5th Edition- Penram International Publications, 2009. [For unit I to unit IV]
2	Soumitra Kumar Mandal -"Microprocessors and Microcontrollers – Architectures, Programming and Interfacing using 8085, 8086, 8051", Tata McGraw Hill Education Private Limited. [For unit V].
Reference Books	
1.	Mathur- "Introduction to Microprocessor"- 3rd Edition- Tata McGraw-Hill -1993.
2.	Raj Kamal - "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.
3.	Krishna Kant, "Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096", PHI, 2008
Web Resources	
1.	E-content from open source libraries
2.	https://www.bing.com/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	2	3	3	3	2	3
CO 3	3	3	3	3	3	3
CO 4	3	2	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	14	15	15	13	15

SKILL ENHANCEMENT COURSE

Subject Code	Subject Name	Category	L	T	P	C	Marks		
							CIA	External	Total
23120SEC36	INTRODUCTION TO HTML	Skill Enha. Course (SEC)	3	0	0	2	25	75	100

Learning Objectives

LO1	Insert a graphic within a web page.
LO2	Create a link within a web page.
LO3	Create a table within a web page.
LO4	Insert heading levels within a web page.
LO5	Insert ordered and unordered lists within a web page. Create a web page.

UNIT	Contents	No. Of. Hours
I	Introduction: Web Basics: What is Internet–Web browsers–What is Web page –HTML Basics: Understanding tags?	6
II	Tags for Document structure(HTML, Head, Body Tag).Block level text elements: Headings paragraph(<p> tag)–Font style elements:(bold,italic,font,small,strong,strike,bigtags)	6
III	Lists: Types of lists: Ordered, Unordered– Nesting Lists–Other tags: Marquee, HR, BR-Using Images –Creating Hyperlinks.	6
IV	Tables: Creating basic Table, Table elements, Caption–Table and cell alignment–Rowspan, Colspan–Cell padding.	6
V	Frames: Frameset–Targeted Links–No frame–Forms: Input, Text area, Select, Option.	6
TOTAL HOURS		30

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Knows the basic concept in HTML Concept of resources in HTML	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand the page formatting. Concept of list	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Creating Links. Know the concept of creating link to email address	PO1, PO2, PO3, PO4, PO5, PO6
	Concept of adding images	PO1, PO2, PO3, PO4, PO5, PO6

CO5	Understand the table creation.	
Textbooks		
1	“Mastering HTML5 and CSS3 Made Easy”, Teach Comp Inc., 2014.	
2	Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”	
Web Resources		
1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf	
2.	https://www.w3schools.com/html/default.asp	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	2	3	3	3
CO 3	2	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	2	3	3
Weightage of course contributed to each PSO	14	15	14	14	15	15

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120SEC37	Cloud Computing	Elective	2	0	0	2	4	25	75	100
Course Objective										
LO1	Learning fundamental concepts and Technologies of Cloud Computing.									
LO2	Learning various cloud service types and their uses and pitfalls.									
LO3	To learn about Cloud Architecture and Application design.									
LO4	To know the various aspects of application design, benchmarking and security on the Cloud.									
LO5	To learn the various Case Studies in Cloud Computing.									
UNIT	Contents								No. of Hours	
I	<p>Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications.</p> <p>Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – Map Reduce – Identity and Access Management – Service Level Agreements – Billing.</p>								12	
II	<p>Cloud Services Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines</p> <p>Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage</p> <p>Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service</p> <p>Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services</p>								12	

	<p>Content Delivery Services: Amazon Cloud Front - Windows Azure Content Delivery Network</p> <p>Analytics Services: Amazon Elastic Map Reduce - Google Map Reduce Service - Google Big Query - Windows Azure Hindsight.</p> <p>Deployment and Management Services: Amazon Elastic Bean stack - Amazon Cloud Formation</p> <p>Identity and Access Management Services: Amazon Identify and Access Management - Windows Azure Active Directory</p> <p>Open Source Private Cloud Software: CloudStack – Eucalyptus – Open Stack.</p>	
III	<p>Cloud Application Design: Introduction – Design Considération for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and upgradassions – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Méthodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approches: Relationnel Approach (SQL), Non-RelationalApproach (NoSQL).</p>	12
IV	<p>Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping. Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion – Key Management – Auditing.</p>	12
V	<p>Case Studies: Cloud Computing for Healthcare – Cloud Computing for EnergySystems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.</p>	12

		Total	60
Course Outcomes		Programme Outcome	
CO	On completion of this course, students will		
CO 1	Understand the fundamental concepts and Technologies in Cloud Computing.	PO1	
CO 2	Able to understand various cloud service types and their uses and pitfalls.	PO1, PO2	
CO 3	Able to understand Cloud Architecture and Application design.	PO4, PO5	
CO 4	Understand the various aspects of application design, benchmarking and security in the Cloud.	PO4, PO5, PO6	
CO 5	Understand various Case Studies in Cloud Computing.	PO3, PO6	
Text Book			
1	ArshdeepBahga, Vijay Madiseti, <i>Cloud Computing – A Hands On Approach</i> , Universities Press (India) Pvt. Ltd., 2018		
Reference Books			
1.	Anthony T Velte, Toby J Velte, Robert Elsenpeter, <i>Cloud Computing: A Practical Approach</i> , Tata McGraw-Hill, 2013.		
2.	Barrie Sosinsky, <i>Cloud Computing Bible</i> , Wiley India Pvt. Ltd., 2013.		
3.	David Crookes, <i>Cloud Computing in Easy Steps</i> , Tata McGraw Hill, 2015.		
4.	Dr. Kumar Saurabh, <i>Cloud Computing</i> , Wiley India, Second Edition 2012.		
Web Resources			
1.	https://en.wikipedia.org/wiki/Cloud_computing		
2.	https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7		
3.	https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-		

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

S-Strong-3 M-Medium-2 L-Low-1

Course Code	Course Title	L	T	P	C
23120RMC38	Research Methodology	2	0	0	2

AIM:

To create a basic appreciation towards research process and awareness of various research publication.

OBJECTIVES:

- To understand the steps in research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-based
- To give exposure to MATLAB platform for effective computational and graphic works required for quality research

PREREQUISITIES:

Basic computer skill for working in window environment & conceptual knowledge on basic matrices.

UNIT-I Introduction to Research Methodology

Meaning of research – Objectives of research – Type of research – Significance of research – Research approaches.

UNIT-II Research Methods

Research methods versus Methodology – Research and scientific method – criteria of good research – Problems encountered by researchers in India.

UNIT-III Literature Survey

Articles – Thesis – Journals – Patents – Primary sources of journals and patents – Secondary sources – Listing of titles – Abstracts – Review – General treatises – Monographs.

UNIT-IV Database Survey

Database search – NIST –MSDS –PubMed – Scopus – Science citation index – Information about a specific search.

UNIT-V Introduction to MATLAB:

What is MATLAB? Matrix and its application in different areas: MATLAB approach to environmental modeling; Arithmetic Matrix – Operators; Arithmetic Array – Operators and its applications in MATLAB; Expressions, Opening M-Files; Structure of MATLAB Programming; Programming; Concatenation of strings; Vectorization ; Basic Graphics.

OUTCOME:

Ability to carry out independent literature survey corresponding to the specific publication type and assess basic computation frame works used in mathematical researches.

REFERENCES BOOK:

1. C.R. Kothari, Research Methodology, New Age International publishers. New Delhi,2204.
2. R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 1999.
3. R. Gopalan, Thesis writing, Vijay Nicole Imprints Private Ltd., 2205.
4. A Guide to MATLAB: For Beginners and experienced Users by Brian R. Hunt (Editor), Ronald L. Lipsman, J. Rosenberg
5. Introduction to MATLAB for Engineers by William J. Palm III.

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
231ACLSOAN	OFFICE AUTOMATION	Skill Enha. Course (SEC)	-	-	-	1	2	25	75	100
Learning Objectives										
LO1	Understand the basics of computer systems and its components.									
LO2	Understand and apply the basic concepts of a word processing package.									
LO3	Understand and apply the basic concepts of electronic spreadsheet software.									
LO4	Understand and apply the basic concepts of database management system.									
LO5	Understand and create a presentation using PowerPoint tool.									
UNIT	Contents									No. of Hours
I	Introductory concepts: Memory unit– CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS–UNIX–Windows. Introduction to Programming Languages.									6
II	Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; SpellChecker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing–Preview, options, merge.									6
III	Spreadsheets: Excel– opening, entering text and data, formatting, navigating; Formulas– entering, handling and copying; Charts– creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.									6
IV	Database Concepts: The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS– Access).									6
V	Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures –									6

	Slide transition–Animation effects, audio inclusion, timers.	
	Total	30
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Possess the knowledge on the basics of computers and its components	PO1,PO2,PO3,PO6,PO8
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1,PO2,PO3,PO6
CO3	Learn the concepts of Database and implement the Query in Database.	PO3,PO5,PO7
CO4	Demonstrate the understanding of different automation tools.	PO3,PO4,PO5,PO7
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4,PO6,PO7,PO8
Text Book		
1	Peter Norton, “Introduction to Computers”–Tata McGraw-Hill.	
Reference Books		
1.	Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGrawHill.	
Web Resources		
1.	https://www.udemy.com/course/office-automation-certificate-course/	
2.	https://www.javatpoint.com/automation-tools	

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	15	14	14	15	15	15

S-Strong-3 M-Medium-2 L-Low-1

சங்க இலக்கியம் - 23110AEC41

நான்காம் பருவம்

பாடநோக்கங்கள்

- ◆ இலக்கியங்கள் வாயிலாக சமுதாயக்கருத்தக்களை
- ◆ பழந்தமிழ்இலக்கியவளத்தை உணர்த்துதல்.
- ◆ சங்கஅக. புறபாடல்மரபுகளைப்பயிற்றுவித்தல்
- ◆ வாழ்வியல்அறங்கள்மற்றும்வரலாற்றுச்செய்திகளை .பயிற்றுவித்தல்
- ◆ புறஇலக்கியங்கள்காட்டும்வாழ்வியல்அறங்களைஎடுத்துக்கூறுதல்

பயன்கள்

- ◆ பழந்தமிழ்இலக்கியமரபைஅறிவர்.
- ◆ சங்கஇலக்கியங்களில்உள்ளஅழகியல்கூறுகளைஉணர்வர்.
- ◆ வாழ்வியல்அறங்கள்மற்றும்வரலாற்றுச்செய்திகளைஅறிவர்.
- ◆ சங்கஅக, புறபாடல்மரபுகளைபுரிந்துக்கொள்வர்.
- ◆ புறஇலக்கியங்கள்காட்டும்வாழ்வியல்அறங்களைஉணர்வர்.

அலகு-1

1. குறுந்தொகை- பாடல்எண்: 28,38
2. நற்றிணை- பாடல்எண்: 1,27,28,167,168
- 3.ஐங்குறுநூறு- பாடல்எண்: இளவேனில்பத்து

அலகு-2

- 1.கலித்தொகை- பாடல்எண்: 3,7
- 2.அகநானூறு- பாடல்எண்:5,42,100
3. புறநானூறு- பாடல்எண்: 182,204,41,121

அலகு-3

- 1 சிறுபாணாற்றுப்படைமுழுவதும்

அலகு-4

1. திருக்குறள்- செய்நன்றி அறிதல்,
, நலம்புனைந்துரைத்தல்.

கூடாநட்பு

2.

2. நாலடியார் – பாடல்எண்: 1,172,215,253

அலகு-5

இலக்கியவரலாறு

1. சங்கஇலக்கியம்
2. எட்டுத்தொகை, பத்துப்பாட்டு
3. பதினெண்மீழ்க்கணக்குநூல்கள்

பார்வைநூல்கள்

1. குறுந்தொகை - கழகவெளியீடு, சென்னை.
2. நற்றிணை - கழகவெளியீடு, சென்னை.
3. ஐங்குறுநூறு - கழகவெளியீடு, சென்னை.
4. கலித்தொகை - கழகவெளியீடு, சென்னை.
5. அகநானூறு - கழகவெளியீடு, சென்னை.
6. புறநானூறு - கழகவெளியீடு, சென்னை.
7. திருக்குறள் - பரிமேலழகர்உரை , கழகவெளியீடு, சென்னை
8. இணையதளம் - www.tamilvu.org , www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

SECOND YEAR - SEMESTER IV

PAPER II –GENERAL ENGLISH [23111AEC42]

Subject Code	Category	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23111AEC42	Part II	3	0	0-	3	6	25	75	100
Learning Objectives									
LO1	To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.								
LO2	To enable them use receptive skills through reading and listening to acquire good exposure to language and literature.								
LO3	To help them develop style in speech and writing and manipulate the tools of language for effective communication.								
LO4	To provide exposure to plays, autobiographies and expose them to value based ideas.								
LO5	To enhance their language skills especially in the areas of grammar and pronunciation.								
Unit No.	Unit Title & Text								No. of Periods for the Unit
I	Life Writing 1.1 I am Malala-Malala Yousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2								20
II	One Act Plays 2.1 The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov								20
III	Interviews 3.1 Nelson Mandela’s Interview with Larry King. 3.2 Rakesh Sharma’s Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)								20

IV	Language Competency 4.1 Refuting, Arguing & Debating 4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help 4.3 Interviews(face to face, telephone and video conferencing)	15
V	English for Workplace 5.1 Job Applications: Covering letters, CV and Resume 5.2 Creating a digital profile - LinkedIn 5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM,Credit/debit card 5.4 Body Language -Practical Skills for Interviews	15

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Learn to communicate effectively and appropriately in real life situation.	PO1
CO2	Use English effectively for study purpose across the curriculum	PO1,PO2
CO3	Develop interest in and appreciation of Literature	PO4,PO6
CO4	Develop and integrate the use of the four language skills	PO4,PO5,P O6
CO5	Enhance their language skills especially in the areas of grammar and pronunciation.	PO3,PO8

Textbooks(Latest Editions)	
1	I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by <u>Malala Yousafzai</u> , <u>Christina Lamb</u> , Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition
ReferencesBooks (Latest editions, and the style as given below must be strictly adhered to)	
1	Autobiographies, Mary , Taylor & Francis, 2021

2	One-act Plays for Acting Students: An Anthology of Short Norman A. Bert · 1987 ·
3	The One-Act Play Companion: A Guide to plays, play wrights ... Colin Dolley, Rex Walford · 2015
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Role Play-Theory and Practice.Kryisia M Yardley-Matwiejczuk, SAGE publications ltd, 1997

Web Resources	
1	For Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s (the link to the performance; refer scripts by Aaron Shepherd)
2	http://BBC learn English.com
3	http://onestopenglish.com
4	http://hearn-english-today.com
5	http://talkenglish.com
6	The Zoo Story: http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pdf
7	The Proposal: https://www.one-act-plays.com/comedies/proposal.html
8	Nelson Mandela with Larry King Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lk1.00.html
9	Rakesh Sharma with Indira Gandhi Interview : https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-told-indira-gandhi-about-india-from-space-2204839
10	Lionel Messi with Sid Lowe Interview: https://www.worldsoccer.com/world-soccer-latest/lionel-messi-interview-part-one-338553

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2

CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

S-Strong-3 M-Medium-2 L-Low-1

SEMESTER IV

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	Ext	Total
23120AEC 43	Java Programming	Core	5	1	0	3	5	25	75	100

Learning Objectives

LO1	To provide fundamental knowledge of object-oriented programming
LO2	To equip the student with programming knowledge in Core Java from the basics up.
LO3	To enable the students to use AWT controls, Event Handling and Swing for GUI.
LO4	To provide fundamental knowledge of object-oriented programming.
LO5	To equip the student with programming knowledge in Core Java from the basics up.

UNIT	Contents	No. of Hours
I	Introduction: Review of Object Oriented concepts – History of Java – Java buzzwords – JVM architecture – Datatypes - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes.	15
II	Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. Packages: Definition-AccessProtection –Importing Packages. Interfaces: Definition–Implementation–Extending Interfaces. Exception Handling: <i>try – catch- throw - throws – finally</i> – Built-in	15

	exceptions - Creating own Exception classes.	
III	<p>Multithreaded Programming: Thread Class - Runnable interface – Synchronization–Using synchronized methods– Using synchronized statement- Interthread Communication –Deadlock.</p> <p>I/O Streams: Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.</p>	15
IV	<p>AWT Controls: The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Color - Fonts and layout managers.</p> <p>Event Handling: Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes</p>	15
V	<p>Swing: Introduction to Swing - Hierarchy of swing components. Containers - Top level containers – Frame – Window – Dialog – Panel – Button – J toggle Button – Checkbox – JRadioButton – JLabel,JTextField – JTextArea – JList – JComboBox – JScrollPane.</p>	15
	Total	75
Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1, PO2, PO6
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO2, PO3, PO8
CO3	Implement multi-threading and I/O Streams of Core Java	PO1, PO3, PO5
CO4	Implement AWT and Event handling.	PO2, PO6
CO5	Use Swing to create GUI.	PO1, PO3, PO6
Text Books:		
1.	Herbert Scheldt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010	

2.	Gary Cornell, <i>Core Java 2 Volume I – Fundamentals</i> , Addison Wesley, 1999
References :	
1.	Head First Java, O’Rielly Publications,
2.	Y. Daniel Liang, <i>Introduction to Java Programming</i> , 7th Edition, Pearson Education India, 2010
Web Resources	
1.	https://javabeginnerstutorial.com/core-java-tutorial
2.	http://docs.oracle.com/javase/tutorial/
3.	https://www.coursera.org/

Mapping with Programme Outcomes:

S-Strong-3 M-Medium-2 L-Low-1

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	1
Weightage of course contributed to each PSO	14	14	13	14	14	11

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120SEC45 L	Java Programming Lab	Core	0	0	3	3	4	25	75	100
Learning Objectives										
LO1	To provide fundamental knowledge of object-oriented programming.									
LO2	To equip the student with programming knowledge in Core Java from the basics up.									
LO3	To enable the students to know about Event Handling.									
LO4	To enable the students to use String Concepts.									
LO5	To equip the student with programming knowledge in to create GUI using AWT controls.									
EXCERCISE	Details									
1	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer									
2	Write a Java program to multiply two given matrices.									
3	Write a Java program that displays the number of characters, lines and words in a text									
4	Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.									
5	Write a program to do String Manipulation using Character Array and perform the following string operations: a. String length b. Finding a character at a particular position c. Concatenating two strings									
6	Write a program to perform the following string operations using String class: a. String Concatenation									

	<ul style="list-style-type: none"> b. Search a substring c. To extract substring from given string 	60
7	<p>Write a program to perform string operations using String Buffer class:</p> <ul style="list-style-type: none"> a. Length of a string b. Reverse a string c. Delete a substring from the given string 	
8	<p>Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.</p>	
9	<p>Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread2.</p>	
10	<p>Write a program to demonstrate the use of following exceptions.</p> <ul style="list-style-type: none"> a. Arithmetic Exception b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception 	
11	<p>Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes</p>	
12	<p>Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.</p>	
13	<p>Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).</p>	
14	<p>Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by</p>	

	zero.	
15	Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message shown.	
Total		60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1
2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO1, PO2
3	Implement multi-threading and I/O Streams of Core Java	PO4, PO6
4	Implement AWT and Event handling.	PO4, PO5, PO6
5	Use Swing to create GUI.	PO3, PO6
Text Book		
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.	
2.	Gary Cornell, <i>Core Java 2 Volume I – Fundamentals</i> , Addison Wesley, 1999.	
Reference Books		
1.	Head First Java, O’Rielly Publications,	
2.	Y. Daniel Liang, <i>Introduction to Java Programming</i> , 7th Edition, Pearson Education India, 2010.	
Web Resources		
1.	https://www.w3schools.com/java/	
2.	http://java.sun.com	
3.	http://www.afu.com/javafaq.html	

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	2
Weightage of course contributed to each PSO	14	14	13	14	14	12

S-Strong M-Medium L-Low

Discipline Specific Elective-II

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120DSC44 A	Agile Project Management	Elective	5	1	0	3	4	25	75	100
Learning Objectives										
LO1	Learning of software design, software technologies and APIs.									
LO2	Detailed demonstration about Agile development and testing techniques.									
LO3	Learning about Agile Planning and Execution.									
LO4	Understanding of Agile Management Design and Quality Check.									
LO5	Detailed examination of Agile development and testing techniques.									
UNIT	Contents								No. of Hours	
I	<p>Introduction: Modernizing Project Management: Project Management Needed a Makeover – Introducing Agile Project Management.</p> <p>Applying the Agile Manifesto and Principles: Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 15 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values – The Agile litmus test.</p> <p>Why Being Agile Works Better: Evaluating Agile benefits – How Agile approaches beat historical approaches – Why people like being Agile.</p>								12	
II	<p>Being Agile</p> <p>Agile Approaches: Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, Extreme Programming - Summary</p>								12	

	<p>Agile Environments in Action: Creating the physical environment – Low-tech communicating – High-tech communicating – Choosing tools.</p> <p>Agile Behaviors in Action: Establishing Agile roles – Establishing new values – Changing team philosophy.</p>	
III	<p>Agile Planning and Execution</p> <p>Defining the Product Vision and Roadmap: Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog.</p> <p>Planning Releases and Sprints: Refining requirements and estimates – Release planning – Sprint planning.</p> <p>Working Throughout the Day: Planning your day – Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day.</p> <p>Showcasing Work, Inspecting and Adapting: The sprint review – The sprint retrospective.</p> <p>Preparing for Release: Preparing the product for deployment (the release sprint) – Preparing the operational support – Preparing the organization for product deployment - Preparing the marketplace for product deployment</p>	12
IV	<p>Agile Management</p> <p>Managing Scope and Procurement: What’s different about Agile scope management – Managing Agile scope – What’s different about Agile procurement – Managing Agile procurement.</p> <p>Managing Time and Cost: What’s different about Agile time management – Managing Agile schedules – What’s different about Agile cost management – Managing Agile budgets.</p> <p>Managing Team Dynamics and Communication: What’s different about Agile team dynamics – Managing Agile team dynamics – What’s different about Agile communication – Managing Agile communication?</p> <p>Managing Quality and Risk: What’s different about Agile quality –</p>	12

	Managing Agile quality – What’s different about Agile risk management – Managing Agile risk.	
V	<p>Implementing Agile</p> <p>Building a Foundation: Organizational and individual commitment – Choosing the right pilot team members – Creating an environment that enables Agility – Support Agility initially and over time.</p> <p>Being a Change Agent: Becoming Agile requires change – why change doesn’t happen on its own – Platinum Edge’s Change Roadmap – Avoiding pitfalls – Signs your changes are slipping.</p> <p>Benefits, Factors for Success and Metrics: Ten key benefits of Agile project management – Ten key factors for project success – Ten metrics for Agile Organizations.</p>	12
	Total	60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	Understanding of software design, software technologies and APIs using Agile Management.	PO1
CO2	Understanding of Agile development and testing techniques.	PO1, PO2
CO3	Understanding about Agile Planning and Execution using Sprint.	PO4, PO5
CO4	Understanding of Agile Management Design, scope, Procurement, managing Time and Cost and Quality Check.	PO4, PO5, PO6
CO5	Analyzing of Agile development and testing techniques.	PO2, PO4
Text Book		
1	Mark C. Layton, Steven J. Ostermiller, Agile Project Management for Dummies, 2nd Edition, Wiley India Pvt. Ltd., 2018.	
	Jeff Sutherland, Scrum – The Art of Doing Twice the Work in Half the Time, Penguin,	

	2014.
Reference Books	
1.	Mark C. Layton, David Morrow, <i>Scrum for Dummies</i> , 2 nd Edition, Wiley India Pvt. Ltd., 2018.
2.	Mike Cohn, <i>Succeeding with Agile – Software Development using Scrum</i> , Addison-Wesley Signature Series, 2010.
3.	Alex Moore, <i>Agile Project Management</i> , 2020.
4.	Alex Moore, <i>Scrum</i> , 2020.
5.	Andrew Stellman and Jennifer Greene, <i>Learning Agile: Understanding Scrum, XP, Lean, and Kanban</i> , Shroff/O'Reilly, First Edition, 2014.
Web Resources	
1.	www.agilealliance.org/resources

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	11	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120DSC44 B	Analytics for Service Industry	Elective	5	1	0	3	4	25	75	100

Course Objectives:

1. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
2. To become familiar with the processes needed to develop, report, and analyze business data.
3. To learn how to use and apply Excel and Excel add-ins to solve business problems.

- I. Overview of Business Analytics • Introduction to Analytics • Davenport article - “Competing on Analytics. The New Path to Value”
- II. Visualization/ Data Issues • Organization/sources of data • Importance of data quality • Dealing with missing or incomplete data • Data Classification • Davenport and Harris article - “The Dark Side of Customer Analytics”
- III. Introduction to Data Mining • Introduction to Data Mining • Data Mining Process • Data mining tool XLMiner • Loveman article – “Diamonds in the Data Mine” • Market Basket Analysis –• Classification and Regression Trees
- IV. Introduction to Decision Modeling • Optimization Use of Excel to solve business problems: e.g. marketing mix, capital budgeting, portfolio optimization • Decision Making under Uncertainty Simulation Introduction to Risk
- V. Types of problems: inventory management, capital investment analysis, market share estimation, sensitivity analysis.

Reference Books:

1. Data Analysis and Business Modeling by Wayne L. Winston
2. A Data Visualization Guide for Business Professionals by Cole Nussbaumer Knaflic

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120DSC44 C	Computing Intelligence	Elective	5	1	0	3	4	25	75	100
Learning Objectives										
LO1	To identify and understand the basics of AI and its search.									
LO2	To study about the Fuzzy logic systems.									
LO3	Understand and apply the concepts of Neural Network and its functions.									
LO4	Understand the concepts of Artificial Neural Network									
LO5	To study about the Genetic Algorithm.									
UNIT	Contents						No. of Hours			
I	Introduction to AI: Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.						12			
II	Fuzzy Logic Systems: Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier.						12			
III	Neural Networks: What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Back propagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications						12			
IV	Artificial Neural Networks: Fundamental Concepts						12			

	– Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.	
V	Genetic Algorithm: Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm	12
Total		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Describe the fundamentals of artificial intelligence concepts and searching techniques.	PO1
2	Develop the fuzzy logic sets and membership function and defuzzification techniques.	PO1, PO2
3	Understand the concepts of Neural Network and analyze and apply the learning techniques	PO4, PO6
4	Understand the artificial neural networks and its applications.	PO4, PO5, PO6
5	Understand the concept of Genetic Algorithm and Analyze the optimization problems using GAs.	PO3, PO5
Text Book		
1	S.N. Sivanandam and S.N. Deep, “Principles of Soft Computing”, 2nd Edition, Wiley India Pvt. Ltd.	
2	Stuart Russell and Peter Norvig, “Artificial Intelligence - A Modern Approach”, 2nd Edition, Pearson Education in Asia.	
3	S. Rajasekaran, G. A. Vijayalakshmi, “Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications”, PHI.	
Reference Books		
1.	F. Martin, Mcneill, and Ellen Thro, “Fuzzy Logic: A Practical approach”, AP Professional, 2000. Chin Teng Lin, C. S. George Lee,” Neuro-Fuzzy Systems”, PHI	
2.	Chin Teng Lin, C. S. George Lee,” Neuro-Fuzzy Systems”, PHI.	

Web Resources	
1.	https://www.javatpoint.com/artificial-intelligence-tutorial
2.	https://www.w3schools.com/ai/

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to Each PSO	15	12	10	11	12	13

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks			
								CIA	External	Total	
23120SEC46	PHP PROGRAMMING	Skill Enha. Course (SEC)	3	0	0	2	2	25	75	100	
Learning Objectives											
LO1	To provide the necessary knowledge on basics of PHP.										
LO2	To design and develop dynamic, database-driven web applications using PHP version.										
LO3	To get an experience on various web application development techniques.										
LO4	To learn the necessary concepts for working with the files using PHP.										
LO5	To get a knowledge on OOPS with PHP.										
UNIT	Contents								No. of Hours		
I	Introduction to PHP -Basic Knowledge of websites -Introduction of Dynamic Website -Introduction to PHP -Scope of PHP -XAMPP and WAMP Installation								6		
II	PHP Programming Basics -Syntax of PHP -Embedding PHP in HTML -Embedding HTML in PHP. Introduction to PHP Variable -Understanding Data Types -Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement.								6		
III	Switch() Statements -Using the while() Loop -Using the for() Loop PHP Functions. PHP Functions -Creating an Array -Modifying Array Elements -Processing Arrays with Loops - Grouping Form Selections with Arrays -Using Array Functions.								6		
IV	PHP Advanced Concepts -Reading and Writing Files -Reading Data from a File.								6		
V	Managing Sessions and Using Session Variables -Destroying a Session -Storing Data in Cookies -Setting Cookies.								6		
	Total								30		
Course Outcomes						Programme Outcomes					
CO	On completion of this course, students will know about php.										
CO1	Write PHP scripts to handle HTML forms					PO1,PO4,PO6					
CO2	Write regular expressions including modifiers,					PO2,PO5,PO7.					

	operators, and meta characters.	
CO3	Create PHP Program using the concept of array.	PO3,PO4,PO5.
CO4	Create PHP programs that use various PHP library functions	PO2,PO3,PO5
CO5	Manipulate files and directories.	PO3,PO5,PO6.
Text Book		
1	Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.	
2	The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes	
Reference Books		
1.	PHP: The Complete Reference-Steven Holzner.	
2.	DT Editorial Services (Author), “HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)”, Paperback 2016, 2 nd Edition.	
Web Resources		
1.	Opensource digital libraries: PHP Programming	
2.	https://www.w3schools.com/php/default.asp	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	15	12	10	11	12	13

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks			
								CIA	External	Total	
23120SEC4 7	Software Testing	Skill Enha. Course (SEC)	2	0	0	2	2	25	75	100	
Learning Objectives											
LO1	To study fundamental concepts in software testing										
LO2	To discuss various software testing issues and solutions in software unit test, integration and system testing.										
LO3	To study the basic concept of Data flow testing and Domain testing.										
LO4	To Acquire knowledge on path products and path expressions.										
LO5	To learn about Logic based testing and decision tables										
UNIT	Contents							No. of Hours			
I	Introduction: Purpose–Productivity and Quality in Software–TestingVsDebugging–Model for Testing–Bugs–Types of Bugs – Testing and Design Style.							6			
II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction Flow Testing Techniques.							6			
III	Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.							6			
IV	Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing–Formats–Test Cases							6			
V	Logic Based Testing–Decision Tables–Transition Testing–States, State Graph, State Testing.							6			
	Total							30			
Course Outcomes							Program Outcomes				
CO	On completion of this course, students will										
CO1	Students learn to apply software testing knowledge and engineering methods							PO1			
CO2	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.							PO1, PO2			
CO3	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.							PO4, PO6			

CO4	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems	PO4, PO5, PO6
CO5	Have an ability to use software testing methods and modern software testing tools for their testing projects.	PO3, PO8
Text Book		
1	B.Beizer,“SoftwareTestingTechniques”,IIEdn.,DreamTechIndia,NewDelhi,2003.	
2	K.V.K.Prasad,“SoftwareTestingTools”,DreamTech.India,NewDelhi,2005	
Reference Books		
1.	I.Burnstein,2003,“PracticalSoftwareTesting”,SpringerInternationalEdn.	
2.	E. Kit, 1995, “Software Testing in the Real World: Improving the Process”, PearsonEducation,Delhi.	
3.	R. Rajani,andP.P.Oak,2004,“SoftwareTesting”,TataMcgrawHill,NewDelhi.	
Web Resources		
1.	https://www.javatpoint.com/software-testing-tutorial	
2.	https://www.guru99.com/software-testing.html	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	15	12	10	11	12	13

S-Strong-3 M-Medium-2 L-Low-1

Course Code	Course Title	L	T	P	C
231AECCEVS	Environmental Studies	2	0	0	2

AIM:

To create the awareness about environmental problems among the students.

OBJECTIVE:

- It deals with the study of flow of energy and materials in the environment
- It deals with the study of natural and its function

UNIT-I

The Multidisciplinary Nature of Environmental Studies – Definition, Scope and Importance - Need for public awareness - **Natural Resources: Renewable and Non-Renewable Resources** - Forest resources - Water resources - Mineral resources - Food resources - Energy resources - Land resources.

UNIT-II

Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids - Types of ecosystem - Forest ecosystem - Grassland ecosystem - Desert ecosystem - Aquatic ecosystems.

UNIT-III

Biodiversity and its Conservation – Definition - Genetic, species and ecosystem diversity - Bio geographical classification of India - Values of biodiversity - Biodiversity at global, National and local levels - India as a mega - diversity nation - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India - Conservation of biodiversity.

UNIT-IV

Environmental Pollution – Definition - Air pollution - Water pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Nuclear hazards - Solid waste Management - Role of an individual in prevention of pollution - Disaster management.

UNIT-V

Social Issues and the Environment - From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Environmental ethics - Climate change green house effect and global warming - Ozone depletion - Waste land reclamation - Consumerism and waste products - Environmental Legislation - Issues involved in enforcement of environmental legislation - Public awareness - **Human Population and the Environment.**

REFERENCE BOOK:

- 1.“ENVIRONMENTAL STUDIES”, K.Kumarasamy, A.Alagappa Moses, M.Vasant

Course Code	Course Title	L	T	P	C
231LCSCLS	Leadership and Management Skills	-	-	-	1

Aim:

The aim of the course cultivating and nurturing the innate leadership skills of the youth so that they may transform these challenges into opportunities and become torch bearers of the future by developing creative solutions.

Course Objective:

The Module is designed to:

- Help students to develop essential skills to influence and motivate others
- Inculcate emotional and social intelligence and integrative thinking for effective leadership
- Create and maintain an effective and motivated team to work for the society
- Nurture a creative and entrepreneurial mindset
- Make students understand the personal values and apply ethical principles in professional and social contexts.

Course Outcomes:

Upon completion of the course students will be able to:

1. Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision
2. Learn and demonstrate a set of practical skills such as time management, self management, handling conflicts, team leadership, etc.
3. Understand the basics of entrepreneurship and develop business plans
4. Apply the design thinking approach for leadership
5. Appreciate the importance of ethics and moral values for making of a balanced personality.

UNIT I- Leadership Skills

a. Understanding Leadership and its Importance

- What is leadership?
- Why Leadership required?
- Whom do you consider as an ideal leader?

Traits and Models of Leadership

- Are leaders born or made?
- Key characteristics of an effective leader
- Leadership styles
- Perspectives of different leaders

Basic Leadership Skills

- Motivation
- Team work
- Negotiation
- Networking

UNIT II - Managerial Skills

a. Basic Managerial Skills

- Planning for effective management
- How to organize teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate
- Conflict management

Self Management Skills

- Understanding self concept
- Developing self-awareness
- Self-examination
- Self-regulation

UNIT III - Entrepreneurial Skills

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurship
- Traits and competencies of entrepreneur

Creating Business Plan

- Problem identification and idea generation
- Idea validation
- Pitch making

UNIT IV - Innovative Leadership and Design Thinking

a. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

Design Thinking

- What is design thinking?
- Key elements of design thinking:
 - Discovery
 - Interpretation
 - Ideation
 - Experimentation
 - Evolution.
- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

UNIT V- Ethics and Integrity

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

Ethics and Conduct

- Importance of ethics
- Ethical decision making
- Personal and professional moral codes of conduct
- Creating a harmonious life

Bibliography and Suggested Readings:

Books

- Ashokan, M. S. (2015). Karmayogi: A Biography of E. Sreedharan. Penguin, UK.
- Brown, T. (2012). Change by Design. Harper Business
- Elkington, J., & Hartigan, P. (2008). The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World. Harvard Business Press.
- Goleman D. (1995). Emotional Intelligence. Bloomsbury Publishing India Private Limited.
- Kalam A. A. (2003). Ignited Minds: Unleashing the Power within India. Penguin Books India
- Kelly T., Kelly D. (2014). Creative Confidence: Unleashing the Creative Potential Within Us
All. William Collins

- Kurien V., & Salve G. (2012). *I Too Had a Dream*. Roli Books Private Limited
- Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success*. New York: American Management Association
- McCormack M. H. (1986). *What They Don't Teach You at Harvard Business School: Notes From A Street-Smart Executive*. RHUS
- O'Toole J. (2019) *The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good*. Harpercollins
- Sinek S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. Penguin
- Sternberg R. J., Sternberg R. J., & Baltes P. B. (Eds.). (2004). *International Handbook of Intelligence*. Cambridge University Press.

E-Resources

- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15 from <https://www.forbes.com/sites/kimberlyfries/2018/02/08/8-essential-qualities-that-define-great-leadership/#452ecc963b63>.
- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - . "A Leader Should Know How to Manage Failure" <https://www.youtube.com/watch?=laGZaS4sdeU>
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, 85(6): 60.
- NPTEL Course on Leadership - <https://nptel.ac.in/courses/122105021/9>

SEMESTER-V

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120AEC51	Software Engineering	Core	5	1	0	4	5	25	75	100
Learning Objectives										
LO1	Gain basic knowledge of analysis and design of systems									
LO2	Ability to apply software engineering principles and techniques									
LO3	Model a reliable and cost-effective software system									
LO4	Ability to design an effective model of the system									
LO5	Perform Testing at various levels and produce an efficient system.									
UNIT	Contents						No. of Hours	Course Objectives		
I	<p>Introduction: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable changes in software development practices, computer systems engineering.</p> <p>Software Life Cycle Models: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.</p>						15			
II	<p>Requirements Analysis and Specification: Requirements gathering and analysis, Software requirements specification (SRS)</p> <p>Software Design: Good software design, cohesion and coupling, neat arrangement, software design approaches, object-oriented vs function-oriented design</p>						15			
III	<p>Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design.</p> <p>User-Interface design: Characteristics of a good</p>						15			

	interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.	
IV	Coding and Testing: Coding; code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing; debugging; program analysis tools; integration testing; system testing; some general issues associated with testing. Software Reliability and Quality Management: Software reliability; statistical testing; software quality; software quality management system; SEI capability maturity model; personal software process.	15
V	Computer Aided Software Engineering: CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment. Software Maintenance: Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost.	15
	Total	75

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Gain basic knowledge of analysis and design of systems	PO1
CO2	Ability to apply software engineering principles and techniques	PO1, PO2
CO3	Model a reliable and cost-effective software system	PO4, PO6
CO4	Ability to design an effective model of the system	PO4, PO5, PO6
CO5	Perform Testing at various levels and produce an efficient system.	PO3, PO6
Text Books		
1.	Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018	
References Books		
1.	Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997	
2.	Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.	
3.	James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	3	2	2	3
CO2	3	2	2	2	1	2
CO3	3	3	3	2	3	2
CO4	3	3	3	2	2	2
CO5	3	3	3	2	2	2
Weightage of course contribute d to each PO/PSO	15	13	14	10	10	11

S-Strong-3 M-Medium-2 L-Low-

Subject Code	Subject Name	Category	L	T	P	C	Inst. Hours	Marks		
								CIA	External	Total
23120AEC52	Database Management System	Core	5	1	0	3	5	25	75	100
Learning Objectives										
LO1	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.									
LO2	To understood the concepts of data base management system, design simple Database models									
LO3	To learn and understand to write queries using SQL, PL/SQL.									
LO4	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.									
LO5	To understood the concepts of data base management system, design simple Database models									
UNIT	Contents						No. of Hours			
I	Database Concepts: Database Systems - Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction						15			
II	Design Concepts: Relational database model - logical view of data-keys -Integrity rules - relational set operators - data dictionary and the system catalog - relationships -data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram						15			
III	Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.						15			

IV	Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT – MINUS. SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function	15
V	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation – Arithmetic operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	15
Total		75
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1, PO2
CO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	PO4, PO6

CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5, PO6
CO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO5
Text Book		
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition	
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016	
Reference Books		
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", McGraw Hill International Publication ,VI Edition	
2.	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition	
Web Resources		
1.	Web resources from NDL Library, E-content from open-source libraries	

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	15	12	10	11	12	13

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C		Inst. Hours	Marks		
									CIA	External	Total
23120DSC53	Internet of Things and its applications	Elective	5	0	0	4		4	25	75	100
Course Objective											
C1	Use of Devices, Gateways and Data Management in IoT.										
C2	Design IoT applications in different domain and be able to analyze their performance										
C3	Implement basic IoT applications on embedded platform										
C4	To gain knowledge on Industry Internet of Things										
C5	To Learn about the privacy and Security issues in IoT										
UNIT	Details							No. of Hours			
I	IoT& Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.							12			
II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.							12			
III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views							12			

IV	IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management	12
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	12
Total		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
4	Perform analytics on data streams.	PO4, PO5, PO6
5	Learn NoSQL databases and management.	PO3, PO5
Text Book		
1	Vijay Madisetti and Arshdeep Bahga, "Internet of Things: (A Hands-on Approach)", Universities Press (INDIA) Private Limited 2014, 1st Edition.	
Reference Books		
1.	Michael Miller, "The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World", kindle version.	
2.	Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", Apress Publications 2013, 1st Edition,.	

3	Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice" 4..CunoPfister, "Getting Started with the Internet of Things", O'Reilly Media 2011
Web Resources	
1.	https://www.simplilearn.com
2.	https://www.javatpoint.com
3.	https://www.w3schools.com

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	3	3
CO3	3	2	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	12	11	15	15	14

S-Strong-3 M-Medium-2 L-Low-1

Discipline Specific Elective Courses-III

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23120DSC54 A	Introduction to Data Science	Elective	4	-	-	-	3	4	25	75	100
Learning Objectives											
LO1	To learn about basics of Data Science and Big data.										
LO2	To learn about overview and building process of Data Science.										
LO3	To learn about various Algorithms in Data Science.										
LO4	To learn about Hadoop Framework.										
LO5	To learn about case study about Data Science.										
UNIT	Contents										No. of Hours
I	Introduction: Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science										12
II	The Data science process: Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building.										12
III	Algorithms : Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised										12
IV	Introduction to Hadoop : Hadoop framework – Spark – replacing Map Reduce– NoSQL – ACID – CAP – BASE – types										12
V	Case Study: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation										12
	Total										60
Course Outcomes							Programme Outcome				
CO	On completion of this course, students will										
CO1	Understand the basics in Data Science and Big data.						PO1				
CO2	Understand overview and building process in Data Science.						PO1, PO2				
CO3	Understand various Algorithms in Data Science.						PO3, PO6				

CO4	Understand Hadoop Framework in Data Science.	PO4, PO5
CO5	Case study in Data Science.	PO3, PO5
Text Book		
1	Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications 2016	
Reference Books		
1.	Roger Peng, “The Art of Data Science”, lulu.com 2016.	
2.	MurtazaHaider, “Getting Started with Data Science – Making Sense of Data with Analytics”, IBM press, E-book.	
3.	Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools”, Dreamtech Press 2016.	
4.	Annalyn Ng, Kenneth Soo, “Numsense! Data Science for the Layman: No Math Added”, 2017,1st Edition.	
5.	Cathy O'Neil, Rachel Schutt, “Doing Data Science Straight Talk from the Frontline”, O'Reilly Media 2013.	
6.	Lillian Pierson, “Data Science for Dummies”, 2017 II Edition	
Web Resources		
1.	https://www.w3schools.com/datascience/	
2.	https://en.wikipedia.org/wiki/Data_science	
3.	http://www.cmap.polytechnique.fr/~lepenec/en/post/references/refs/	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	11	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks		
								CIA	External	Total
23120DSC54 B	RDBMS with PL/SQL	Elective	4	0	0	4	4	25	75	100

COURSE OUTCOMES

1. The purpose of PL/SQL is to combine database language and procedural programming language.

2. The basic unit in PL/SQL is called a block and is made up of three parts: a declarative part, an executable part and an exception-building part.

Unit-1 Introduction to PL/SQL

PL/SQL Overview-Benefits of PL/SQL Subprograms-Overview of the Types of PL/SQL blocks
Create a Simple Anonymous Block-Generate Output from a PL/SQL Block

Unit-2 PL/SQL Identifiers

List the different Types of Identifiers in a PL/SQL subprogram-Usage of the Declarative Section to define Identifiers-Use variables to store data-Identify Scalar Data Types-The %TYPE Attribute-What are Bind Variables-Sequences in PL/SQL Expressions.

UNIT-3 Interaction with Server

Invoke SELECT Statements in PL/SQL to Retrieve data-Data Manipulation in the Server Using PL/SQL SQL Cursor concept-Usage of SQL Cursor Attributes to Obtain Feedback on DML-Save and Discard Transactions.

UNIT-4 Composite Data Types

Use PL/SQL Records-The %ROWTYPE Attribute-Insert and Update with PL/SQL Records

Associative Arrays (INDEX BY Tables)-Examine INDEX BY Table Methods-Use INDEX BY Table of Records

UNIT-5 Exception Handling

Understand Exceptions-Handle Exceptions with PL/SQL-Trap Predefined Oracle Server Errors-Trap Non-Predefined Oracle Server Errors-Trap User-Defined Exceptions

Propagate Exceptions-RAISE_APPLICATION_ERROR Procedure.

Reference:

1. RDBMS with PL/SQL -Steven Feuerstein with Bill Priby

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks		
								CIA	External	Total
23120DSC54C	Cloud Computing	Elective	4	0	0	4	4	25	75	100
Course Objective										
LO1	Learning fundamental concepts and Technologies of Cloud Computing.									
LO2	Learning various cloud service types and their uses and pitfalls.									
LO3	To learn about Cloud Architecture and Application design.									
LO4	To know the various aspects of application design, benchmarking and security on the Cloud.									
LO5	To learn the various Case Studies in Cloud Computing.									
UNIT	Contents									No. of Hours
I	Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – Map Reduce – Identity and Access Management – Service Level Agreements – Billing.									12
II	Cloud Services Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service Application Services: Application Runtimes and Frameworks -									12

	<p>Queuing Services - Email Services - Notifications Services - Media Services</p> <p>Content Delivery Services: Amazon CloudFront - Windows Azure Content Delivery Network</p> <p>Analytics Services: Amazon Elastic Map Reduce - Google MapReduce Service - Google BigQuery - Windows Azure HDInsight</p> <p>Deployment and Management Services: Amazon Elastic Beanstack - Amazon CloudFormation</p> <p>Identity and Access Management Services: Amazon Identity and Access Management - Windows Azure Active Directory</p> <p>Open Source Private Cloud Software: Cloud Stack – Eucalyptus – Open Stack.</p>	
III	<p>Cloud Application Design: Introduction – Design Considerations for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradassions – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), REST ful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).</p>	12
IV	<p>Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping.</p> <p>Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data atrest, securing data in motion – Key Management – Auditing.</p>	12
V	<p>Case Studies: Cloud Computing for Healthcare – Cloud Computing</p>	12

	for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.	
	Total	60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO 1	Understand the fundamental concepts and Technologies in Cloud Computing.	PO1
CO 2	Able to understand various cloud service types and their uses and pitfalls.	PO1, PO2
CO 3	Able to understand Cloud Architecture and Application design.	PO4, PO5
CO 4	Understand the various aspects of application design, benchmarking and security in the Cloud.	PO4, PO5, PO6
CO 5	Understand various Case Studies in Cloud Computing.	PO3, PO6
Text Book		
1	ArshdeepBahga, Vijay Madiseti, <i>Cloud Computing – A Hands On Approach</i> , Universities Press (India) Pvt. Ltd., 2018	
Reference Books		
1.	Anthony T Velte, Toby J Velte, Robert Elsenpeter, <i>Cloud Computing: A Practical Approach</i> , Tata McGraw-Hill, 2013.	
2.	Barrie Sosinsky, <i>Cloud Computing Bible</i> , Wiley India Pvt. Ltd., 2013.	
3.	David Crookes, <i>Cloud Computing in Easy Steps</i> , Tata McGraw Hill, 2015.	
4.	Dr. Kumar Saurabh, <i>Cloud Computing</i> , Wiley India, Second Edition 2012.	
Web Resources		
1.	https://en.wikipedia.org/wiki/Cloud_computing	
2.	https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7	
3.	https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-CDW-Cloud-Computing-Reference-Guide.pdf	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	C	Inst.	Marks			
								CIA	External	Total	
23120SEC56 L	Database Management System lab	Core	0	0	3	3	5	25	75	100	
Learning Objectives											
LO1	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.										
LO2	To understood the concepts of data base management system, design simple Database models										
LO3	To learn and understand to write queries using SQL, PL/SQL.										
LO4	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.										
LO5	To understood the concepts of data base management system, design simple Database models										
	List of Exercises:						No. of Hours	Course Objective			
II	I. SQL 1. DDLCOMMANDS 2. DMLCOMMANDS 3. TCLCOMMANDS II. PL/SQL 4. FIBONACCI SERIES 5. FACTORIAL 6. STRING REVERSE 7. SUM OF SERIES 8. TRIGGER III. CURSOR 9. STUDENT MARK ANALYSIS USING CURSOR IV. APPLICATION							75			

	10. LIBRARY MANAGERMENT SYSTEM 11. STUDENT MARK ANALYSIS		
	Total		75
Course Outcomes		Programme Outcomes	
CO	On completion of this course, students will		
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1	
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1, PO2	
CO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	PO4, PO6	
CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5, PO6	
CO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO4	
Text Book			
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition		
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016		
Reference Books			
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", McGraw Hill International Publication, VI Edition		
2.	Shio Kumar Singh, "Database Systems", Pearson publications, II Edition		
Web Resources			
1.	Web resources from NDL Library, E-content from open-source libraries		

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	3	3	3	2
CO2	3	3	1	2	2	2
CO3	2	2	3	3	3	3
CO4	2	2	3	3	3	1
CO5	2	3	3	3	3	3
Weightage of course contributed to each PSO	12	12	13	14	14	11

S-Strong-3 M-Medium-2 L-Low-1

Discipline Specific Elective-IV

Course Code	Course Title	L	T	P	C
23120DSC55A	Disaster Management	4	0	0	4

AIM: Disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery.

Course Objectives:

1. To provide students an understanding the need for studying the disaster management
2. Develop an understanding about the various types of disasters.
3. To expose students to the risk and vulnerability analysis
4. To create awareness about disaster prevention and risk reduction
5. To establish relationship between disasters and developments.
6. To understand Rehabilitation, Reconstruction and Recovery in the event of Disaster
7. To gain knowledge on Climate Change Adaptation and IPCC Scenario and Scenarios in the context of India.

Course Outcomes:

- CO1: Understand the need and significance of studying disaster management
- CO2: Understand the different types of disasters and causes for disasters.
- CO3: Gain knowledge on the impacts Disasters on environment and society
- CO4: Study and assess vulnerability of a geographical area.
- CO5: Students will be equipped with various methods of risk reduction measures and risk mitigation.
- CO6: Understand the role of Information Technology in Disaster Management
- CO7: Understand Geographical Information System applications in Disaster Management

Content of Course
Unit I: Introduction to Disasters
<p>ChapterNo.1 Disaster: Concept, Meaning, and Definition</p> <p>ChapterNo.2 History of Major Disaster Events in India</p> <p>ChapterNo.3 Types of Disasters–Natural Disasters: Famine, Drought, Flood, Cyclone, Tsunami, Earthquake</p>
Unit II: Disaster Mitigation and Disaster Management
<p>ChapterNo.4 Man-made Disasters: Riots, Blasts, Industrial, Militancy</p> <p>ChapterNo.5 Profile, Forms and Reduction of Vulnerability</p> <p>Chapter No. 6 Disaster Mitigation: Concept and Principles</p>
Unit III: Impact of Disaster
<p>ChapterNo.7 Disaster Management: Concept and Principles</p> <p>ChapterNo.8 Pre-disaster-Prevention and Preparedness</p> <p>ChapterNo.9 Physical, Economic, Social, Psycho-socio Aspects, Environmental Impacts</p>
Unit IV: Disaster Process and Intervention
<p>ChapterNo.10 During Disaster-Rescue and Relief</p> <p>ChapterNo.11 Post-disaster-Rehabilitation and Reconstruction</p> <p>ChapterNo.12 Victims of Disaster-Children, Elderly, and Women</p> <p>ChapterNo.13 Displacement-Causes, Effects and Impact</p>
Unit V: Disaster Intervention
<p>ChapterNo.14 Major Issues and Dynamics in the Administration of Rescue, Relief, Reconstruction and Rehabilitation</p> <p>ChapterNo.15 Components of Rescue, Relief, Reconstruction; Rehabilitation</p> <p>ChapterNo.16 Disaster Policy in India; Disaster Management Authority-NDMA, SDMA, DDMA; Disaster Management Act, 2005</p>

References:

- AnilSinha(2001),DisasterManagement-LessonsDrawnandStrategiesforFuture.New Delhi, Jain Publications.
- Backer,C.W.andChapman,W.(ed.).(1969),ManandSocietyinDisasters,New Delhi,
- Clarke,J.I.,PeterCurson,et.al.(ed.)(1991),PopulationandDisaster,Oxford,Basil Blackwell

23120DSC55B	Artificial Neural Network	4	0	0	4
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Learning Objectives		
LO1	Understand the basics of artificial neural networks, learning process, single layer and multi-layer perceptron networks.	
LO2	Understand the Error Correction and various learning algorithms and tasks.	
LO3	Identify the various Single Layer Perception Learning Algorithm.	
LO4	Identify the various Multi-Layer Perception Network.	
LO5	Analyse the Deep Learning of various Neural network and its Applications.	
UNIT	Contents	No. of Hours
I	Artificial Neural Model- Activation functions- Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms- Error correction - Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem.	12
II	Introduction, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann learning, credit assignment problem, Learning with and without teacher, learning tasks, Memory and Adaptation.	12
III	.Single layer Perception: Introduction, Pattern Recognition, Linear classifier, Simple perception, Perception learning algorithm, Modified Perception learning algorithm, Adaptive linear combiner, Continuous perception, Learning in continuous perception. Limitation of Perception.	12
IV	Multi-Layer Perception Networks: Introduction, MLP with 2 hidden layers, Simple layer of a MLP, Delta learning rule of the output layer, Multilayer feed forward neural network with continuous perceptions, Generalized delta learning rule, Back propagation algorithm	12
V	Deep learning- Introduction- Neuro architectures building blocks for the DL techniques, Deep Learning and Neocognitron, Deep Convolutional Neural Networks, Recurrent Neural Networks (RNN), feature extraction, Deep Belief Networks, Restricted Boltzmann Machines, Training of DNN and Applications	12
Total		60
		Programme Outcome

23120DSC55B	Artificial Neural Network	4	0	0	4
Course Outcomes					
CO	On completion of this course, students will				
CO1	Students will learn the basics of artificial neural networks with single layer and multi-layer perception networks.	PO1			
CO2	Learn about the Error Correction and various learning algorithms and tasks.	PO1, PO2			
CO3	Learn the various Perception Learning Algorithm.	PO4, PO5			
CO4	Learn about the various Multi-Layer Perception Network.	PO4, PO5, PO6			
CO5	Understand the Deep Learning of various Neural network and its Applications.	PO3, PO5			
Text Book					
1	Neural Networks A Classroom Approach- Satish Kumar, McGraw Hill- Second Edition.				
2.	"Neural Network- A Comprehensive Foundation"- Simon Haykins, Pearson Prentice Hall, 2nd Edition, 1999.				
Reference Books					
1.	Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.				
Web Resources					
1.	https://www.w3schools.com/ai/ai_neural_networks.asp				
2.	https://en.wikipedia.org/wiki/Artificial_neural_network				
3.	https://link.springer.com/chapter/10.1007/978-3-642-21004-4_12				

23120DSC55C	CRYPTOGRAPHY	4	0	0	4
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Learning Objectives		
LO1	To understand the fundamentals of Cryptography	
LO2	To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.	
LO3	To understand the various key distribution and management schemes.	
LO4	To understand how to deploy encryption techniques to secure data in transit across data networks.	
LO5	To design security applications in the field of Information technology	
UNIT	Contents	No. Of. Hours
I	Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.	12
II	Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Mono alphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography	12
III	Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES – RSA: The RSA algorithm.	12
IV	Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. Web Security: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.	12
V	Intruders – Malicious software – Firewalls.	12
TOTAL HOURS		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Apply the different cryptographic operations of public key cryptography	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Apply the various Authentication schemes to simulate different applications.	PO1, PO2, PO3, PO4, PO5, PO6

CO5	Understand various Security practices and System security standards	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	William Stallings , “Cryptography and Network Security Principles and Practices”.	
Reference Books		
1.	Behrouz A. Foruzan , “Cryptography and Network Security”, Tata McGraw-Hill, 2007.	
2	AtulKahate , “ <i>Cryptography and Network Security</i> ”, Second Edition, 2003, TMH.	
3	M.V. Arun Kumar , “ <i>Network Security</i> ”, 2011, First Edition, USP.	
Web Resources		
1	https://www.tutorialspoint.com/cryptography/	
2	https://gpptools.tenderapp.com/kb/how-to/introduction-to-cryptography	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	3	2
CO 2	3	2	3	2	3	3
CO 3	3	3	3	2	3	3
CO 4	2	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	14	13	15	12	14	14

S-Strong-3 M-Medium-2 L-Low-1

Course Code	Course Title	L	T	P	C
231ACLSPSL	Professional Skills	-	-	-	1

Aim: Course Objectives:

The Objectives of the course are to help students/candidates:

1. Acquire career skills and fully pursue to partake in a successful career path
2. Prepare good resume, prepare for interviews and group discussions
3. Explore desired career opportunities in the employment market in consideration of an Individual SWOT.

Course Outcomes:

At the end of this course the students will be able to:

1. Prepare their resume in an appropriate template without grammatical and other errors and using proper syntax
2. Participate in a simulated interview
3. Actively participate in group discussions towards gainful employment

Unit I: Resume Skills

Resume Skills: Preparation and Presentation

- Introduction of resume and its importance
- Difference between a CV, Resume and Bio data
- Essential components of a good resume

Resume skills: common errors

- Common errors people generally make in preparing their resume
- Prepare a good resume of her/his considering all essential components

Unit II: Interview Skills

i. Interview Skills : Preparation and Presentation

- Meaning and types of interview (F2F, telephonic, video, etc.)
- Dress Code, Background Research, Do's and Don'ts
- Situation, Task, Approach and Response (STAR Approach) for facing an interview
- Interview procedure (opening, listening skills, closure, etc.)
- Important questions generally asked in a job interview (open and closed ended questions)

Interview Skills: Simulation

- Observation of exemplary interviews
- Comment critically on simulated interviews

Interview Skills: Common Errors

- Discuss the common errors generally candidates make in interview
- Demonstrate an ideal interview

Unit III: Group Discussion Skills

Meaning and methods of Group Discussion

- Procedure of Group Discussion
- Group Discussion- Simulation
- Group Discussion - Common Errors

Unit IV: Exploring Career Opportunities

Knowing yourself – personal characteristics

- Knowledge about the world of work, requirements of jobs including self-employment.
- Sources of career information
- Preparing for a career based on their potentials and availability of opportunities

SEMESTER-VI

23120AEC61	COMPUTER NETWORKS	5	1	0	4
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Course Objective		
LO1	To learn the basic concepts of Data communication and Computer network	
LO2	To learn about wireless Transmission	
LO3	To learn about networking and data link layer.	
LO4	To study about Network communication.	
LO5	To learn the concept of Transport layer	
UNIT	Contents	No. of Hours
I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	15
II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	15
III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.	15
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	15
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography	15
	Total	75
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models	PO1

CO2	To gain knowledge on Telephone systems using wireless network	PO1, PO2
CO3	To understand the concept of MAC	PO4, PO6
CO4	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	PO3, PO4
Text Book		
1	A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.	
Reference Books		
1.	B. A. Frozen, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017	
2.	F. Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008	
3.	D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, PHI, 2008.	
4.	Lamarca, "Communication Networks", Tata McGraw- Hill, 2002	
Web Resources		
1.	https://en.wikipedia.org/wiki/Computer_network	
2.	https://citationsy.com/styles/computer-networks	

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models	PO1
CO2	To gain knowledge on Telephone systems using wireless network	PO1, PO2
CO3	To understand the concept of MAC	PO4, PO6
CO4	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	PO3, PO4
Text Book		
1	A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.	
Reference Books		
1.	B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th	

	Edition, 2017
2.	F. Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008
3.	D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, PHI, 2008.
4.	Lamarca, "Communication Networks", Tata McGraw- Hill, 2002
Web Resources	
1.	https://en.wikipedia.org/wiki/Computer_network
2.	https://citationsy.com/styles/computer-networks

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	3
CO2	3	2	2	2	2	2
CO3	3	2	3	3	2	3
CO4	3	2	2	2	2	2
CO5	3	2	2	2	2	3
Weightage of course contributed to each PSO	15	11	11	12	10	13

S-Strong-3 M-Medium-2 L-Low-1

23120AEC62	Data Analytics Using R	5	1	0	4
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Course Objective		
C1	To understand the problem solving approaches	
C2	To learn the basic programming constructs in R Programming	
C3	To learn the basic programming constructs in R Programming	
C4	To use R Programming data structures - lists, tuples, and dictionaries.	
C5	To do input/output with files in R Programming.	
UNIT	Contents	No. of Hours
I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model	15
II	CONTROL STRUCTURES AND VECTORS - Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations	15
III	LISTS- Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List	15

23120AEC62		Data Analytics Using R	5	1	0	4
	Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations					
IV	FACTORS AND TABLES - Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions R PROGRAMMING .	15				
V	OBJECT-ORIENTED PROGRAMMING S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation	15				
Total		75				
Course Outcomes			Programme Outcomes			
CO	On completion of this course, students will					
1	Work with big data tools and its analysis techniques.	PO1				
2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO3				
3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO2, PO6				
4	Perform analytics on data streams.	PO4, PO5, PO6				
5	Learn NoSQL databases and management.	PO5, PO6				
Text Book						
1	Roger D. Peng,” R Programming for Data Science “, 2012					

23120AEC62	Data Analytics Using R	5	1	0	4
2	Norman Matloff,"The Art of R Programming- A Tour of Statistical Software Design", 2011				
Reference Books					
1.	1. Garrett Golemund, Hadley Wickham,"Hands-On Programming with R: Write Your Own Functions and Simulations" , 1st Edition, 2014				
2.	Venables ,W.N.,andRipley,"S programming“, Springer, 2000.				
Web Resources					
1.	https://www.simplilearn.com				

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	2	2
CO3	3	2	3	3	3	2
CO4	3	2	3	2	3	3
CO5	2	3	3	3	3	3
Weightage of course contributed to each PSO	14	13	14	14	14	13

S-Strong-3 M-Medium-2 L-Low-1

Discipline Specific Elective Courses-V

23120DSC63A	Robotics and its Applications	5	0	0	3
Learning Objectives					
LO1	To understand the robotics fundamentals				
LO2	Understand the sensors and matrix methods				
LO3	Understand the Localization: Self-localizations and mapping				
LO4	To study about the concept of Path Planning, Vision system				
LO5	To learn about the concept of robot artificial intelligence				
UNIT	Details	No. of Hours	Course Objective		
I	Introduction: Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics.	12			
II	Actuators and sensors :Types of actuators, stepper-DC-servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders tachometers-strain gauge based force torque sensor-proximity and distance measuring sensors Kinematics of robots: Representation of joints and frames, frames transformation, homogeneous matrix, D-H matrix, Forward and inverse kinematics: two link planar (RR) and spherical robot (RRP). Mobile robot Kinematics: Differential wheel mobile robot	12			
III	Localization: Self-localizations and mapping - Challenges in localizations – IR based	12			

23120DSC63A	Robotics and its Applications	5	0	0	3
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	localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.	
IV	Path Planning: Introduction, path planning-overview-road map path planning-cell decomposition path planning potential field path planning-obstacle avoidance-case studies Vision system: Robotic vision systems-image representation-object recognition-and categorization-depth measurement- image data compression-visual inspection-software considerations	12
V	Application: Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications-nuclear applications-space Applications-Industrial robots-artificial intelligence in robots-application of robots in material handling-continuous arc welding-spot welding-spray painting-assembly operation-cleaning-etc.	12
Total		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Describe the different physical forms of robot architectures.	PO1
CO2	Kinematically model simple manipulator and mobile robots.	PO1, PO2
CO3	Mathematically describe a kinematic robot system	PO4, PO6
CO4	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and	PO4, PO5, PO6

23120DSC63A	Robotics and its Applications	5	0	0	3
	uncertainty.				
CO5	Program robotics algorithms related to kinematics, control, optimization, and uncertainty.	PO3, PO8			
Text Book					
1	RichardD.Klafter. Thomas Achmielewski and MickaelNegin, Robotic Engineering and Integrated Approach, Prentice Hall India-Newdelhi-2001				
2	SaeedB.Nikku, Introduction to robotics, analysis, control and applications, Wiley-India, 2 nd edition 2011				
Reference Books					
1.	Industrial robotic technology-programming and application by M.P.Groover et.al, McGrawhill2008				
2.	Robotics technology and flexible automation by S.R.Deb, THH-2009				
Web Resources					
1.	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm				
2.	https://www.geeksforgeeks.org/robotics-introduction/				

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	L	T	P	C	Inst. Hours	Marks		
							CIA	External	Total
23120DSC63B	Virtual Reality	5	0	0	3	4	25	75	100
Learning Objectives									
LO1	To provide knowledge on basic principles of virtual & augmented reality								
LO2	To have the ability to use its technology as a platform for real-world applications.								
Unit	Contents								No. of Hours
I	Virtual Reality: The Three I's of VR – History – Early commercial VR Technology – Components of a VR System –Input Devices: Trackers – Navigation and Manipulation Interfaces – Gesture Interfaces								12
II	Output Devices: Graphics Displays – Sound Displays – Haptic Feedback - Computer Architecture for VR: The Rendering Pipeline- PC Graphics Architecture - VR Programming: Toolkits and Scene Graphs – Traditional and Emerging Applications of VR								12
III	Augmented Reality: Introduction – Augmented Reality Concepts: Working Principle of AR –Concepts related to AR- Ingredients of an Augmented Reality Experience								12
IV	Augmented Reality Hardware– Augmented Reality Software– Software to create content for AR Application – Tools and Technologies								12
V	Augmented Reality Content: Introduction- Creating Content for Visual, Audio, and other senses – Interaction in AR - Mobile Augmented Reality: Introduction – Augmented Reality Applications Areas- Collaborative Augmented Reality								12
Total Hours								60	
CO	Course Outcomes								
CO1	Outline the basic terminologies, techniques and applications of VR and AR								
CO2	Describe different architectures and principles of VR and AR systems								
CO3	Use suitable hardware and software technologies for different varieties of virtual and								

	augmented reality applications
CO4	Analyze and explain the behavior of VR and AR technology relates to human perception and cognition
CO5	Assess the importance of VR/AR content and interactions to implement for the real-world problem
Text books	
1.	Grigore C. Burdea and Philippe Coiffet, “Virtual Reality Technology”, Wiley Student Edition , Second Edition (Unit I: Chapter 1,2 & Unit II: Chapter 3,4,6,8 & 9)
2.	Alan B. Craig (2013), “Understanding Augmented Reality: Concepts and Applications”(Unit III: Chapter 1, 2, Unit IV : Chapter 3, 4 & Unit V: Chapter 5,6,8)
3.	Jon Peddie (2017), “Augmented Reality: Where We Will All Live”, Springer, Ist Edition (Unit IV: Chapter 7 (Tools & Technologies)
Reference Books	
1.	Alan Craig & William R. Sherman & Jeffrey D. Will , Morgan Kaufmann(2009), “Developing Virtual Reality Applications: Foundations of Effective Design”, Elsevier(Morgan Kaufmann Publishers)
2.	Paul Mealy (2018), “Virtual and Augmented Reality”, Wiley
3.	Bruno Arnaldi & Pascal Guitton & Guillaume Moreau (2018), “Virtual Reality and Augmented Reality: Myths and Realities”, Wiley
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://msl.cs.uiuc.edu/vr/
2.	http://www.britannica.com/technology/virtual-reality/Living-in-virtual-worlds
3.	https://mobidev.biz/blog/augmented-reality-development-guide

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L		T	P	C		Inst. Hours	Marks		
										CIA	External	Total
23120SEC64L	Data analytics using R Lab	Core	0		0	3	3		4	25	75	100
Course Objective												
C1		To understand the problem solving approaches										
C2		To learn the basic programming constructs in R Programming										
C3		To practice various computing strategies for R Programming -based solutions to real world problems										
C4		To use R Programming data structures - lists, tuples, and dictionaries.										
C5		To do input/output with files in R Programming.										
Sl. No		Contents										
1.		Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.										
2.		Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.										
3.		Write a program to find list of even numbers from 1 to n using R-Loops.										
4.		Create a function to print squares of numbers in sequence.										
5.		Write a program to join columns and rows in a data frame using cbind() and rbind() in R.										
6.		Implement different String Manipulation functions in R.										
											60	

7.		Implement different data structures in R (Vectors, Lists, Data Frames)	
8		Write a program to read a csv file and analyze the data in the file in R.	
9		Create pie chart and bar chart using R.	
10		10. Create a data set and do statistical analysis on the data using R.	
11		Program to find factorial of the given number using recursive function	
12		Write a R program to count the number of even and odd numbers from array of N numbers.	
		Total	60
	Course Outcomes		Programme Outcome
CO		On completion of this course, students will	
1		Acquire programming skills in core R Programming	PO1,PO4,PO5
2		Acquire Object-oriented programming skills in R Programming.	PO1, PO4,PO6
3		Develop the skill of designing graphical-user interfaces (GUI) in R Programming	PO1,PO3,PO6
4		Acquire R Programming skills to move into specific branches	PO3,PO4
5			PO1,PO5,PO6
	Text Book		
1		Roger D. Peng," R Programming for Data Science ", 2012	
2		Norman Matloff,"The Art of R Programming- A Tour of Statistical Software Design", 2011	
	Reference Books		
1		Garrett Golemund, Hadley Wickham,"Hands-On Programming with R: Write Your Own Functions and Simulations" , 1st Edition, 2014	
2.		Venables ,W.N.,andRipley,"S programming", Springer, 2000.	
	Web Resources		
1.		https://www.simplilearn.com	

Course Code	Course Title	L	T	P	C
231ACSIKWS	INDIAN KNOWLEDGE SYSTEM	-	-	-	2

Course Objectives:

The course design seeks to address the following issues:

- To introduce to the students the overall organization of IKS
- To develop an appreciation among the students the role and importance of Veda, Vedangas, Upanishads and Puranas.
- To show case the multi-dimensional nature of IKS and their importance in the contemporary society
- To motivate the students to take up a detailed study of some of these topics and explore their application potential

Course Outcomes:

CO1: Explain the historicity of Indian Knowledge System and the broad classification of Indian philosophical systems

CO2: Explain the potential of Sanskrit in natural language processing

CO3: Explain the features of Indian numeral system and its role in science & technology advancement

CO4: Illustrate the basic elements of the Indian calendar and the components of Indian Panchanga

CO5: Outline the science, engineering & technology heritage of ancient and medieval India

Unit I:

Introduction to Indian Knowledge System (IKS), Definition, Concept and Scope of IKS (4)

Definition, Concept and Scope of IKS

IKS based approaches on Knowledge Paradigms

IKS in ancient India and in modern India

Unit II: IKS and Indian Scholars, Indian Literature (8)

1. **Philosophy and Literature (Maharishi Vyas, Manu, Kanad, Pingala, Parasara, Banabhatta, Nagarjuna)**

and Panini)

2. Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhashkaracharya, Varahamihira and Brahmgupta)
3. Medicine and Yoga (Charak, Susruta, Maharishi Patanjali and Dhanwantri)
4. Sahitya (Vedas, Upvedas, Upavedas (Ayurveda, Dhanurveda, Gandharvaveda)
5. Puran and Upnishad) and shaddarshan (Vedanta, Nyaya, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma and Meditation)
6. Shastra (Nyaya, vyakarana, Krishi, Shilp, Vastu, Natya and Sangeet)

Unit III: Indian Traditional/tribal/ethnic communities, their livelihood and local wisdom (6)

1. Geophysical aspects, Resources and Vulnerability
2. Resource availability, utilization pattern and limitations
3. Socio-Cultural linkages with Traditional Knowledge System
4. Tangible and intangible cultural heritage.

Unit IV: Unique Traditional Practices and Applied Traditional Knowledge (8)

1. Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives
2. Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices
3. Indigenous Bio-resource Conservation, Utilization Practices and Food Preservation Methods, Handicrafts, Wood Processing and Carving, -Fiber Extraction and Costumes
4. Vaidya (traditional health care system), Tantra-Mantra, Amchi Medicine System
5. Knowledge of dyeing, chemistry of dyes, pigments and chemicals.

Unit V: Protection, preservation, conservation and Management of Indian Knowledge System (4)

1. Documentation and Preservation of IKS
2. Approaches for conservation and Management of nature and bio-resources
3. Approaches and strategies to protection and conservation of IKS



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

SCHOOL OF ARTS AND SCIENCE

2023-24

DEPARTMENT OF BIOCHEMISTRY

NEW COURSES - PG



Course Structure

MSc Biochemistry 2023 regulation

CourseCode	CourseTitle	L	T	P	C
SEMESTER I					
23215AEC11	Basics of Biochemistry	5	1	0	4
23215AEC12	Biochemical and Molecular Biology Techniques	5	1	0	4
23215AEC13	Physiology and Cell Biology	5	1	0	4
23215SEC14L	Biomolecules and Biochemical Techniques Lab	0	0	4	4
23215DSC15__	Microbiology & Immunology OR Endocrinology	5	1	0	3
23215RMC16	Research Methodology	2	-	-	2
Total		22	4	4	21
SEMESTER II					
23215AEC21	Enzymology	4	1	0	4
23215AEC22	Cellular Metabolism	4	1	0	4
23215AEC23	Clinical Biochemistry	4	1	0	4
23215SEC24L	Enzymology, Microbiology and Cell Biology Lab	0	0	4	4
23215DSC25_	Energy and drug metabolism OR NeuroBiochemistry	4	1	0	3
23215SEC26	Nutritional Biochemistry	4	0	0	3

23215BRC27	ParticipationinboundedResearch	2	0	0	2
23215SEC28	*Internship [ClinicalLaboratory]	-	-	-	2
	Total	22	3	4	26
	SEMESTERIII				
23215AEC31	IndustrialMicrobiology	5	1	0	4
23215AEC32	MolecularBiology	4	1	0	4
23215AEC33	GeneEditing, CellandGenetherapy	4	1	0	4
23215SEC34L	ClinicalBiochemistryLab	0	0	4	4
23215DSC35_	BiostatisticsandDataScience OR Immunology	4	1	0	3
23215SEC36	Molecularbasisofdiseaseandtherapeutic strategies	4	1	0	3
23215SEC37	IndustrialVisit– Biotech	-	-	-	2
	Total	21	5	4	24
	SEMESTERIV				
23215AEC41	PharmaceuticalBiochemistry	4	1	0	4
23215AEC42	BiochemicalToxicology	4	1	0	4
23215PRW43	Project and viva	0	0	10	4
23215DSC44_	Biosafety,LabSafetyandIPR or PlantBiochemistry	4	1	0	3
23215DSC45_	DevelopmentalBiology or CancerBiology	4	1	0	3
23215SEC46	IndustrialVisit–Pharmaor FoodProcessing	-	-	-	2
	Total	16	4	10	20
	TotalCredits fortheProgramme				91

DisciplinespecificElectives

Semester	DisciplinespecificElectiveCourses-I
I	a) 20215DSC15A –Microbiology&Immunology b) 20215DSC15B –Endocrinology
	DisciplinespecificElectiveCourses-II
II	a) 2015DSC25A-Energyand drugmetabolism b) 2015DSC25B- NeuroBiochemistry
	DisciplinespecificElectiveCourses-III
III	a) 2015DSC34A-BiostatisticsandDataScience b) 2015DSC34B- Immunology
VI	a) 2015DSC44A– Biosafety,LabSafetyand IPR b) 2015DSC44B–PlantBiochemistry
V	a) 2015DSC45A-DevelopmentalBiology b) 2015DSC45B-Cancer Biology

CreditDistribution:

Sem	AEC	SEC	DSC	RSB Courses	Others	Total
I	12	4	3	2	-	21
II	12	7	3	2	2	26
III	12	7	3	-	2	24
IV	8	-	6	4	2	20
Total	44	18	15	08	06	91

CourseCode	Coursename	L	T	P	C
23215AEC11	BASICSOFBIOCHEMISTRY	5	1	0	4

Pre-requisites,if any: Basic Knowledge of Biochemistry and Biomolecules

Course Objectives

The main objectives of this course are to:

1. Students will be introduced to the structure of biomolecules.
2. The significance of carbohydrates in biological processes will be understood.
3. The structure, properties and biological significance of lipids in the biological system will be studied
4. Students will learn about the concepts of protein structure and their significance in biological processes and creatively comprehend the role of membrane components with their biological significance.

Students will gain knowledge about the structures and functional roles of nucleic acids in the biological system

Course Outcomes

On successful completion of the course, the students should be able to:

CO1: Explain the chemical structure and functions of carbohydrates. (K1, K2)

CO2: Using the knowledge of lipid structure and function, explain how it plays a role in

Signaling pathways (K3, K4)

CO3: Describe the various levels of structural organisation of proteins and the role of proteins in biological system (K4, K5)

CO4: Apply the knowledge of proteins in cell-cell interactions. (K3, K4)

CO5. Applying the knowledge of nucleic acid sequencing in research and diagnosis (K2, K3, K4)

UNIT I

Carbohydrates- Classification, structure (configurations and conformations, anomeric forms), function and properties of monosaccharides, mutarotation, Disaccharides and oligosaccharides with suitable examples . Polysaccharides - Homopolysaccharides (starch, glycogen, cellulose, inulin, dextrin, agar, pectin, dextran). Heteropolysaccharides - Glycosaminoglycans– source, structure, functions of hyaluronic acid, chondroitin sulphates, heparin, keratan sulphate,. Glycoproteins - proteoglycans. O- Linked and N-linked glycoproteins. Biological significance of glycan. Blood group polysaccharides. Bacterial cell wall (peptidoglycans, teichoic acid) and plant cell wall carbohydrates.

UNIT II:

Lipids – Classification of lipids, structure, properties and functions of fatty acids, triacylglycerols, phospholipids, glycolipids, sphingolipids and steroids – Biological importance. Eicosanoids- classification, structure and functions of prostaglandins, thromboxanes, leukotrienes. Lipoproteins – Classification ,structure, transport (endogenous and exogenous Pathway) and their biological significance.

UNIT III:

Over view of Amino acids classification, structure and properties of amino acids, Biological role. Non Protein amino acids and their biological significance. Proteins–

classification based on composition, structure and functions. Primary, secondary, supersecondary (motifs) (Helix-turn –helix, helix-loop-helix, Beta-alpha-beta motif, Rosemann Rossmann fold , Greek key),tertiary and quaternary structure of proteins. Structural characteristics of collagen and hemoglobin. Determination of amino acid sequence.Chemical synthesis of a peptide, Forces involved in stabilization of protein structure. Ramachandran plot. Folding of proteins. Molecular chaperons – Hsp 70 and Hsp 90 - biological role.

UNIT IV: Membrane Proteins - Types and their significance. Cytoskeleton proteins - actin , tubulin , intermediate filaments . Biological role of cytoskeletal proteins. Membrane structure- fluid mosaic model

UNIT V: Nucleic acids – types and forms (A, B, C and Z) of DNA. Watson-Crick model- Primary, secondary and tertiary structures of DNA. Triple helix and quadruplex DNA. Mitochondrial and chloroplast DNA. DNA supercoiling (calculation of Writhe, linking and twist number). Determination of nucleic acid sequences by Maxam Gilbert and Sanger’s methods. Forces stabilizing nucleic acid structure. Properties of DNA and RNA. C-value, C-value paradox, Cot curve. Structure and role of nucleotides in cellular communications. Major and minor classes of RNA, their structure and biological functions.

Self-Study

1. Classification of Sugars
2. Nutritional classification of fatty acids

Recommended Texts

1. David L. Nelson and Michael M. Cox (2012) Lehninger Principles of Biochemistry (6th ed) W.H. Freeman.

2. Voet.D&Voet.J.G(2010) Biochemistry,(4thed),JohnWiley&Sons,Inc.
3. MetzlerD.E(2003).Thechemicalreactionsoflivingcells(2nded),AcademicPress.
4. ZubayG.L(1999)Biochemistry,(4thed),Mc Grew-Hill.
5. LubertStryer(2010)Biochemistry,(7thed),W.H.Freeman

Satyanarayan,U(2014)Biochemistry(4thed),ArunabhaSenBooks&Allied(P)Ltd,Kolkata.

Recall(K1)-Simpledefinitions, MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-MCQ,True/False,Shortessays,Concept explanations, short summary or overview.

Application(K3)- Suggestidea/conceptwith examples,Solveproblems,Observe, Explain.

Analyse(K4)–Problem-solvingquestions,Finishaprocedureinmanysteps,Differentiate between various ideas.

Evaluate(K5)-Longernessay/Evaluationessay, Critiqueorjustifywithprosandcons

Create(K6)–Checkknowledgeinspecificoroffbeatsituations. Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	L	M	S	M	M	M	S	M	M
CO 2	S	M	L	S	M	M	M	S	M	M
CO 3	S	M	M	S	S	M	L	S	M	M
CO 4	S	M	M	S	M	M	M	S	M	M
CO 5	S	S	M	S	S	M	M	S	M	M

S-Strong

M-Medium

L-Low

CourseCode	Coursename	L	T	P	C
23215AEC12	BIOCHEMICAL AND MOLECULAR BIOLOGY TECHNIQUES	5	1	0	4

Pre-requisites, if any: Comprehensive Knowledge of Tools of Biochemistry/Molecular Biology

Course Objectives Biochemical techniques combine various inter-disciplinary methods in biological research and the course aims to provide students with the following objectives:

1. To understand the various techniques used in biochemical investigation and microscopy.
2. To explain chromatographic techniques and their applications.
3. To explain electrophoretic techniques.
4. To comprehend the spectroscopic techniques and demonstrate their applications in biochemical investigations.
5. To acquire knowledge of radiolabelling techniques and centrifugation.

Course Outcomes After completion of the course, the students should be able to:

CO1. Attain good knowledge in modern used in biochemical investigation and microscopy and apply the experimental protocols to plan and carry out simple investigations in biological research. (K1, K5)

CO2. Demonstrate knowledge to implement the theoretical basis of chromatography in upcoming practical course work. (K3, K5)

CO3. Demonstrate knowledge to implement the theoretical basis of

electrophoretic techniques in research work. (K3, K5)

CO4. Tackle more advanced and specialized spectroscopic techniques that are pertinent to research. (K1, K2 & K5)

CO5. Tackle more advanced and specialized radioisotope and centrifugation techniques that are pertinent to research work. (K1, K2 & K5)

Units I

General approaches to biochemical investigation, cell culture techniques and microscopic techniques. Organ and tissue slice technique, cell distribution and homogenization techniques, cell sorting, and cell counting, tissue culture techniques. Cryopreservation, Biosensors- principle and applications. Principle, working and applications of light microscope, dark field, phase contrast and fluorescent microscope. Electron microscope- Principle, instrumentation of TEM and SEM, Specimen preparation and applications- shadow casting, negative staining and freeze fracturing.

Unit II

Chromatographic Techniques:

Basic principles of chromatography- adsorption and partition techniques. Chiral Chromatography and counter current Chromatography. Adsorption Chromatography – Hydroxy apatite chromatography and hydrophobic interaction Chromatography. Affinity chromatography. Gas liquid chromatography- principle, instrumentation, column development, detectors and applications. Low pressure column chromatography – principle, instrumentation, column packing, detection, quantitation and column efficiency, High pressure liquid chromatography- principle, instrumentation, delivery pump, sample injection unit, column packing, development, detection and application. Reverse HPLC, capillary electro chromatography and perfusion chromatography.

Unit III**Electrophoretic Techniques:**

General principles of electrophoresis, supporting medium, factors affecting electrophoresis, Isoelectric focusing-principle, ampholyte, development of pH gradient and application. PAGE-gel casting-horizontal, vertical, slab gels, sample application, detection-staining using CBB, silver, fluorescent stains. SDS PAGE-principle and application in molecular weight determination principle of disc gel electrophoresis, 2D PAGE. Electrophoresis of nucleic acids-agarose gel electrophoresis of DNA, pulsed field gel electrophoresis- principle, apparatus, application. Electrophoresis of RNA, curve. Microchip electrophoresis and 2D electrophoresis, Capillary electrophoresis.

Unit IV**Spectroscopic techniques:**

Basic laws of light absorption- principle, instrumentation and applications of UV-Visible, IR, ESR, NMR, Mass spectroscopy, Turbidimetry and Nephelometry. Luminometry (Luciferase system, chemiluminescence). X-ray diffraction. Atomic absorption spectroscopy - principle and applications - Determination of trace elements

Unit V**Radiolabeling Techniques and Centrifugation:**

Nature of radioactivity-detection and measurement of radioactivity, methods based upon ionisation (GM counter) and excitation (scintillation counter), autoradiography and applications of radioactive isotopes, Biological hazards of radiation and safety measures in handling radioactive isotopes.

Basic principles of Centrifugation. Preparative ultracentrifugation - Differential centrifugation, Density gradient centrifugation. Analytical ultracentrifugation-Molecular weight determination.

Reading List

Principles and techniques of biochemistry and molecular biology:

(Print and Online)

<https://www.kau.edu.sa/Files/0017514/Subjects/principals%20and%20techniques%20of%20biochemistry%20and%20molecular%20biology%207th%20ed%>

Self-Study

1. Types of rotors
2. Colorimetry—principle and applications

Recommended**Texts**

1. Keith Wilson, John Walker (2010) Principles and Techniques of Biochemistry and Molecular Biology (7th ed) Cambridge University Press
2. David Sheehan (2009), Physical Biochemistry: Principles and Applications (2nd ed), Wiley-Blackwell
3. David M. Freifelder (1982) Physical Biochemistry: Applications to Biochemistry and Molecular Biology, W.H. Freeman
4. Rodney F. Boyer (2012), Biochemistry Laboratory: Modern Theory and techniques, (2nd ed), Prentice Hall
5. Kaloch Rajan (2011), Analytical techniques in Biochemistry and Molecular Biology, Springer
6. Segel I.H (1976) Biochemical Calculations (2nd ed), John Wiley and Sons
7. Roby J.F. (2015) Biochemical techniques: Theory and Practice (1st ed), CBS Publishers & Distributors

Methods of assessment:

Recall (K1)—Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/Comprehend (K2)—MCQ, True/False, Short essays, Concept explanations, short summary or overview.

Application (K3)—Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse (K4)—Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas.

Evaluate (K5)—Longer essay/Evaluation essay, Critique or justify with pros and cons

Create (K6)—Check knowledge in specific or off-beat situations. Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	M	S	S	L	L	S	S	M
CO2	S	M	M	S	M	L	M	S	S	L
CO3	S	M	L	S	M	M	M	S	M	L
CO4	S	S	L	S	S	M	M	S	M	M
CO5	S	S	M	S	M	M	M	S	M	M

S-Strong MS-StrongM-Medium L-Low

CourseCode	Coursename	L	T	P	C
23215AEC13	PHYSIOLOGYANDCELLBIOLOGY	5	1	0	4

Pre-requisites,if any: Anatomy,CellsandBiologicalCompounds

Course Objectives To understand the functions and activities of organs, tissues or cells and of physical and chemical phenomena involved in the human body

Aftercompletionofthecourse,thestudentsshouldbeableto:

CO1. specifically understand the biological and chemical processes within a human cell (K1, K2, K5, K6)

Course Outcomes **CO2.** identifyandpreventdiseases(K2, K3, K4, k5,K6)

CO3. understand defects in digestion, nutritional deficiencies and intolerances, and gastrointestinal pathologies (K1, K2, K3, K4, K5, K6)

CO4. identifygeneralcharacteristicsinindividualswithimbalancesof acid-base, fluid and electrolytes.(K1 , K2 , K3 , K4, K5, K6)

CO5. processthe mechanism: the transmission of biochemical information between cell membrane and nucleus. (K1, K2, K5)

UnitI Major classes of cell junctions- anchoring, tight and gap junctions. Major familiesofcelladhesionmolecules(CAMs)-cadherins,integrins.Types

of tissues. Epithelium- organisation and types. The basement membrane. Cell cycle- mitosis and meiosis, Cell cycle-phases and regulation. Cell death mechanisms- an overview-apoptosis, necrosis.

Unit II Reproductive system- sexual differentiation and development; sperm transport, sperm capacitation, semen analyses and Acrosome reaction. Clinical relevance of female reproductive physiology- menstrual cycle, pregnancy and menopause. Fertilisation and infertility issues.

Unit III Digestive system- structure and functions of different components of digestive system, digestion and absorption of carbohydrates, lipids and proteins, role of bile salts in digestion and absorption, mechanism of HCl formation in stomach, role of various enzymes and hormones involved in digestive system. Composition of blood, lymph and CSF. Blood cells - WBC, RBC and energy metabolism of RBC, Blood clotting mechanism and blood groups- ABO and Rhesus system.

Unit IV Respiratory system-Gaseous transport and acid-base homeostasis. Mechanism of the movement of O₂ and CO₂ through lungs, arterial and venous circulation. Bohr effect, oxygen and carbon dioxide binding haemoglobin. pH maintenance by cellular and intracellular proteins. Phosphate and bicarbonate buffers, Metabolic acidosis and alkalosis. Respiratory acidosis and alkalosis. Regulation of fluid and electrolyte balance.

Unit V Sensory transduction, Nerve impulse transmission- nerve cells, synapses, reflex arc structure, resting membrane potential, Nernst equation, action potential, voltage gated ion-channels, impulse transmission, neurotransmission, neurotransmitter receptors, synaptosomes, synaptotagmin, rod and cone cells in the retina, changes in the visual cycle, photochemical reaction and regulation of rhodopsin, odour receptors, learning and memory. Chemistry of muscle contraction- actin and myosin filaments, theories involved in muscle contraction, mechanism

of muscle contraction, energy sources for muscle contraction.

VI

Hormones – Classification, Biosynthesis, circulation in blood, modification and degradation. Mechanism of hormone action, Target cell concept. Hormones of Hypothalamus, pituitary, Pancreatic, thyroid & parathyroid, adrenal and gonadal hormones. Synthesis, secretion, physiological actions and feedback regulation of synthesis.

Reading (Print and online)

List <https://www.genome.gov/genetics-glossary/Cell-Cycle>
<https://my.clevelandclinic.org/health/diseases/16083-infertility-causes>
<https://www.webmd.com/heartburn-gerd/reflux-disease>
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5760509/>
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3249628/>

Self-Study

1. Variation in cell differentiation and progression
2. Lesch-Nyhan syndrome, orotic aciduria and GERD

Recommended Texts

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments (6th ed). John Wiley & Sons. Inc.
2. Bruce Alberts and Dennis Bray (2013), Essential Cell Biology, (4th ed), Garland Science.
3. De Robertis, E.D.P. and De Robertis, E.M.F. (2010). Cell and Molecular Biology. (8th ed). Lippincott Williams and Wilkins, Philadelphia.
4. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. (5th ed). Sunderland, Mass. Sinauer Associates, Inc.
5. Wayne M. Baker (2008) the World of the Cell. (7th ed). Pearson Benjamin Cummings Publishing, San Francisco. Cell Biology
6. John E. Hall (2010). Guyton and Hall Textbook of Medical Physiology (12th ed), Saunders
7. Harrison's Endocrinology by J. Larry Jameson Series: Harrison's Specialty, 19th Edition Publisher: McGraw-Hill, Year: 2016.

Methods of assessment:

Recall(K1)-Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application(K3)-Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse(K4)-Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas.

Evaluate(K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create(K6)-Check knowledge in specific or offbeat situations. Discussion

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	S	S	S	M
CO2	S	S	S	S	S	L	S	S	S	M
CO3	S	S	S	S	S	M	M	S	S	M
CO4	S	S	S	S	S	M	M	S	S	M
CO5	M	S	L	S	S	L	M	M	L	L

S-Strong

M-Medium

L-Low

CourseCode	Coursename	L	T	P	C
23215SEC14L	BiomoleculesandBiochemicalTechniquesLab	0	0	4	4

Pre-requisites Knowledge on basic principles, Instrumentation of Biochemical techniquesandmetabolicreactions

- Course Objectives**
1. To instill skill in students enabling them to apprehend the wider knowledge about principles and techniques to be employed for the biomolecules under investigation.
 2. To inculcate the knowledge of various isolation and purification techniques of macromolecules like DNA, RNA, Glycogen and Starch,
 3. To perform colorimetric estimations to quantify important metaboliteslike lactateandtryptophanandmineralslikecalciumand iron from various sources.
 4. To achieve training in subcellular fractionation and to identify them by markers.
 5. To achieve training in various chromatographic techniques.
 6. To perform the isolation and identification of the organelles of a cell using differential centrifugation.
 7. To perform phytochemical screening and quantification enabling them to give an insight on phytochemicals this will be useful for future research.

Course Outcomes On successful completion of this course, students should be able to:

After completion of the course, the students should be able to:

CO1. The student will be able to acquire knowledge and skill in the techniques used in the isolation, purification and estimation of different biomolecules that are widely employed in research (K1, K2, K4)

CO2. The students will get acquainted with Principle, Instrumentation and method of Performing UV absorption studies of DNA, Protein and interpreting the alteration occurred during the process of denaturation (K1, K2, K3, K4).

CO3.The student will be fine-tune in handling the instruments like colorimeter, spectrophotometer and will be able to estimate the biomolecules and minerals from the given samples (K1,K2,K4,)

CO4. The student, in addition to acquiring skill in performing various biochemical techniques can also learn to detect presence of phytochemicals and quantify them in the plant sample. (K1,K2,K3,K4 & K6)

CO5.The students will develop skill in analytical techniques like subcellular fractionation, Paper, Column and Thin layer Chromatography and the group experiments will enable them to build learning skills like team work, Problem solving, Communication ability. (K1, K2,K3,K4 & K6)

Units I

Biochemical studies and estimation of macromolecules

1. Isolation and estimation of glycogen from liver.
2. Isolation and estimation of DNA from animal tissue.
3. Isolation and estimation of RNA from yeast.
4. Purification of Polysaccharides – Starch and assessment of its purity

Units II

UV absorption

1. Denaturation of DNA and absorption studies at 260nm.
2. Denaturation of Protein and absorption studies at 280nm.

Units III

Colorimetric estimations

1. Estimation of Pyruvate
2. Estimation of tryptophan.

Units IV

Estimation of minerals

1. Estimation of calcium
2. Estimation of iron

Units V

Plant Biochemistry

1. Qualitative analysis Phytochemical screening
2. Estimation of Flavonoids-Quantitative analysis

Units VI

Group Experiments

1. Fractionation of sub-cellular organelles by differential centrifugation-Mitochondria and nucleus
2. Identification of these separated sub-cellular fractions using marker enzymes (any one)
3. Separation and identification of lipids by thin layer chromatography..
4. Separation of plant pigments from leaves by column chromatography
5. Identification of Sugars by Paper Chromatography
6. Identification of Amino acids by Paper Chromatography

Reading List**(Print and Online)**

1. https://www.researchgate.net/publication/313745155_Practical_Biochemistry_A_Student_Companion
2. <https://doi.org/10.1186/s13020-018-0177-x>
3. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5368116/>
4. <https://www.life.illinois.edu/biochem/455/Lab%20exercises/2Photometry/spectrophotometry.pdf>
5. <https://ijpsr.com/bft-article/determination-of-total-flavonoid-and-phenol-content-in-mimusops-elengi-linn/?view=fulltext>
6. <https://skyfox.co/wp-content/uploads/2020/12/Practical-Manual-of-Biochemistry.pdf>

Self-Study

1. Laboratory Safety Rules, Requirements and Regulations.
2. Preparation of standard solutions and reagent

Books Recommended

1. David Plummer (2001) An Introduction to Practical Biochemistry (3rd ed) McGraw Hill Education (India) Private Ltd
2. Jayaraman, J (2011), Laboratory Manual in Biochemistry, New age publishers
3. Varley H (2006) Practical Clinical Biochemistry (6th ed), CBS Publishers

4. O. Debiyi and F. A. Sofowora, (1978)“Phytochemical screening of medical plants,” Iloyidia, vol. 3, pp. 234–246,
5. Prof.SarinA.Chavhan,Prof.SushilkumarA.Shinde(2019)A Guide to Chromatography TechniquesEdition:1
6. AnalyticaltechniquesinBiochemistryandMolecularBiology; Katoch, Rajan. Springer (2011)

Methods of assessment:

Recall(K1)-Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application(K3)-Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse(K4)-Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas

Evaluate(K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create(K6)-Check knowledge in specific or off-beat situations, Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	S	L	S	M	S
CO2	S	S	S	S	M	S	L	S	M	S
CO3	S	S	S	S	M	S	M	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S-Strong M-Medium L-Low

CourseCode	Coursename	L	T	P	C
23215DSC15A	MICROBIOLOGY & IMMUNOLOGY	5	1	0	3

Pre-requisites, any: if The student should possess basic knowledge about microorganisms, types and their general characteristics. The students are also expected to possess basic understanding about the process of infection, immunological defence and pathological outcomes, if any.

Course Objectives

1. To appreciate the classification of microorganisms based on their structure, size and shape with an insight into the ancient scriptures about microbes.
2. To understand the role of microorganisms in environment and also to learn the culture conditions.
3. To recognize the possible contamination of foods by microorganisms, to learn about counteracting preservative measures and to know about probiotic nature of microorganisms.
4. To gain knowledge on pathogenic mediation by microorganisms and preventive measures as well.
5. To comprehend the features of antimicrobial agents, their mechanism of action along with the side effects and also to explore natural remedial measures against microbes.
6. To be able to exploit the various features of microorganisms for the beneficial industrial production.

Course Outcomes After completion of the course, the student should be able to:

CO1. To classify (by both ancient and modern modes) different types of microorganisms and explain life cycle of the microbes (K1, K2 & K5)

CO2. To recognize the microorganisms involved in decay of foods and will be able to apply various counteracting measures. The students also will be able to relate the role of certain beneficial microbes in day-to-day's food consumption. (K1, K2 & K4)

CO3. To understand the common pathogenic bacterial and fungi that cause toxic effects and also will be able to employ curative measures. (K1 & K2)

CO4. To analyse various features of wide variety of antimicrobial agents along with their mode of action, in addition, being able to apprehend the valuable potentials of traditional and easily available herbs. (K2, K5 & K6)

CO5. To apply knowledge gained in production of industrially important products as both pharmaceutical and nutraceutical. (K2, K4 & K5)

Units I

Taxonomical classification - bacteria, viruses (DNA, RNA), algae, fungi and protozoa. Distribution and role of microorganisms in soil, water and air. Charaka's classification of microbes, lytic cycle and lysogeny. Types of culture media, isolation of pure culture, growth curve and the measurement of microbial growth.

Units II

Contamination and spoilage of foods – cereals, cereal products, fruits, vegetables, meat, fish, poultry, eggs, milk and milk products. General principles of traditional and modern methods of food preservation - Removal or inactivation of microorganisms, boiling, steaming, curing, pasteurization, cold processing, freeze drying, irradiation, vacuum packing, control of oxygen and enzymes. Microbes involved in preparation of fermented foods - cheese, yoghurt, curd, pickles, rice pancake, appam, ragi porridge (கேழ்வரசு கூழ்) and bread.

Units III

Food poisoning- bacterial food poisoning, *Salmonella*, *Clostridium botulinum* (botulism), *Staphylococcus aureus*, fungal food poisoning – aflatoxin, food infection – *Clostridium*, *Staphylococcus* and *Salmonella*. Pathogenic microorganisms, *E. coli*, *Pseudomonas*, *Klebsilla*, *Streptococcus*, *Haemophilus*, & *Mycobacterium*, causes, control, prevention, cure and safety. Food microbiological screening- Real time PCR, ELISA, Aerobic and anaerobic Plate Count, dye reduction method, anaerobic lactic acid bacteria, anaerobic spore formers, Hazard analysis critical control point (HACCP)

UnitsIV

Antimicrobial chemotherapy, General characteristics of antimicrobial agents. Mechanism of action – sulfonamides, sulphones and PAS. Penicillin, streptomycin- spectra of activity, mode of administration, mode of action, adverse effects and sensitivity test., Antiviral and antiretroviral agents, Antiviral RNA interference, natural intervention (Natural immunomodulators routinely used in Indian medical philosophy).

UnitsV

Immune system- definition and properties. Cells of the immune system – neutrophils, eosinophils, basophils, mast cells, monocytes, macrophages, dendritic cells, natural killer cells, and lymphocytes (B cells and T cells). Lymphoid organs- Primary and Secondary; structure and functions. Antigens and Complement System: definition, properties- antigenicity and immunogenicity, antigenic determinants and haptens. Antigen - antibody interactions - molecular mechanism of binding. Affinity, avidity, valency, cross reactivity and multivalent binding. Immunoglobulins & Immune Response: Structure, classes and distribution of antibodies. Antibody diversity. Immune system in health & disease, Transplantation immunology- graft rejection and HLA antigens. Immunological techniques, Flow cytometry and its application.

Reading List (Print and Online)

<https://www.ijam.co.in/index.php/ijam/article/view/1326> (Krumi
(Microorganisms) in Ayurveda- a critical review)

Virtual Lectures in Microbiology and Immunology, University of Rochester

<https://www.frontiersin.org/articles/10.3389/fphar.2020.578970/full#h9>
<https://www.frontiersin.org/articles/10.3389/fmicb.2018.02151/full>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7559905/>

Self-Study

1. Microbial infections and gut microbiome with relevance to *tridoshas*
2. Microbial population and pH variations in different dairy products.

1. Michael J. Pelczar Jr. (2001) *Microbiology (5th ed)*, McGraw Hill Education
(India) Private Limited

Recommended

Texts

2. Frazier WC, Westhoff DC, Vanitha NM (2010) Food Microbiology (5th ed), McGraw Hill Education (India) Private Limited
3. Willey J and Sherwood L (2011) , Prescott's Microbiology (8th ed) McGraw Hill Education (India)
4. Ananthanarayanan , Paniker and Arti Kapil (2013) Textbook of Microbiology (9th ed) Orient BlackSwan
5. Judy Owen, Jenni Punt Kuby (2013), Immunology (Kindt, Kuby Immunology) (7th ed) W. H. Freeman & Co
6. Brooks GF and Carroll KC (2013) Jawetz Melnick & Adelbergs Medical Microbiology, (26th ed) McGraw Hill Education
7. Greenwood D (2012), Medical Microbiology, Elsevier Health

Methods of assessment:

Recall (K1)- Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/Comprehend (K2) -MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3)- Suggest idea/concept with examples, Observe, Explain.

Analyse (K4)- Finish procedure in stepwise manner, Differentiation between various ideas, Map knowledge

Evaluate (K5)- Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create (K6)- Check knowledge in specific or offbeat situations, Discussion, Debating, Presentation

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	S	S	S	S	M	S	S	S
CO2	S	S	S	S	S	M	L	M	S	S
CO3	S	M	M	S	M	M	M	M	L	M
CO4	S	M	M	M	M	M	M	S	S	S
CO5	S	L	S	S	M	L	L	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215DSC15B	Endocrinology	5	1	0	3

Aim:

To have a basic understanding of the endocrine system

Course Objective:

The specific objectives of the program are to train the fellow to:

- History and physical examination with emphasis on examination of the thyroid, breasts, penis, testes and female reproductive organs. •
- Selection and interpretation of endocrine biochemical tests. •

Course Outcomes:

- CO1 Apply the knowledge from this course while working in medical laboratory to diagnose different hormone disorders •
- CO2 Explain recent laboratory methods in diagnosis hormone disorders •
- CO3 Knowledge and Understanding the synthesis of different endocrine gland hormones •
- CO4 Ability to analyze and solve problems related to hormone tests •
- CO5 To know the pathophysiology significance of the system with special reference to humans •
- CO6- Understand the synthesis of various hormones by respective gland •

UNIT: I

Hormones in general -definition – types of secretions – nature – classification synthesis and their role – Feed back control with specific examples Hormones action Proteins and Steroids – Cell Signaling in hormone action.

UNIT: II

Hypothalamo hypophysial axis - Hormones of hypothalamus and their role Structure of pituitary - Secretions - Physiology role -Pathophysiology Current status of pituitary as a master gland.

UNIT: III

Thyroid - Parathyroid - structure -hormones – synthesis – storage – releases- carrier proteins (eg. TBA and TBG) – Physiology role – Pathophysiology

UNIT: IV

Adrenal and Gonadal Hormones – Steroid biosynthesis – maintenance of cyclicity. Physiological role – Pathophysiology – Steroids in metabolism

UNIT: V

Gastro intestinal hormones – pancreas as an endocrine organ – secretions- functions – physiological role and pathophysiology other endocrine organs in vertebrate Insect and crustacean hormones – their role in growth and metamorphosis.

REFERENCE:

1. Text Book of endocrinology – Williams
2. Physiological review of Biochemistry – Harper and others
3. Endocrinology – Turner
4. Invertebrate reproduction – KKNayar

CourseCode	CourseTitle	L	T	P	C
20215RMC26	ResearchMethodology	3	0	0	2

AIM:

To create a basic appreciation towards research process and awareness of various research publication

COURSE OBJECTIVES:

- To understand the steps in research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-bases
- To give exposure to MATLAB platform for effective computational and graphic works required for quality research

COURSE OUTCOME:

- CO1 Understanding research questions and tools
- CO2 Experience in scientific writings
- CO3 Practice in various aspects of scientific publications
- CO4 Inculcation of research ethics

UNIT I:

Selection of problem-stages in the execution of research: choosing a topic to publication- preparation of manuscript-report writing- format of journals – proof reading – sources of information: Journals, reviews, books, monographs, etc, Bibliography. Journal ; standard of research journals – Impact factor.

UNIT II:

Measures of dispersion: Universe and population – delimiting population – sampling method – random sampling, stratified random sampling – types of variables: qualitative and quantitative variables – continuous and discontinuous variables – scaling method S- mean – standard deviation – standard error – coefficient of variation.

UNIT III:

Comparison of means, chi-square test, student test (ANOVA – partitioning of variation). F test – model sums on one way ANOVA with interpretation of data – introduction to MANOVA – Statistical and their use – significance test and fixing levels of significance – use of statistical software like COSTAT and STATISTICA. Brief introduction to pie and histograms. Use of LCD.

UNIT IV:

Chromatography – principle, operative technique and applications of paper, TLC, adsorption chromatography, GLC and HPLC. Ion-Exchange, molecular sieve, Electrophoretic techniques – principle and technique of gel, SDS, high voltage and discontinuous electrophoresis, Isoelectric focusing, pulsed field gel electrophoresis and capillary electrophoresis. Spectrometry – Centrifugation techniques.

UNIT V:

X-Rays – X-Ray diffraction, crystals and detectors, quantitative analysis and applications. Radio chemical methods – Basic concepts, counting methods and applications. Autoradiography, detection and measurement of radioactivity, applications of radioisotopes in biology.

REFERENCES:

1. An introduction to practical biochemistry by David T. Plummer.
2. Laboratory Manual in Biochemistry by Pattabiraman and Acharya
3. Practical Biochemistry by J. Jayaraman.
4. Analytical Biochemistry, D. J. Home and Hazel Peck, Longman group, 3rd edition, 1998.
5. Physical Biochemistry – Application of Biochemistry and Molecular Biology, David Friefelder, W.H Freeman and Co, 2nd Edition 1999.
6. Experimental Biochemistry, Robert Switzer and Liam Garrity, W.H. Freeman and Co, 3rd 1999.
7. Davis, G. and C. A. Parker, 1997. Writing the doctoral dissertation, Barrons Education series, 2nd edition, Pp 160, ISBN: 081208005
8. Duneary, P. 2003. Authoring a Ph.D thesis: how to plan, draft, write and finish a doctoral dissertation. Plagrave Macmillan, Pp 256. ISBN 1403905843

SEMESTER II

CourseCode	CourseTitle	L	T	P	C
23215AEC21	Enzymology	4	1	0	4

Pre-requisites

Basic knowledge about catalysis, kinetics and chemical reaction mechanisms.

Course Objectives

1. Students will be introduced to the theory and practice of enzymology.
2. Mechanisms of catalysis and factors affecting catalysis will be understood.
3. The kinetics of enzyme catalyzed reactions in the absence and presence of inhibitors will be studied and the options for applying enzymes and their inhibitors in medicine will be analyzed.
4. Students will learn about the applications of enzymes in research, medicine, and industry, which will prepare them for careers in industrial and biomedical research.
5. The control of metabolic pathways and cellular responses through enzyme regulation will be emphasized.

Course Outcomes

On successful completion of this course, students should be able to:

CO1: Describe the catalytic mechanisms employed by enzymes (K1, K2 & K5)

CO2: Choose and use the appropriate methods to isolate and purify enzymes and check the purity of the enzyme. (K1, K2, K3, K4 & K5)

CO3: Analyze enzyme kinetic data graphically, calculate kinetic parameters, determine the mechanism of inhibition by a drug/chemical and analyze options for applying enzymes and their inhibitors in

medicine(K1,K2,K3&K4)

CO4: Explain allosterism and cooperativity and differentiate Michaelis-Menten kinetics from sigmoidal kinetics. The role played by enzymes in the regulation of vital cellular processes will be appreciated.(K1, K2 ,K5, K6)

CO5: Highlight the use of enzymes in industries and biomedicine (K1,K2 & K3)

Units I

Introduction to enzymes and features of catalysis: A short history of the discovery of enzymes and how they became powerful biochemical tools. Holoenzyme, apoenzyme, cofactors, coenzyme, prosthetic groups, Classification and Nomenclature, Specificity of enzyme action-group specificity, absolute specificity, substrate specificity, stereochemical specificity. Active site, Identification of amino acids at the active site-trapping of ES complex, identification using chemical modification of amino acid side chains and by site-directed mutagenesis.

Mechanisms of enzyme catalysis: acid-base catalysis, covalent catalysis, electrostatic catalysis, metal ion catalysis, proximity and orientation effects, Low barrier H-bonds, Structural flexibility Mechanism of action of chymotrypsin

Units II

Enzyme techniques: Isolation and purification of enzymes -Importance of enzyme purification, methods of purification- choice of source , extraction, fractionation methods-based on size or mass (centrifugation, gel filtration); based on polarity (ion-exchange chromatography, electrophoresis, isoelectric focusing, hydrophobic interaction chromatography); based on solubility(change in pH, change in ionic strength); based on specific binding sites (affinity chromatography), choice of methods, Criteria of purity of enzymes.

Enzyme units - Katal, IU. Measurement of enzyme activity - discontinuous, continuous, coupled assays; stopped flow method and its applications. Isoenzymes and their separation by electrophoresis with special reference to LDH

Units III

Enzyme kinetics I: Thermodynamics of enzyme action, Activation energy, transition-state theory, steady-state kinetics & pre-steady-state kinetics. Single substrate enzyme catalyzed reactions - assumptions, Michaelis-Menten and Briggs-Haldane kinetics, derivation of Michaelis-Menten equation. Double reciprocal (Lineweaver-Burk) and single reciprocal (Eadie-Hofstee) linear plots, their advantages and limitations. Analysis of kinetic data- determination of K_m , V_{max} , k_{cat} , and their physiological significance, Importance of k_{cat}/K_m . Enzyme inhibition: Irreversible inhibition. Reversible inhibition-Competitive, uncompetitive, noncompetitive, mixed and substrate inhibition. Michaelis-Menten equation in the presence of competitive, uncompetitive and non-competitive inhibitors. Graphical analysis - Diagnostic plots for the determination of inhibition type. Therapeutic use of enzyme inhibitors- Aspirin, statins (irreversible inhibitors), Methotrexate (competitive inhibitor), Etoposide (non-competitive inhibitor), camptothecin (uncompetitive inhibitor).

Demonstration: Using Microsoft Excel to Plot and Analyze Kinetic Data

Units IV

Enzyme kinetics II: Allosteric enzymes: Cooperativity, MWC and KNF models of allosteric enzymes, Sigmoidal kinetics taking ATCase as an example. Regulation of amount and catalytic activity by - extracellular signal, transcription, stability of mRNA, rate of translation and degradation, compartmentation, pH, temperature, substrate concentration, allosteric effectors, covalent modification. Regulation of glycogen synthase and glycogen phosphorylase. Feedback inhibition-sequential, concerted, cumulative, enzyme-multiplicity with examples.

Bi - Substrate reactions: Single Displacement reactions (SDR) (Ordered and Random bi bi mechanisms), Double Displacement reactions (DDR) (Ping pong mechanism), Examples, Cleland's representation of bisubstrate reactions, Graphical analysis (diagnostic plots) to differentiate SDR from DDR.

Units V

Enzyme technology: Immobilization of enzymes – methods -Reversible immobilization (Adsorption, Affinity binding), Irreversible immobilization (Covalent coupling, Entrapment and Microencapsulation, Crosslinking, Advantages and Disadvantages of each method, Properties of immobilized enzymes,. Designer enzymes-ribozymes and deoxyribozymes, abzymes, synzymes. Enzymes as therapeutic agents-therapeutic use of asparaginase and streptokinase. Application of enzymes in industry-Industrial application of rennin, lipases, lactases, invertase, pectinases, papain.

Reading List

(Print and Online)

Enzymes | MIT OpenCourseWare | Free Online Course Materials

<https://ocw.mit.edu/high-school/biology/exam-prep/chemistry-of-life/enzymes/>

Enzymology

https://onlinecourses.swayam2.ac.in/cec20_bt20/preview

<https://mooc.es/course/enzymology/>

The active site of enzymes

<https://dth.ac.in/medical/courses/biochemistry/block-1/1/index.php>

Enzymes and Enzyme Kinetics

<https://www.lecturio.com/medical-courses/enzymes-and-enzyme-kinetics.course#/>

Mechanistic enzymology in drug discovery: a fresh perspective

<https://www.nature.com/articles/nrd.2017.219>

Enzyme Biosensors for Biomedical Applications: Strategies for Safeguarding Analytical Performances in Biological Fluids

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4934206/>

Self-Study

1. Mechanistic enzymology in drug discovery
2. Enzyme Biosensors for Biomedical Applications

**Recommended
Texts**

1. Enzymes: Biochemistry, Biotechnology and Clinical chemistry, 2nd edition, 2007, Palmer T and Bonner P; Affiliated-East West press private Ltd, New Delhi
2. Fundamentals of Enzymology, 3rd edition, 2003, Price NC and Stevens L; Oxford University Press, New York
3. Voet's Biochemistry, Adapted ed, 2011, Voet, D and Voet JG; Wiley, India
4. Lehninger Principles of Biochemistry, 8th edition, 2011, Nelson DL and Cox MM; WH Freeman & Co, New York
5. Biochemistry, Berg JM, Stryer L, Gatto, G, 8th ed, 2015; WH Freeman & Co., New York.
6. Enzyme Kinetics and Mechanism; Cook PF, Cleland W.; 2007; Garland Science, London

Methods of assessment:

Recall (K1)- Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3)- Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse (K4)- Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas

Evaluate (K5)- Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create (K6)- Check knowledge in specific or off-beat situations, Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	M	S	L	S	S	M
CO2	S	S	S	S	M	M	L	S	S	S
CO3	S	S	S	S	M	M	M	S	S	S
CO4	S	S	S	S	M	M	M	S	S	S
CO5	S	S	S	S	M	L	M	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215AEC22	CELLULARMETABOLISM	4	1	0	4

Pre-requisites Basic knowledge on biochemical reactions such as addition, deletion, rearrangement, transfer and breaking of bonds

- Course Objectives**
1. Familiarize on blood glucose homeostasis
 2. Provide an insight into the metabolic path way of glycogen, glycoprotein, mucopolysaccharide and peptidoglycan with clinical correlation wherever required
 3. Inculcate knowledge on nucleotide metabolism and disorders associated with it
 4. Provide a platform to understand the versatile role of PLP in amino acid degradation, formation of specialized products and disorders associated with ammonia detoxification
 5. Educate on heme and sulphur metabolism with associated clinical manifestation

Course Outcomes **On successful completion of this course, students should be able to:**

After completion of the course, the students should be able to:

CO1. Appreciate the modes of synthesis and degradation of glucose and will be able to justify the pros and cons of maintain the blood sugar level (**K1, K2, K5**)

CO2. Gain knowledge on polysaccharide metabolism and glycogen storage disease (**K1, K2, K5**)

CO3. Acquaint with the making and breaking of nucleotides (**K1, K2, K4**)

CO4. Differentiate the diverse reaction a particular amino acid can

experience(**K1,K2,K3**)

CO5.Correlate the disturbance of metabolic reactions to clinical manifestations with reference to heme and sulphur metabolism (**K1, K2, K4, K5**)

UnitsI

Glycolysis – aerobic and anaerobic, inhibitors, and regulation. Feeder pathway- entry of hexoses into glycolysis, Galactosemia, fructosuria, Pyruvate dehydrogenase complex-mechanism and regulation. Glyoxalate cycle and its regulation. Gluconeogenesis- source, key enzymes, reaction sequence and its regulation. Blood glucose homeostasis and the role of hormones. Pentose phosphate pathway-significance and its regulation. Metabolism of glycogen and its regulation. Biosynthesis of N-linked and O-linked glycoproteins, mucopolysaccharides, Chondroitin sulphate.

UnitsII

Oxidation of fatty acids-oxidation of saturated and unsaturated fatty acids (α , β & ω oxidation) Oxidation of fatty acids with odd and even numbered carbonatoms. Regulationof β oxidation. Ketogenesisand its regulation. Biosynthesis of fatty acid–saturated and unsaturated, chain elongation, regulation. Biosynthesis of prostaglandins, thromboxanes and leukotrienes and hydroxyl eicosanoic acids. Biosynthesis and degradationoftriacylglycerol,phosphoglycero lipids-lecithin,cephalin, plasmalogens and phosphatidyl inositol, Sphingolipid-sphingomyelin, cerebroside, sulfatides, and gangliosides. Cholesterolbiosynthesis and itsregulation.Lipoproteinmetabolism-chylomicrons,VLDL,HDLand LDL.

UnitsIII

Metabolismofnucleotides- *De novo* synthesis and salvage pathways of purine and pyrimidine nucleotides. Regulation and inhibitors of nucleotidebiosynthesis.Roleofribonucleotidereductaseandits regulation.Degradationofpurineandpyrimidine nucleotides.

Units IV Biosynthesis of non-essential amino acids.- Role and biological significance of glutamate dehydrogenase, glutamine and asparagine synthetase, lysine, proline and phenylalanine hydroxylase. Interconversion of amino acids - proline to glutamate, methionine to cysteine, serine to glycine. Biosynthesis of spermine and spermidine. Degradation of amino acids –glucogenic and ketogenic amino acids. Formation of acetate from leucine and aromatic amino acid, pyruvate from cysteine, threonine and hydroxy proline, α -keto glutarate from histidine and proline, succinate from methionine, threonine, valine and isoleucine, Oxaloacetate from aspartate, glycine and serine.

Units V Biosynthesis and degradation of heme. Jaundice-classification, pathology and Differential diagnosis Oxidation and reduction of inorganic sulphur compounds by microbes and plants. Sulpho transferases and their biological role-rhodanases, sulphatases, 3-mercapto pyruvate sulphur transferases. Mucopolysaccharidoses - Hunter syndrome, Sanfilippo syndrome and Maroteaux-Lamy syndrome. Oxidation of cysteine to sulphate and interconversion of sulphur compounds.

1. <https://www.embopress.org/doi/full/10.1038/msb.2013.19>
2. <https://people.wou.edu/~guralnl/450Glycogen%20metabolism.pdf>
3. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3243375/>
4. https://www.researchgate.net/publication/334458898_Urea_Cycle
5. https://www.researchgate.net/publication/51233381_Heme_biosynthesis_and_its_regulation_Towards_understanding_and_improvement_of_heme_biosynthesis_in_filamentous_fungi
6. https://www.researchgate.net/publication/349746691_Microbial_Sulfur_Metabolism_and_Environmental_Implications

**Reading List
(Print and Online)**

Self-study

1. Cori's Cycle and Glucose-Alanine Cycle
2. Coenzymes involved in Methanogenesis

Books Recommended

1. David L. Nelson and Michael M. Cox (2012) Lehninger Principles of Biochemistry (6th ed), W.H. Freeman

2. Voet.DandVoet. J.G(2010)Biochemistry, (4thed),JohnWiley& Sons, Inc.
3. Metzler D.E (2003). The chemical reactions of living cells (2nd ed), Academic Press.
4. ZubayG.L(1999)Biochemistry,(4thed),McGrew-Hill.
5. Textbook of Biochemistry with Clinical Correlations, 7th Edition,Thomas M. Devlin (Editor), Wiley
6. HumanBiochemistry–JamesM.Orten&Otto.W.Neuhan-10th edn-The C.V.Mosby Company

Methodsofassessment:

Recall(K1)-Simpledefinitions, MCQ, Recallsteps,Conceptdefinitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe, Explain.

Analyse(K4)-Problem-solvingquestions,Finishaprocedureinmanysteps,Differentiatebetween various ideas

Evaluate(K5)-Longer essay/Evaluationessay,Critiqueorjustifywithprosand cons.

Create(K6)-Checkknowledgeinspecificoroffbeatsituations, Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	S	S	S	M
CO2	S	M	S	S	S	M	S	S	S	M
CO3	S	M	S	S	S	M	S	S	S	S
CO4	S	M	S	M	S	M	S	S	S	M
CO5	S	M	S	S	S	M	S	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215AEC23	CLINICALBIOCHEMISTRY	4	1	0	4

Pre-requisites,if any: The students should have a basic knowledge of body fluids and their composition and metabolism; anatomy and physiology of vital organs.

Course Objectives

1. To understand the need and methods of various biological sample collection.
2. To explicitly understand the etiopathogenesis, symptoms and complications of metabolic and hormonal disorders and the relevant diagnostic markers
3. To emphasize the diagnostic significance of serum enzymes in different pathologies and other Laboratory investigations of diagnostic importance so as to differentiate normal from disease
4. To conceive the role of inherited genes in inborn errors of metabolism and methodologies pertaining to *in utero* diagnosis and post-natal screening.
5. To get updated about electrolyte and hormonal imbalances and the biochemical tests to diagnose them.

Course Outcomes CO1. To appreciate the biological significance of sample collection and awareness of the diagnostic/screening tests to detect common non-communicable diseases so as to understand role of laboratory investigations for biochemical parameters and understand the disorders associated with blood cells

CO2.To understand the etiology of metabolic diseases like diabetes and atherosclerosis and avoid such lifestyle disorders by healthy eating and correlate the symptoms with underlying pathology based on diagnostic and prognostic markers.

CO3.To understand the diagnostic application of serum/plasma enzymes to correlate their levels with the organ pathologies associated with specific diseases.

CO4. To appreciate the role of pre and post-natal diagnosis leading to healthy progeny.

CO5.To link the serum hormone levels and clinical symptoms with underlying hormonal disturbances. To review the onward transmission of signal via downstream signaling molecules from cell surface to the nucleus by different pathways by comparing and contrasting them and critically evaluate the network between them resulting in the biological outcome.

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Unit I

Biochemical investigations in diagnosis, prognosis, monitoring, screening:

Specimen collection – blood, (primary/Secondary specimen), urine and CSF.

Preservation of biological specimens -blood, urine, CSF and amniotic fluid. ; .

Biological reference ranges;

Disorders of blood cells: Hemolytic, iron deficiency and aplastic anemia and

diagnosis, sickle cell anaemia, thalassemia HBA1C variants. Porphyrias,

Thrombocytopenia, Causes of leucopenia, leukemia and leucocytosis.

Disorders of blood clotting mechanism - Von willebrand's disease, Hemophilia A, B and C, diagnostic test for clotting disorders, D-dimer and its clinical significance

- Unit II** **Diabetes mellitus: pathology and complications:** Acute changes; Chronic complications: Diabetic nephropathy, neuropathy, retinopathy and Diabetic foot ulcers, Random/Fasting/PP glucose testing, Impaired glucose tolerance (IGT), Impaired fasting glucose (IFT), Diagnosis-by GTT, Pre-diabetes, Gestational DM, Glycosylated Haemoglobin (HbA1c) ; Glycated albumin., Hypoglycaemia and critical alert value for glucose. Markers of complications of Diabetes mellitus: Metabolic syndrome, Lipid profile & lipoproteinemia, Atherosclerosis, Diabetic nephropathy, Microalbuminuria, eGFR.
- Point of care testing for glucose (Glucometers) and continuous glucose monitoring (CGM): principle and its use. Major groups of anti-diabetic drugs.
- Diet and lifestyle modifications
- Unit III** **Diagnostic Enzymology:** Clinically Important Enzymes and Isoenzyme as diagnostic markers: Clinical significance of AST, ALT, ALP, ACP, CK, γ -GT, amylase, pseudocholinesterase and their pattern in .Myocardial infarction; Liver disease, Bone disease, Muscle disease, Cancer (tumor markers), GI tract pancreatitis); Enzymes as therapeutic agents.
- Pre- and post-natal testing:** Amniocentesis, prenatal detection of inborn errors of metabolism in developing fetus- Autosomal recessive mode of inheritance- cystic fibrosis, X linked recessive inheritance- Duchenne muscular dystrophy. Newborn screening (NBS) for inborn errors of metabolism, Tandem mass spectrometry application in NBS.

Unit IV

Liver function tests: Liver function test panel, Fatty liver . Plasma protein changes in liver diseases. Hepatitis A ,B and C. Cirrhosis and fibrosis. Portal hypertension and hepatic coma. Acute phase proteins -CRP, Haptoglobins, α -fetoprotein, ferritin and transferrin and their clinical significance, Interpreting serum protein electrophoresis. Inflammatory markers (cytokines such as TNF- α , IL6 and others)

Unit V

Renal function tests - tests for glomerular and tubular function - Acute and chronic renal failure - Glomerulonephritis, Nephrotic syndrome, uraemia - urinary calculi - Nephrocalcinosis and Nephrolithiasis - causes, pathology and symptoms. Chronic kidney disease. Dialysis - Hemodialysis and peritoneal dialysis.

Electrolyte disorder: calcium: hypercalcemia and hypocalcemia; Calcium homeostasis in Blood; phosphate: hyperphosphatemia or hypophosphatemia; Clinical significance: Potassium: hyperkalemia and hypokalemia, Sodium: hypernatremia and hyponatremia; Chloride:

hyperchloremia, hypochloremia **Hormonal disorders and diagnostics:** T3, T4 and TSH in the diagnosis of

thyroid disorders; Diagnostic methods for disorders associated with adrenal, pituitary and sex hormones - Addison's disease, Cushing's syndrome, pituitary tumour, Hypopituitarism, Hypogonadism

Reading List (Print and Online)

1. Utility of HIL in Clinical Chemistry:

<https://www.aacc.org/science-and-research/clinical-chemistry-trainee-council/trainee-council-in-english/pearls-of-laboratory-medicine/2018/utility-of-hil-in-clinical-chemistry>

2. Pre, Post and Analytical Errors in Clinical Chemistry Laboratory

DOI: 10.7860/NJLM/2016/22587:2173

<https://doi.org/10.2147/JMDH.S286679>

3. Standards of Medical Care in Diabetes—2022 Abridged for Primary Care

Providers [https://diabetesjournals.org/clinical/article/40/1/10/139035/Standards-of-](https://diabetesjournals.org/clinical/article/40/1/10/139035/Standards-of-Medical-Care-in-Diabetes-2022)

Medical-Care-in-Diabetes-2022

<https://doi.org/10.2337/diaspect.16.1.32>

<http://www.ngsp.org/>

4. Quality control in clinical laboratory

https://www.researchgate.net/publication/335830829_Quality_Control_in_a_Clinical_Laboratory

<https://labpedia.net/quality-control-of-the-clinical-laboratory/>

<https://journals.sagepub.com/doi/full/10.1016/j.jala.2008.12.001>

<https://doi.org/10.1016/B978-0-12-407821-5.00004-8>

<https://www.westgard.com/cli.htm>

<https://www.labroots.com/webinar/bio-rad-unity-solution-molecular-quality-control-data-management>

Self-Study

1. Potential sources of variability in the estimation of the analytes:

Pre-analytical phase: acceptance rejection criteria in terms of haemolysis/icteric/lipemia (HIL) interferences

Analytical phase: Linearity, detection limits precision, accuracy, specificity, sensitivity; Total Allowable Error. (Definitions and examples).

Post-analytical phase: Units of reporting of clinical chemistry parameters-

2. Interpretation of results in clinical chemistry based on laboratory investigations and quality control:

- critical/ alert values
- American Diabetes Association (ADA) Standards of Medical Care in Diabetes (yearly update); HbA1C testing :NGSP
- Case studies to review
- Quality control for clinical chemistry in laboratory

Recommended Texts

1. Thomas M. Devlin (2014) Textbook of Biochemistry with Clinical Correlations (7th ed). John Wiley & Sons
2. Montgomery R, Conway TW, Spector AA (1996), Biochemistry: A Case-Oriented Approach (6th ed), Mosby Publishers, USA.
3. Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics

(2018) (8th ed),Saunders

4. Dinesh Puri, (2020) Text book of Biochemistry: A clinically oriented approach – 4th Edition, Elsevier.
5. M.N.Chatterjee and Rana Shinde (2012).Textbook of Medical Biochemistry (8th ed), Jaypee Brothers Medical Publishers.
6. Clinical Case Discussion In Biochemistry A Book On Early Clinical Exposure (ECE),PoonamAgrawal, 2021, CBS Publishers & distributors pvt. Ltd

Methods of assessment:

Recall(K1)-Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/Comprehend(K2)-MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application(K3)-Suggest ideas/concept with examples, Observe, Explain.

Analyse(K4)-Finish procedure in stepwise manner, Differentiation between various ideas, Map knowledge

Evaluate(K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create(K6)-Check knowledge in specific or offbeat situations, Discussion, Debating, Presentation

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	S	M	M	S
CO2	S	M	S	M	S	S	S	M	M	M
CO3	S	S	S	S	S	M	S	S	M	M
CO4	S	M	M	M	S	M	S	S	S	M

CO5	S	M	S	M	S	S	S	S	S	S
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S-Strong **M-Medium** **L-Low**

CourseCode	CourseTitle	L	T	P	C
23215SEC24L	Enzymology, Microbiology and Cell Biology Lab	0	0	4	4

Pre-requisites Knowledge on basic principles, Instrumentation of Biochemical techniques and metabolic reactions

- Course Objectives**
1. To inculcate skill in students enabling them to apprehend the wider knowledge about principles and techniques to be employed for the assay of enzymes under investigation.
 2. To inculcate the knowledge of isolation and purification techniques of enzymes using alkaline phosphatase as an example
 3. To perform experiments to study the factors affecting enzyme activity
 4. To achieve training in assay of enzymes
 5. To achieve training in basic microbiological techniques – preparation of culture, sterilization and staining methods.
 6. To perform the blood grouping test and to prepare blood smear to study different types of blood cells
 7. To learn molecular biology techniques like Gel electrophoresis and Blotting techniques
 8. To introduce industrial visits so that students may be aware of actual need of the industry and various opportunities available

Course Outcomes **On successful completion of this course, students should be able to:**

After completion of the course, the students should be able to:

CO1. The student will be able to employ the relevant techniques for isolation and purification of enzymes and gain skill in kinetic studies which is essential for research activity (K1, K2, K4)

CO2. Student will acquire ability in performing enzyme assay, and explicate the methods that form the basis of enzyme characterization. (K1, K2, K4)

CO3. Learn the basic concepts in microbiology and cell biology which will be helpful for interdisciplinary research work. (K1, K3, K4)

CO4. Students will be trained in separation techniques used in molecular biology which will be supportive in their future research (K1, K3, K4 & K6)

CO5. Industrial visits will provide the students with an opportunity to learn practically through interaction, working methods and employment practices. Students will have an exposure to industrial standard and current work practices (K1, K2, K3, K4 & K6)

Units I

Enzymology Alkaline

Phosphatase

- a. Isolation of Alkaline Phosphatase from goat kidney.
- b. Purification of alkaline phosphatase
- c. Checking the purity using SDS-PAGE
- d. Determination of optimum pH and temperature of alkaline phosphatase.
- e. Determination of specific activity and K_m of alkaline phosphatase.
- f. Effect of activators and inhibitors on the activity of alkaline phosphatase.

Assay of enzymes

- a. Salivary Amylase
- b. Acid Phosphatase

Units II

Microbiology

- a. Safety measures and Good Laboratory Practices in microbiology laboratory
- b. Sterilization, Culture and inoculum preparation
- c. Staining of bacteria – Gram Staining

Units III

Physiology & Cell Biology

- a. Test for blood grouping (Haemagglutination).
- b. Peripheral Blood smear – Staining and Interpretation

Units IV

Group Experiments

- a. Separation of proteins based on molecular weight by SDS PAGE
- b. Agarose gel electrophoresis of genomic DNA

Units V

Industrial visit can be organised to students through Academia – Industry collaborative Program

Reading List

(Print and Online)

1. https://www.researchgate.net/publication/337146254_Kinetic_studies_with_alkaline_phosphatase
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4846332/>
3. <https://www.ijsr.net/archive/v3i8/MDIwMTU0MDk=.pdf>
4. https://www.researchgate.net/publication/349318898_ABC_of_Peripheral_smear
5. <https://ncdc.gov.in/WriteReadData/1892s/File608.pdf>
6. <https://www.ncbi.nlm.nih.gov/books/NBK562156/>

Self-Study

1. Preparation of Buffers and pH measurement
2. Michaelis-Menten equation and Lineweaver-Burk plot

Books Recommended

1. David Plummer (2001) An Introduction to Practical Biochemistry (3rd ed) McGraw Hill Education (India) Private Ltd
2. Jayaraman, J (2011), Laboratory Manual in Biochemistry, New age publishers
3. Fundamentals of Enzymology; 3rd Edn. Nicholas C. Price and Lewis

Stevens, Oxford University Press (2012).

4. Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis; Robert A. Copeland, Wiley-VCH Publishers (2000).
5. Cappuccino JG & Sherman N (2005). Microbiology - A Laboratory Manual, Pearson Education Inc
6. Practical Enzymology, Second Revised Edition: Hans Bisswanger, Wiley – Blackwell; 2 edition (2011)

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3) - Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas

Evaluate (K5) - Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create (K6) - Check knowledge in specific or off-beat situations, Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	S	L	S	M	S
CO2	S	S	S	S	M	S	L	S	M	S
CO3	S	S	S	S	M	S	M	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215DSC25A	Energyanddrugmetabolism	4	1	0	3

Pre-requisites Basicknowledgeonbiochemicalreactionssuchasaddition,deletion, rearrangement,transfer andbreakingofbonds

- Course Objectives**
1. Familiarize on concepts of enthalpy, entropy, free energy, redox system, biological oxidation and high energy compounds
 2. Provide an insight into the relationship between electron flow and phosphorylation
 3. Inculcate knowledge on processes involved in converting light energy to chemical energy and associated food production by autotrophs
 4. Provide a platform to understand the versatile role of Krebs cycle, transport of NADH across mitochondrial membrane and energetics
 5. Educate on the various phases xenobiotic metabolism

Course Outcomes **On successful completion of this course, students should be able to:**

After completion of the course, the student should be able to:

CO1. Appreciate the relationship between free energy and redox potential and will be able to justify the role of biological oxidation and energy rich compounds in maintaining the energy level of the system **(K1,K2,K3,K4)**

CO2. Gain knowledge on role of mitochondria in the production of energy currency of the cell **(K1, K2, K5, K6)**

CO3. Acquaint with the process of photosynthesis **(K1,K2,K5)**

CO4. Comprehend on the diverse role of TCA cycle and the energy obtained on complete oxidation of glucose and fatty acid

(K1,K2,K4,K5)

CO5.Correlate the avenues available to metabolize the xenobiotics **(K1, K2,K4,K5)**

- Units I** Thermodynamic- principles in biology- Concept of entropy, enthalpy and free energy change. Redox systems. Redox potential and calculation of free energy. Biological oxidation – Oxidases, dehydrogenases, hydroperoxidases, oxygenases. Energy rich compounds – phosphorylated and non-phosphorylated. High energy linkages.
- Units II** Electron transport chain-various complexes of ETC, Q-cycle. Inhibitors of ETC. Oxidative phosphorylation-P/O ratio, chemiosmotic theory. Mechanism of ATP synthesis - role of F₀-F₁ ATPase, ATP-ADP cycle. Inhibitors of oxidative phosphorylation ionophores, protonophores. Regulation of oxidative phosphorylation
- Units III** Light reaction-Hills reaction, absorption of light, photochemical event. Photo ETC-cyclic and non-cyclic electron flow. Photophosphorylation-role of CF₀-CF₁ ATPase. Dark reaction- Calvin cycle, control of C₃ pathway, and Hatch-Slack pathway (C₄ pathway), Photorespiration. Synthesis and degradation of starch
- Units IV** Interconversion of major food stuffs. Energy sources of brain, muscle, liver, kidney and adipose tissue. Amphibolic nature of Citric acid cycle. Anaplerotic reaction. Krebs cycle, Inhibitors and regulation of TCA cycle. Transport of extra mitochondrial NADH – Glycerophosphate shuttle, malate aspartate shuttle. Energetics of metabolic pathways – glycolysis, (aerobic and anaerobic), citric acid cycle, beta oxidation
- Units V** Activation of sulphate ions – PAPS, APS, SAM and their biological role. Metabolism of xenobiotics – Phase I reactions – hydroxylation, oxidation and reduction. Phase II reactions – glucuronidation, sulphation, glutathione conjugation, acetylation and methylation. Mode of action and factors affecting the activities of xenobiotic enzymes.

1. <https://chemed.chem.purdue.edu/genchem/topicreview/bp/ch21/gibbs.php>

2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7767752/#:~:text=The%20mitochondrial%20electron%20transport%20chain,cellular%20ATP%20through%20oxidative%20phosphorylation.>

3. https://www.researchgate.net/figure/Oxidative-phosphorylation-in-mitochondrial-electron-transport-chain-ETC-and-proton_fig1_230798915

Reading List (Print and Online)

4. <https://www.lyndhurstschools.net/userfiles/84/Classes/851/photosynthesis%20light%20&%20dark%20reactions%20ppt.pdf?id=560837>

5. <https://bajan.files.wordpress.com/2010/05/amphibolic-nature-of-krebs-cycle.pdf>

6. <https://www.sciencedirect.com/topics/medicine-and-dentistry/xenobiotic-metabolism#:~:text=Xenobiotic%20metabolism%20can%20be%20defined,more%20readily%20excreted%20hydrophilic%20metabolites>

Self-Study

1. Calculation of K_{eq} and ΔG

2. Interrelationship of carbohydrate, protein, and fat metabolism-role of acetyl CoA

Recommended Texts

1. David L. Nelson and Michael M. Cox (2012) Lehninger Principles of Biochemistry (6th ed), W.H. Freeman

2. Robert K. Murray, Darryl K. Granner, Peter A. Mayes, and Victor W. Rodwell (2012), Harper's Illustrated Biochemistry, (29th ed), McGraw-Hill Medical

3. Metzler D.E (2003). The chemical reactions of living cells (2nd ed), Academic Press.

4. Zubay G.L (1999) Biochemistry, (4th ed), McGraw-Hill.

5. Devlin R.M (1983) Plant Physiology (4th ed), PWS publishers

6. Taiz L,

Zeiger E (2010), Plant Physiology (5th ed), Sinauer Associates, Inc

Methods of assessment:

Recall(K1)-Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3) - Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse(K4)-Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas

Evaluate(K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create(K6)-Check knowledge in specific or offbeat situations, Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	M	S	M	S	M	S	S	S	L
CO5	S	M	S	S	S	M	S	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215DSC25B	NeuroBiochemistry	4	1	0	3

Aim:

The course aims to provide students with a basic understanding of:

- the principles and major mechanisms of metabolic control and of molecular signalling by hormones;•
- the control of cell proliferation•

Course Objective:

By the end of the course, students should be able to:

- demonstrate knowledge and understanding of the molecular machinery of living cells;•
- demonstrate knowledge and understanding of the principles that govern the structures of macromolecules and their participation in molecular recognition;•
- use basic laboratory skills and apparatus to obtain reproducible data from biochemical experiments.•

Course outcomes:

- CO1 To understand various neurological system•
- CO2 Recognize the need for, and engage in life-long learning in neurological system•
- CO3 To understand various Exocytosis of neurotransmitter•
- CO4 To be able to understand DNA microarrays, Methodology, types and applications•
- CO5 To acquire knowledge related to LEARNING AND MEMORY•
- CO6 Gain knowledge of contemporary issues•
- CO7 to understand biochemistry of vision and muscle contraction•

UNIT I: NERVOUS SYSTEM

Structure and function of the brain. Central Nervous System, Peripheral and Autonomic Nervous system. Cells of Nervous System – Neurons, Astrocytes, Glial cells, Oligodendrocytes and Schwann cells. Chemical composition of brain – utilization and uptake of glucose and amino acids, Blood – Brain barrier.

UNITII: NEUROTRANSMISSION

Membrane potentials, Resting potential – Depolarization, repolarization and hyperpolarization, Action potential. Mechanism of axonal neurotransmission. Membrane channels – Types of channels, ion gated, voltage gated, chemically gated, mechanically gated and responsive to intracellular messengers. DISEASES OF NERVOUS SYSTEM Molecular basis of Parkinson's disease, Alzheimer's disease, Schizophrenia, Myasthenia gravis and Multiple sclerosis.

UNITIII:NEUROTRANSMITTERS

Synthesis, storage, release, uptake, degradation and action of neurotransmitters. Acetylcholine, GABA, Serotonin, Dopamine, Glutamate, Aspartate, Nitrous oxide, etc. Neuropeptides. Synaptic transmission – Cholinergic receptors – Nicotinic and Muscarinic receptors, Agonists and Antagonists – their mode of action and effects. Adrenergic receptors, serpentine receptors and intracellular signaling. Fast and slow receptors. Exocytosis of neurotransmitter – Role of synapsins, synaptogamins, SNAP, SNARE and other proteins in docking, exocytosis and recycling of vesicles.

UNITIV: LEARNING AND MEMORY

Mechanism of short term memory and Long Term Potentiation. NMDA and AMPA glutamate receptors. Retrograde messengers in synaptic transmission. Role of CAM kinase II, Calcium, protein kinases, cAMP, NO, Calpain and other proteins in memory and learning process. Synaptic plasticity INTERACTION OF DRUGS WITH CNS Mechanism of action of anesthetics, analgesics, hallucinogens, depressants, stimulants and toxins on the nervous system. Addiction and drugs of abuse.

UNITV: BIOCHEMISTRY OF VISION AND MUSCLE CONTRACTION:

Rod and cone cells, visual cycle, mechanism and regulation of vision, color vision. Thick and thin filaments, interaction of actin and myosin muscle contraction, role of calcium and regulation of muscle contraction. Smooth muscle contraction and its regulation

REFERENCE

1. Neurochemistry by Ferdinand Hucho, VCH Publication, 1986
2. Molecular Cell Biology, by Lodish, Baltimore, et al W.H. Freeman & Co. 1996
3. Basic Neurochemistry by M.P. Spiegel

CourseCode	CourseTitle	L	T	P	C
23215SEC26	NutritionalBiochemistry	4	0	0	3

Pre-requisites, if any: **BASICKNOWLEDGEONFOOD, NUTRITION& DIETETICS, AND METABOLISM OF NUTRIENTS.**

Course Objectives

1. To understand basic concepts involved in growth , health, nutrition, physiology and metabolism
2. To discuss the conceptsand applications of nutrition in correlation with biochemistry
3. Todefinenutritionalneeds inhealthyindividualsand modificationof diet during illness.

Course Outcomes After completionofthecourse,thestudentsshouldbeableto:

- CO1.** Planabalanceddiet basedonanindividual'senergy requirement, Assess nutritional status of an individual(K3, K4, K5)
- CO2.** Describethebiochemical,physiologicalandnutritionalfunctions of macronutrients and their integrated role.Understand the role played by antinutritional factors(k! to K6)
- CO3.** Evaluate the functions of vitamins and minerals ,and fluids and electrolyte balance in different physiological states and in sports persons(K1 to K6)
- CO4.** Identify nutritional deficiency conditions , its prevention and dietary management((K3,K4)
- CO5.** Acquire knowledge about the importance of balanced diet and diet therapy (k5,K6)

UnitsI

Basic concepts - Nutrition - Food groups and balanced diet.
NovelFoods.Calorificvalueoffoods:Directandindirectcalorimetry.

Empty calories. Basal metabolic rate: Factors affecting BMR. SDA and physical activity. Calculation of day's energy requirement. Assessment of nutritional status. Lactose intolerance. Nutritional requirement and biochemical changes in different physiological states -infancy, childhood, pregnancy, lactation, and ageing. Sports nutrition.

Units II

Elements of nutrition - Plant and animal sources of simple and complex carbohydrates, fats and proteins and their requirement. Biological significance, deficiency and toxicity of macronutrients and micronutrients. Role of dietary fibre. Protein sparing action of carbohydrates and fats. Essential amino acids. Essential fatty acids. Effects of naturally occurring food toxins, preservatives, additives, alcohol and tobacco on health.

Units III

Vitamins and Minerals- Dietary sources, classification, biochemical functions, requirements, absorption, metabolism and excretion. Vitamin B complex as coenzyme. Nutritional significance of dietary calcium, phosphorus, magnesium, iron, iodine, zinc and copper.

Units IV

Malnutrition - Diseases arising due to Protein - Calorie Malnutrition and undernutrition (Kwashiorkor and Marasmus), Prevention of malnutrition. Deficiency diseases associated with vitamin B complex, vitamin C and A, D, E & K vitamins - Mineral deficiency diseases - aetiology, sign and symptoms and dietary supplementation. Enrichment and fortification (vitamins and minerals)

Units V

Nutrition in diseases - Aetiology, signs and symptoms, treatment and dietary management during fever (Typhoid and Malaria) and infectious diseases (COVID-19), Jaundice, hyperacidity (Ulcer), Atherosclerosis, Hypertension, kidney diseases and diabetes in adults. Starvation and Obesity. Inter-relationship of nutrition, infection,

immunityand poverty

**ReadingList(Print
and Online)**

1. <https://www.jmedscindmc.com/article.asp?issn=1011-4564;year=2014;volume=34;issue=5;spage=211;epage=213;aulast=Shrivastava>
2. https://www.researchgate.net/figure/Relationship-between-malnutrition-infection-and-immunity-Malnutrition-is-considered-the_fig1_280722727
3. https://en.wikipedia.org/wiki/Novel_food
4. <https://www.chemicalsafetyfacts.org/preservatives/>
5. <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/food-enrichment>

Self-Study

1. Antabusedrugsandfood
2. Selection of foodsandmarketvisit,readingandunderstandingthe food labels

RecommendedTexts

1. Srilakshmi.E.(2016)NutritionScience,NewAgeInternational Publishers.
2. Mahan,KathleenL.(2004)Krause'sFood,NutritionandDietTherapy, W.B.Saunders's 11th Edition
3. AndreasM.Papas(1998).AntioxidantStatus,Diet,Nutrition,and Health (1st ed) CRC Press.
4. M.Swaminathan(1995)PrinciplesofNutritionandDietetics. Bappco
5. MargaretMcWilliams(2012).FoodFundamentals(10thed) Prentice Hall
6. TomBrody(1998)NutritionalBiochemistry(2nded).Academic Press,USA

Methodsofassessment:

Recall(K1)-Simpledefinitions, MCQ,Recallsteps, Conceptdefinitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3) - Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse(K4)–Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas.

Evaluate(K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons

Create(K6)–Check knowledge in specific or off-beat situations. Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	M	M
CO2	S	S	S	S	S	S	S	S	M	M
CO3	S	S	S	S	S	S	S	S	M	M
CO4	S	S	S	S	S	S	S	S	M	L
CO5	S	S	S	S	S	S	S	S	M	M

S-Strong M-Medium L-Low

SEMESTER III

CourseCode	CourseTitle	L	T	P	C
23215AEC31	IndustrialMicrobiology	5	1	0	4

Pre-requisites, if any: Basic Knowledge of Microbiology and microbial techniques

Course Objectives To gain knowledge of the structure, classification and use of microorganisms in various industries.

To know various fermenter designs, culture systems and the application of fermentation process in industry.

To understand the production and purification of fermented products and their industrial applications.

Understand the basic concepts of food and agricultural microbiology.

Course Outcomes CO1. Students will be able to understand the structure and classification of microorganisms (K2 , K4)

CO2. Gain knowledge of the uses of microorganisms in various industrial applications (K3 , K4)

CO3. Understand the concepts of fermentation process, harvest and recovery. (K1 , K5)

CO4. Students will know the types of microbial fermentation processes and their applications in pharmaceutical industry. (K2 , K3)

CO5. Students will learn about the use of microorganisms in beverages, dairy and food industries. (K3 , K6)

Units I Structure of bacteria, fungi and viruses and their classification. Types and characteristics of microorganisms used in Industry (a) Food Industry (b) Chemical Industry (c) Pharmaceutical Industry

Units II Fundamentals and principles of microbial fermentation techniques – application in industry and pharmaceutical Biochemistry. Fermentation – types, techniques, design and operation of fermenters including addition of

	medium. Types and characteristics of microorganisms, environmental conditions required for the growth and metabolism of industrially and pharmaceutically important microbes. Sterilization methods in fermentation techniques, air, gas, culture medium sterilization. Steam-filtration and chemicals. Types and constituents of fermentative culture medium and conditions of fermentations, Antifoaming devices.
Units III	Recovery and estimation of products of fermentation- Production of ethanol, acetic acid, glycerol, acetone, butanol and citric acid by fermentation. Production of Enzymes- amylase, protease, lipase, Production of pharmaceuticals by fermentation- penicillin, streptomycin, tetracycline, riboflavin, vitamin B12. Beverages- wine, beer and malt beverages.
Units IV	Food Microbiology: Production of dairy products- bread, cheese and yoghurt (preparation and their types). Food borne diseases- Bacterial and Non- Bacterial. Food preservation - Principles- Physical methods: temperature (low, high, canning, drying), irradiation, hydrostatic pressure, high voltage pulse, microwave processing and aseptic packaging, Chemical methods - salt, sugar, organic acids, SO ₂ , nitrite and nitrates, ethylene oxide, antibiotics and bacteriocins.
Units V	Agricultural Microbiology: General Properties of soil, microorganisms in soil – decomposition of organic matter in soil. Biogeochemical cycles, nitrogen fixation, Production of bio fertilizers and its field applications – Rhizobium, azotobacter, blue green algae, mycorrhizae, azospirillum, Production of biofuels (biogas- methane), soil inoculants.
Self-Study	Micro-organisms in food processing and pharma industries Upstream and Downstream processes in Biopharma
Reading List (Print and Online)	Industrial biotechnology: https://nptel.ac.in/courses/102/105/102105058/ Bioreactors: https://nptel.ac.in/courses/102/106/102106053/ Food Microbiology: https://nptel.ac.in/courses/126/103/126103017/ Agriculture Microbiology:

CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	M	S	S	M	S	S	M	M	M
CO3	S	M	L	S	M	M	S	S	M	S
CO4	M	S	S	S	L	M	S	M	S	M
CO5	S	S	M	S	S	M	M	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215AEC32	MolecularBiology	4	1	0	4

Pre-requisites, if Knowledgeofthebasicsofgenetics,cellbiologyandmolecular biology.

any:

Course

Objectives

1. To introduce the students to the process of inheritance, concepts of genes, genome, chromatin and chromosomes.
2. To impart a thorough understanding of the key events of molecular biology, including the mechanismsofDNAreplication, transcription and translation along with DNA repair mechanisms.
3. To provide a detailed understanding of post transcriptional and posttranslationalmodifications and processing of eukaryotic RNA and proteins
4. To give a detailed explanation of transcriptional regulation with lac operon and tryptophan operon as examples
5. To impart adequate information of the types of regulatory RNAs along with key concepts of gene silencing

Course Outcomes

Aftercompletionofthecourse,thestudentsshouldbeableto:

CO1: Comprehend the organization of genomes, the molecular basis of DNA replication, recombination and transposition, the significance of these processes, the various ways in which the DNA can be damaged leadingtomutationsand lesionsandthedifferentways inwhichtheyare repaired.(K1,K2,K3,K5)

CO2: Gain knowledge about how genes are transcribed and translated in prokaryotes and eukaryotes and how these processes are regulated, recognize the nature of the genetic code and the various experimental approaches used to crack the code (K1,K2,K3,K4,K5)

CO3: AcquireknowledgeofthemolecularbasisofRNAprocessingand

RNA splicing and the various human pathologies that can result from defects of RNA modification. (K1,K2,K4,K5)

CO4: Comprehend the techniques of gene silencing and its applications.(K1,K2,K3,K4,K5,K6)

CO5:Apply the knowledge they have gained in understanding the above vital life processes to enhancing their analytical and problem- solving skills and develop an interest to pursue high quality research. (K2,K3,K4,K5,K6)

UnitsI

Mendel's laws of inheritance-dominance-complete, incomplete and co-dominance, multiple alleles-gene mapping in haploids and diploids, recombination mapping- restriction mapping- modes of gene information transfer in bacterial- conjugation, transformation and transduction. The bacterial chromosome, the eukaryotic genome- chromosome structure – Histones, Nucleosome, chromatin- heterochromatin, euchromatin, chromatinremodeling, DNAase hypersensitive sites, genome organization – the C-value paradox, reassociation kinetics, repetitive sequences, gene amplification,telomeres,pseudogenes,splitgenes,organellegenomes– mitochondrialandchloroplastgenome.

UnitsII

DNA replication and repair: Enzymes of replication, prokaryotic replication mechanisms, primosome & replisomes, eukaryotic DNA replication, the role of topoisomerases and telomerase, regulation of replication, difference between prokaryotic and eukaryotic replication. Mutations -Types of mutations, mechanisms of mutations, mutagenic agents. DNA repair mechanisms – Direct repair, excision repair, mismatch repair, recombination repair, SOS response, eukaryotic repair systems.Recombinationandmobilegenetic elements-theHolliday model,the generalrecombinationin*E.coli*,sitespecificrecombination,

transposons and retrotransposons.

Units III

Transcription—Prokaryotic transcription-subunits of RNA polymerase, *E. coli* promoters, sigma factor and promoter recognition, alternative sigma factors, initiation, elongation, Rho-dependent and independent termination of transcription. Eukaryotic transcription- Initiation, promoter elements, RNA polymerases, transcription factors, regulatory sequences in eukaryotic protein – coding genes, CpG islands, enhancers.

Translation – organization of the ribosome, the genetic code, evidence for a triplet code, deciphering the genetic code, wobble hypothesis, deviation in the genetic code, unusual codons. activation, initiation, elongation and termination of translation in *E. coli*. The role of tRNA and rRNA, suppressor tRNAs and inhibitors of protein synthesis., Comparison of prokaryotic translation with eukaryotic translation.

Units IV

Regulation of gene expression in prokaryotes—Positive and negative control, the lac operon, identification of operator and regulator sequences by mutations, induction and repression, Foot-printing and gel-shift assays for identification of protein-DNA interactions. Catabolite repression. *Trp* operon – Attenuation, alternative secondary structures of *trp* mRNA. Regulation of gene expression in eukaryotes- Response elements, DNA-binding motifs, steroid receptors, association of methylation and histone acetylation with gene expression.

Units V

Post transcriptional modifications in eukaryotes- RNA processing- mRNA 5' capping and 3' poly-adenylation, introns and exons, RNA splicing,- spliceosome assembly, alternative splicing, processing of tRNA and rRNA, self-splicing, ribozymes, RNA editing- substitution and insertion/deletion editing, Genome editing-CRISPR- Cas technology Posttranslational modification of proteins- Proteolytic cleavage, covalent modifications, glycosylation of proteins, disulfide bond formation, Protein sorting—signal peptides, transport of secretory proteins, Golgi and post-golgi sorting, coated vesicles, targeting of mitochondrial,

lysosomal and nuclear proteins, Protein degradation-Ubiquitination of proteins, Protein folding-chaperones

Reading List (Print and Online) 1. Molecular Biology Free Online Course by MIT Part 3: RNA
Uploaded by edX

2. <https://mooc.es/course/molecular-biology/>
3. https://onlinecourses.swayam2.ac.in/cec20_ma13/preview
4. <https://learn.genetics.utah.edu/>
5. <https://www.cellbio.com/education.html>
6. <https://lifescienceinteractive.com/category/molecular-biology/>

Self-Study . 1. Multiple roles of noncoding RNAs (long ncRNA ,siRNA, miRNA) in development and differentiation; implication of ncRNAs in pathologies.

2.mRNA degradation- nonsense-mediated decay.

Recommended Texts

1. Lewin's Genes XII : 12th edition, Krebs JE, Goldstein ES, Kilpatrick ST ;Prentice Hall, Delhi
2. Molecular Biology of the Gene : 6th edition, Watson JD , Baker TA, Bell S, Gann A, Levine M, Losick R; Cold Spring Harbor Laboratory Press, New York
3. Essential Cell Biology :3rd edition, Alberts B, Bray D, Hopkin K, Johnson A, Lewis J, Raff M, Roberts K, Walter P ; Garland Science, New York
4. Molecular Cell Biology : 8th edition , Lodish H, Arnold Berk; W.H.Freeman & Co, New York
5. Karp's Cell and Molecular Biology: Concepts and Experiments, 8th Edition; Wiley, India
6. An Introduction to Genetic Analysis 12th edition,, Griffith A. F, Doebley J, Peichel C, David A, Wassarman D A; Albion Press. W.H.Freeman & Co, New York

Methods of assessment:

Recall(K1)-Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application(K3)-Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse(K4)-Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas

Evaluate(K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create(K6)-Check knowledge in specific or off-beat situations, Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	M	L	S	S	S	S
CO2	S	S	S	M	M	L	M	S	S	S
CO3	S	S	S	L	M	L	M	S	S	S
CO4	S	S	S	M	M	L	S	S	S	S
CO5	S	S	S	S	S	M	M	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215AEC33	GeneEditing, CellandGenetherapy	4	1	0	4

Pre-requisites, if any: To introduce students molecular basis of cell gene therapy; viral and nonviral gene transfer techniques and gene therapy applications in hereditary and acquired diseases.

Course Objectives

1. To train the student in techniques related to the molecular basis of genetic diseases and to incorporate skills essential for various types of sequencing.
2. To inculcate practical knowledge on comparing the animal models used to model genetic diseases
3. To introduce and also elaborate knowledge about wide varieties of vectors and their features in addition to their applications and to identify the viral and nonviral gene transfer techniques
4. To educate about the characteristics of cell culture, therapeutic strategies in gene therapy with relevant safety/ethics involved and patents as well.

Course Outcomes

After completion of the course, the students should be able to:

- CO1.** Ability to read, and evaluate scientific articles within the subjects of immunotherapy, gene therapy and cell therapy. (K1, & K2)
- CO2.** To clone gene of their interest for several downstream purposes with a robust comprehension about wide variety of applicable gene delivery vectors. (K1, K2 & K5)
- CO3.** Be able to provide examples of diseases that can be treated with immune therapy, gene therapy and cell therapy. (K2, K3 & K4)
- CO4.** To identify knowledge gaps and need for further research within their chosen topic of immune therapy, gene therapy or cell therapy. (K2, K4 & K5)
- CO5.** To critically discuss and reflect on ethical and social aspects of using immune, gene or cell therapy. The student will be persuaded to contemplate on upcoming technologies for futuristic benefits. (K2, K5 & K6)

Units I

Gene Editing: Basis of gene editing, DNA repair mechanisms, Double strand DNA breaks, Nonhomologous End-Joining (NHEJ), Homology directed repair, Programmable nucleases for gene editing, Meganucleases, Zinc-Finger nucleases, Transcription Activator-Like Effector Nucleases (TALEN), CRISPR-Cas systems, gene editing using CRISPR-Cas, drawbacks and major challenges to present gene editing techniques, gene editing for human disease therapy

Units II

Gene and cell therapy: Basics of Gene and cell therapy, types of gene therapy, gene therapy strategies, therapeutic targets for gene therapy, choice of the therapeutic target, administration routes, delivery systems, expression of transgene, persistence of the gene therapy, cell targeting, immunological response to the therapy, ethical and legal issues, concerns about gene and cell therapy

Units III Vectors for Gene therapy: Non-viral and viral vectors for gene therapy, Physical methods of gene delivery, Polymer, Lipid and inorganic material based chemical systems for gene delivery, Viral vectors, Lentiviral, Adenoviral, Adeno-associated virus, Herpes Simplex virus, vaccinia, baculoviral vectors for gene delivery, choice of viral vector and oncolytic virus. Gene therapy applications, Gene therapy for cancer, suicide and oncolytic gene therapy.

Units IV Stem cells and tissue regeneration: Adult and fetal stem cells, embryonic stem cells, cell reprogramming, induced pluripotent stem cells (iPSC), Chemically induced pluripotent stem cells (CiPSC), reprogramming factors, iPSC derived progenitors' cells, Organoids, three dimensional (3D) bioprinting.

Units V Regulatory and Ethical Considerations of stem cell and Gene Therapy, pluripotent stem cell-based cell replacement therapies. Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies. Technological challenges towards development of pluripotent stem cell-based cell replacement therapies.

Reading List (Print and Online)

1. Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
2. Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
3. Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, Alexander Battler,

Self-Study

1. Applications of gene editing strategies
2. CART therapy for Cancer

Recommended Texts

1. An Introduction to Human Molecular Genetics (2nd Edition), J.J. Pasternak, 2005
2. An Introduction to Molecular Medicine and Gene Therapy 1st Edition by Thomas F. Kresina Upadhyay, S. K. (Ed.). (2021).
3. Human Molecular Genetics (4th Edition), Tom Strachan & Andrew Read, 2010.

4. Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA;
Oct. 2003,

Methods of assessment:

Recall(K1)-Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/Comprehend(K2)-MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application(K3)-Suggest idea/concept with examples, Observe, Explain.

Analyse(K4)-Finish procedure in stepwise manner, Differentiation between various ideas, Map knowledge

Evaluate(K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons.

Create(K6)-Check knowledge in specific or offbeat situations, Discussion, Debating, Presentation

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	M	S	M	M	M	M	M	M
CO2	S	S	S	S	M	M	M	M	M	S
CO3	S	M	S	S	M	S	S	S	S	S
CO4	S	L	M	M	M	M	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215SEC34L	ClinicalBiochemistryLab	0	0	4	4

Pre-requisites, if Knowledge on basic principles, Instrumentation of Biochemical techniques and metabolic reactions

any:
Course
Objectives

1. To instill skill in students enabling them to apprehend the wider knowledge about principles and techniques to be employed for the investigation of biological samples, clinical approach, normal values of biochemical constituents and clinical interpretations.
2. To inculcate the knowledge of collection, preservation of blood sample and learning various hematological parameters and their significance.
3. To perform experiments to assess liver functions. And also to study the marker enzymes of liver
4. To evaluate lipid profile and assess their relation to cardiac function.
5. To perform experiments to estimate blood glucose and glycosylated hemoglobin.
6. To perform urinalysis, estimate BUN and creatinine to assess renal function .
7. To learn basic immunotechniques antigen – antibody reactions.
8. To perform data analysis using MS Excel
9. To introduce visit to hospital so that students may be aware of Phlebotomy ,Collection and storage of specimen, Good laboratory practices, Automation and current methods adopted in the diagnostic labs

Course Outcomes

After completion of the course, the students should be able to:

CO1. The student will be able to acquire knowledge and skill in

hematology techniques. They will get familiar with methods and knowledge

to interpret the electrolyte concentration in serum

(K1,K2,K3,K4,K5)

CO2. The student will be able to assess the Liver Function and interpret the biochemical investigation in a given clinical situation (K1,K2,K3,K4,K5)

CO3. Skill to perform the Renal function test to assess the function of Kidney and report the abnormal parameters with reference range will be achieved by the student (K1,K2,K3,K4,K5)

CO4. To estimate the blood glucose content and lipid profile, to evaluate the alterations and record the observation in accordance to reference range will be acquired by the student (K1,K2,K3,K4,K5,K6)

CO5: The Group Experiments will support them to acquire practical skills to work in the healthcare sector and assist them to understand the automation process in clinical labs (K1,K2,K3,K4,K5,K6)

I

Haematology:

RBC count, WBC count – total and differential count, ESR, PCV, MCV.
Bleeding Time, Clotting Time and Estimation of hemoglobin.

Determination of Electrolytes: Sodium, Potassium and Calcium

II

Liver function test:

Estimation of bilirubin – direct and indirect. Estimation of plasma protein, A/G ratio, Thymol turbidity test, Prothrombin Time (PT), Assay of serum glutamate oxaloacetate transaminase, alkaline phosphatase, Gamma-glutamyl transferase (GGT), isoenzyme separation of LDH by electrophoresis.

III

Renal function test:

Collection and Preservation of Urine sample

Qualitative tests for normal and pathological components of urine. BUN:

Estimation of blood Urea, creatinine, and uric acid.

Urea Clearance test

IV

Estimation of blood glucose by orthotoluidine and glucose oxidase method. Determination of glycosylated Hb. Glucose tolerance test. Kit

methodLipid

profile:

Estimation of cholesterol by Zak's method, lipoprotein profile, estimation of ketone bodies, estimation of triglycerides, free fatty acids and phospholipids.

V

Group Experiments

- a. Antigen–Antibody Reaction-HCG kit method ,RA kit method
- b. Phlebotomy–Venipuncture, Different techniques of venipuncture
- c. Collection of blood, Serum or Plasma separation and Storage
- d. Automation in Clinical Biochemistry -Auto analyser, Semiauto analyser

Reading List (Print and Online)

1. https://www.researchgate.net/publication/260182512_Practical_Manual_in_Biochemistry_and_Clinical_Biochemistry
2. https://main.icmr.nic.in/sites/default/files/upload_documents/GCLP_Guidelines_2020_Final.pdf <https://www.westgard.com/clia.html>
3. https://www.researchgate.net/publication/263929434_Biochemistry
4. <https://ucms.ac.in/Lectures-C-2020/Renal%20function%20Tests%20-%20PPT.pdf>
5. <https://youtu.be/i2PjEks4GQ>
6. https://www.euro.who.int/data/assets/pdf_file/0005/268790/WHO-guidelines-on-drawing-blood-best-practices-in-phlebotomy-Eng.pdf

Self-Study

1. Laboratory handling of human biological specimen
2. Automation in Clinical Biochemistry

Recommended Texts

1. Practical Clinical Biochemistry- Varley's by Alan H Gowenlock, published by CBS Publishers and distributors, India Sixth Edition, 1988.
2. Manipal Manual of Clinical Biochemistry (For Med. Lab. And Msc Stud.) 2013 (4 Edition)
3. Case Oriented Approach in Biochemistry- Dr. Rajesh Kawaduji

Jambhulkar, Dr. Abhijit D. Ninghot: 2019 First Edition

4. Medical Lab Technology Vol I & II, Kanai L Mukerjee New Delhi: Tata Mcgraw Hill Publishing Company, 1996.
5. Practical Biochemistry – Plummer, New Delhi: Tata Mcgraw Hill Publishing Company, 2000.
6. Introductory practical Biochemistry – S.K. Sawhney, Randhir Singh, 2nd ed, 2005.

Methods of assessment:

Recall (K1) – Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) – MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3) – Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse (K4) – Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas.

Evaluate (K5) – Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) – Check knowledge in specific or offbeat situations. Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	S	L	S	M	S
CO2	S	S	S	S	M	S	L	S	M	S
CO3	S	S	S	S	M	S	M	S	M	S
CO4	S	S	S	S	M	S	M	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215DSC35A	BiostatisticsandDataScience	4	1	0	3

Pre-requisites, if any: Basic knowledge of Statistics and Computer Applications

- Course Objectives**
1. To summarize the data and to obtain its salient features from the vast mass of original data.
 2. To understand the concept of various measures of dispersion.
 3. To understand the concepts of sampling and learning test of significance.
 4. To understand the concept of various attributes and relate to biological studies.
 5. To gain knowledge in SPSS, a software package which gives a perfect graphical representation and appropriate result for the data that has been entered

Course Outcomes After completion of the course, the students should be able to:

CO1: Concepts of statistical population and sample, variables and attributes. Tabular and graphical representation of data based on variables. (K1, K2, K3)

CO2: Conditions for the consistency' and criteria for the independence of data based on attributes. Measures of central tendency, Dispersion, Skewness and Kurtosis. (K1, K2, K3)

CO3: Learning different sampling methods and analysing statistical significance. (K1, K2, K3, K4)

CO4: Understanding student's t test, ANOVA, Chi square test to

analyse the significance of various research. (K1, K2, K3, K4)

CO5: Learning on data science, algorithm for machine learning, artificial intelligence and big data, their applications in clinical and pharma domain. (K1, K2, K3, K4, K6)

- Units I** Nature of biological and clinical experiments – Collection of data in experiment- Primary and secondary data. Methods of data collection. Classification and tabulation. Different forms of diagrams and graphs related to biological studies. Measures of Averages- Mean, Median, and mode. Use of these measures in biological studies.
- Units II** Measures of Dispersion for biological characters– Quartile deviation, Mean deviation, Standard deviation and coefficient of variation. Measures of skewness and kurtosis. Correlation and regression – Rank correlation– Regression equation. Simple problems based on biochemical data.
- Units III** Basic concepts of sampling- Simple random sample stratified sample and systemic sampling. Sampling distribution and standard error. Test of significance based on large samples. Test for mean, difference of means, proportions and equality of proportions.
- Units IV** Small sample tests – Student's 't' test for mean, difference of two way means, tests for correlation and regression coefficients. Chi-square test for goodness of a non independence of attributes. F test for equality of variances. ANOVA- one way and two way. Basic concept related to biological studies
- Units V** Introduction to Data Science, Definition of data science, importance, and basic applications, Machine Learning Algorithms, Deep Learning, Artificial Neural Networks and their Application, Reinforcement Learning, Natural Language Processing Artificial Intelligence (AI), Data Visualization, Data Analysis, Optimization Techniques, Big Data,

Predictive Analysis. Application of AI in medical, health and pharma industries.

Reading List (Print and Online)

1. https://www.ibm.com/docs/en/SSLVMB_28.0.0/pdf/Accessibility.pdf
2. https://pure.tue.nl/ws/portalfiles/portal/19478370/20160419_CO_Mzolo.pdf
3. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5453888/>
4. <https://home.ubalt.edu/ntsbarsh/excel/excel.htm>
5. https://students.shu.ac.uk/lits/it/documents/pdf/analysing_data_using_spss.pdf
6. <https://www.ibm.com/support/pages/ibm-spss-statistics-28-documentation>

Self-Study

1. Simple problems on probability, theoretical distributions, hypothesis testing
2. Relationship between mean, median and mode and properties of the measures of central tendency and deviation

Recommended Texts

1. Zar, J.H. (1984) "Bio Statistical Methods", Prentice Hall, International Edition
2. Sundar Rao P. S.S., Jesudian G. & Richard J. (1987), "An Introduction to Biostatistics", 2nd edition, Prestographik, Vellore, India,.
3. Warren, J; Gregory, E; Grant, R (2004), "Statistical Methods in Bioinformatics", 1st edition, Springer
4. Milton, J.S. (1992), "Statistical methods in the Biological and Health Sciences", 2nd edition, Mc Graw Hill,
5. Rosner, B (2005), "Fundamentals of Biostatistics", Duxbury Press
6. Introducing Data Science, Davy Cielen, Anro DB Meysman, Mohamed Ali.

Methods of assessment:

Recall(K1)-Simple definitions,MCQ,Recall steps,Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application(K3)-Suggest idea/concept with examples,Solve problems,Observe, Explain

Analyse(K4)-Problem-solving questions,Finish a procedure in many steps,Differentiate between various ideas

Evaluate(K5)-Longer essay/Evaluation essay,Critique or justify with pros and cons

Create(K6)- Check knowledge in specific or offbeat situations,Discussion, Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	S	L	S	S	S
CO2	S	S	S	S	M	S	L	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S
CO5	S	S	S	S	S	S	M	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215DSC35B	Immunology	5	0	0	4

Aim:

To learn the immune system and reaction

Objectives:

- To expose the students with the immune system of human body

Outcomes:

- CO1 The students may understand the immune system, its components and various techniques used in bio manipulation.
- CO2 The course will provide technical knowledge as to how different diseases are caused and various responses mediated by living cells to combat pathogen attack.
- CO3 Compare and contrast the origin, maturation process, and general function of B and T lymphocytes.
- CO4 At the course will provide sound knowledge of how immune system deals with various pathogens, different processes and cell types involved in prevention of disease.
- CO5 To understand the principles of tolerance, autoimmunity and the role of immunity in protection against pathogens.
- CO6 Along with this the students will become aware about concept, synthesis and action mechanism of vaccines.

UNIT-I

Infection

Types – Factors influencing infection – endotoxins and exotoxins – pathogenicity and virulence – sources of infection agents – carriers – portals of entry. **Immunity:** Innate – Acquired – Active and Passive Immunity – phagocytosis – Inflammation. **Immune system:** Components – Lymphoid organs, Primary, Secondary, Tertiary – Lymphoid Tissues – Cells of the immune system.

UNIT-II

Antigens: Antigenicity – Immunogenicity – Types of antigens – Haptens – specificity – Blood group antigens – Blood grouping. **Immunoglobulins:** Isolation – structure and function – Antibodies – classes of immunoglobulins – Biosynthesis and antibody diversity. **Complement:** Complement – chemical and alternate pathway – Consequence of activation – Anaphylotoxins.

UNIT-III

Immune response: B and T cell development Cellular interaction – APC – MHC – cytokines – TCR – cluster of differentiation – HI and CMI – Regulation of immune response – Primary and secondary immune response – Immune tolerance - Immune suppression.

UNIT-IV

Immunological Techniques: Antigen– Antibody reaction– Precipitation– Agglutination– CTI – Torsion neutralization – Immunodiffusion – Immunofluorescence – Immune adherence – Immunoelectrophoresis – EIA– ELISA– RIA– Immunochemistry– Hybridoma Technology – Merits and Demerits – Production of Vaccines and their uses. Production of antisera – Fractionation of leucocytes – Identification of lymphocytes and their subsets – Experimental animal models – Inbred strains – SCID Mice , Nude mice – mice cell culture system.

UNIT-V

REFERENCE:

1. Immunology–Richard.A.GoldshyandKuby.
2. Essential Immunology–Roitt et al.
3. Immunobiology–Janeway. C:Paul Travers.
4. Immunology, Short Course–Eli Benjamin AV. et al.
5. Fundamentals of Immunology Springer Verlag– Wier et al.
6. A Handbook of Practical Immunology–G.P. Talwar.
7. Fundamental Immunology–Coleman.
8. Textbook of microbiology–Ananthamarayanan & Panikar.

CourseCode	CourseTitle	L	T	P	C
23215SEC36	Molecularbasisofdiseaseandtherapeuticstrategies	4	1	0	3

Pre-requisites,ifany: Knowledge of Human Physiology, Metabolism and Clinical Biochemistry

- Course Objectives**
- 1.To understand the concepts of the mechanisms involved in regulation of blood sugar and management of diabetes mellitus
 - 2.To gainin-depthknowledgeofthe mechanisms ofcancerandoftumor metastasis
 - 3.The student will review the basic organization of the central and peripheral nervous system that coordinate the sensory and motor functions of the body. In addition, the student will explore impaired features underlying the major neuropathological complications.
 - 4.Togainknowledgeinrenaldiseases
 - 5.Tounderstandthe mechanismsinvolved incardiaccisorders

Course Outcomes **Oncompletion ofthiscoursethestudentwillbeableto understand**

CO1.Overall view about the complications of diabetes mellitus andits management.

CO2.Comprehensiveunderstandingof theconceptsofcancerbiology and implicating the theoretical concepts for further research

CO3.Understandandappreciatethepathophysiologyofconditions affecting the nervous system.

CO4. A thorough knowledge of renal and cardiac diseases with emphasis related to mechanistic aspects and therapeutic interventions.

CO5. A thorough knowledge on the experimental models of non-communicable diseases that will be applied for future research or project dissertation. An in-depth knowledge on development of drugs against non-communicable diseases.

Units

- I** Mechanism of blood sugar regulation in human body. Pathophysiology of Type I and II diabetes, Diabetes – investigation methods for the diagnosis of diabetes. Nutritional care. Complications related to diabetes – Diabetic cardiovascular disease, retinopathy, neuropathy and nephropathy. Cellular and molecular mechanism of development of diabetes- Management of Type I and Type II diabetes, drugs for the treatment of diabetes.
- II** Biology of cancer: Overview of hallmarks of cancer. Tumorigenesis, Tumor progression and mechanism of Metastasis. Proto-oncogene to oncogene. Oncogene- myc and src family. Tumor suppressor gene-Rb and p53 pathway in cancer. Diagnosis- Non-invasive imaging techniques, Tumor diagnosis, Interventional radiology, New imaging technique, Molecular techniques in cancer diagnosis.- treatment of cancer- surgery, radiotherapy, chemotherapy, hormonal treatment, and biological therapy. Introduction to personalized medicine.
- III** Brain-neuronal network-memory- Neurodegenerative diseases- Parkinson and Alzheimer Disease- molecular understanding of the neurodegenerative diseases- treatment modalities.
- IV** Acute and chronic renal failure, glomerular diseases–

glomerulonephritis, nephritic syndrome, diabetes insipidus, diagnosis of kidney disease.

- V** Introduction to cardiovascular diseases, Lipids and lipoproteins in coronary heart disease-cardiac enzymes, Molecular changes during cardiac remodeling – hypertrophy of hearts – heart failure- treatment modalities.

Reading List (Print and Online)

1. The Biochemical basis of disease: 2018, **Barr AJ**; Portland Press
2. Biochemical Basis of Diseases
3. <https://www.biologydiscussion.com/diseases-2/biochemical-basis-of-diseases/44276>

Recommended Texts

1. Wills' Biochemical Basis of Medicine: 2nd edition, Thomas H, Gillham B; Elsevier
2. Molecular Biochemistry of Human Diseases, 2021, Feuer G, de la Iglesia F; CRC Press

Methods of assessment:

Recall (K1)- Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3)- Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4)- Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5)- Longer essay/ Evaluation essay, Critique or justify with pros and cons

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	S	S	S	S	S
CO2	S	M	S	L	M	M	M	M	M	S
CO3	S	S	M	L	S	S	M	M	S	M
CO4	S	M	M	M	M	M	S	S	M	S
CO5	S	S	M	M	S	M	M	M	S	S

S-Strong M-Medium L-Low

SEMESTER IV

CourseCode	CourseTitle	L	T	P	C
23215AEC41	PharmaceuticalBiochemistry	4	1	0	4

Pre-requisites, any: if The students should have a basic knowledge of drug discovery and development. Student should possess basic knowledge bioinformatics to understand and correlate the drug development process.

Course Objectives

1. To understand the different types of bioinformatic tools for drug discovery.
2. To get an overview of how different bioinformatic tools aid in the process of target identification, drug screening and quantitative structure activity relationship.
3. To assimilate the involvement of different metabolic pathways involved in drug metabolism and correlate their involvement in elimination process
4. To understand the biochemical basis of drug action at the target tissue.
5. To understand different phases in drug clinical trials and its assessment.

Course Outcomes After completion of the course, the students should be able to:

CO1. To understand and explain the basic concepts of drug discovery and drug development process.

CO2. To review the different software and computational tools which aid in the design of drugs and its rationalization.

CO3. To analyze the different stages of the drug discovery process with the target & hit identification, assays for drug screening and preclinical studies.

CO4. To understand the various phases of the clinical trials and the method of conduct of clinical trials.

Units

- I** Drug discovery and development, drug target identification and validation, Hit identification, General principles of screening, correlations between various animal models and human situations, Correlation between in-vitro and in-vivo screens; Special emphasis on cell-based assay, biochemical assay, radiological binding assay, Pharmacological assay, In vitro, In vivo & Ex-vivo experiments, lead optimization, preclinical studies.
- II** Bioinformatics approaches for drug development: Identification of potential molecules, chemical compound library preparation, Identification of target in pathogen, Ligand & protein preparation, Molecular docking, Binding free energy estimation, High throughput virtual screening, Docking protocol validation and enrichment analysis, Single point energy calculation, Pharmacokinetics and Pharmacodynamics, ADME & toxicity prediction, Molecular dynamic simulation, Rule of three and five, Lipinsky rule, Pharmacophore development, Quantitative structure activity relationship, 3D-QSAR, Techniques of developing a pharmacophore map covering both ligand based and receptor based approaches.
- III** Drug metabolism & interactions: Drug-receptor interactions, receptor theories and drug action, Xenobiotics, xenobiotics phases (Phase-I, Phase-II and Phase-III), role of cytochrome P450 oxidases and glutathione S-transferases in drug metabolism, factors affecting drug metabolism, Enzymes as a drug target, Kinase inhibitors, ATPase inhibitors, drug protein interaction, Drug-DNA interaction. Basic ligand concepts-agonist, antagonist, partial agonist, inverse agonist, efficiency and potency. Forces involved in drug-receptor complexes. Receptor classification – the four superfamilies. Receptor binding

assays-measurement of K_d , B_{max} and IC_{50} .

IV Biochemical mode of action of antibiotics- penicillin and chloramphenicol, actions of alkaloids, antiviral and antimalarial substances. Biochemical mechanism of drug resistance- sulphonamides. Drug potency and drug efficacy. General principles of chemotherapy: chemotherapy of parasitic infections, fungal infections, viral diseases.

Introduction to immunomodulators and chemotherapy of cancer.

V Clinical trials (Phase-I, Phase-II, Phase-III and Phase-IV clinical trial). Main features of clinical trials, including methodological and organizational considerations and the principles of trial conduct and reporting. Key design surrounding design, sample size, delivery and assessment of clinical trials.

Self-Study

1. Examples of pharmaceutical development of a drug
2. Basic pharmacology of drug action and kinetics

Reading List (Print and Online)

1. Textbook of Drug Design. Krogsgaard-Larsen, Liljefors and Madsen (Editors), Taylor and Francis, London UK, 2002.
2. Drug Discovery Handbook S.C. Gad (Editor) Wiley-Interscience Hoboken USA, 2005

Recommended Texts

1. Practical Application of Computer-Aided Drug Design, Ed. Charifson P., Marcel Dekker Inc.
2. 3D QSAR in Drug Design: Theory, Methods and Applications, Ed. Kubinyi H., Ledien
3. Pharmaceutical Profiling in Drug Discovery for Lead Selection, Borchardt RT, Kerns, EH, Lipinski CA, Thakker DR and Wang B, AAPS Press, 2004
4. Drug Discovery and Development; Technology in Transition. HP Rang. Elsevier Ltd 1st edition 2006.

5. Pharmacology in Drug Discovery. T. P. Kenakin. Elsevier, 1st Edition
2012.

Methods of assessment:

Recall (K1)-Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3)-Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse (K4)-Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas.

Evaluate (K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons

Create (K6)-Check knowledge in specific or off-beat situations. Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	M	S	S	S
CO2	S	S	S	M	M	S	S	S	S	S
CO3	S	S	S	L	S	M	M	S	S	M
CO4	S	M	S	L	S	L	M	S	S	M
CO5	S	S	S	L	S	M	M	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215AEC42	BiochemicalToxicology	4	1	0	4

Pre-requisites, if any: The students should have a basic knowledge of pharmacology of drug action and understanding on their biochemical pathways.

- Course Objectives**
1. To understand the detailed study of biochemical basis of drugs and its toxicity, particularly their actions on living systems.
 2. To understand the relevance and methods to identify the chemotherapeutic value of drug.
 3. To understand the fundamentals of toxicology and dose- response relationships.
 4. To understand the toxicological drug testing procedures based on in vitro and animal studies
 5. To understand biochemical pathways of drug toxicity and its manifestation on vital organs.

Course Outcomes On completion of this course, the student will be able

CO1: To appreciate and understand the role of toxicological biomarkers to assess drug toxicities.

CO2: To conceive the role of disposition of drug in human system and their metabolism and methodologies pertaining to toxicological studies.

CO3: To understand and evaluate the functions of different organs on drug disposition and associated drug toxicities.

CO4 : To understand the toxicological response to foreign compounds and their pharmacological, physiological and biochemical effects.

CO5: To link the mechanism of toxicity and clinical symptoms with underlying physiological disturbances.

Units

- I** Fundamentals of Toxicology and dose-Response Relationships:
Introduction Biomarkers Criteria of Toxicity New Technologies
Evaluation of Toxicity Interactions; Dose Response; Measurement of Dose-
Response; Relationships Linear Dose Response Hormesis; Hazard and
Risk Assessment Duration and Frequency of Exposure and Effect
- II** Factors Affecting Toxic Responses: Disposition: Absorption, Sites of
absorption, distribution, Excretion; Metabolism: types of Metabolic
change phase I reactions; Phase 2 reactions; control of Metabolism,
Toxication vs. Detoxication
- III** Toxicity testing; Test protocol, Genetic toxicity testing & Mutagenesis
assay: In vitro test systems: bacterial mutation tests-Reversion test, Ames
test, Fluctuation test, and Eukaryotic mutation test. In vivo test system
Mammalian mutation test-Host mediated assay and Dominant Lethal
test. Biochemical basis of toxicity: Mechanism of toxicity: Disturbance
of excitable membrane function, Altered Calcium homeostasis, Covalent
binding to cellular macromolecules & genotoxicity, Tissue specific
toxicity
- IV** Toxic Responses to Foreign Compounds: Direct Toxic Action: Tissue
Lesions; Mechanism and response in cellular toxicity, pharmacological,
physiological and Biochemical effects; Developmental Toxicology-
Teratogenesis; Immunotoxicity Genetic Toxicity; Chemical
Carcinogenesis
- V** Biochemical Mechanisms of Toxicity: Tissue Lesions: Liver Necrosis;
kidney Damage; Lung Damage, Liver damage, Cardiac damage;

Neurotoxicity; Exaggerated and Unwanted pharmacological effects; Physiological effects; Biochemical Effects: Lethal Synthesis and Incorporation, Interaction with specific Protein Receptors; Teratogenesis; Immunotoxicity; multi-Organ Toxicity

Self-Study

- Case studies to review

Reading List (Print and Online)

1. Preclinical Safety Evaluation of Biopharmaceuticals: A Science-Based Approach to Facilitating Clinical Trials by Joy A. Cavagnaro
2. A Comprehensive Guide to Toxicology in Nonclinical Drug Development 2nd Edition by Ali S. Faqi

Recommended Texts

1. Principles of Toxicology by: Karen E Stine, Thomas M Brown 2006 Publisher. Crc Press
2. Principles of Biochemical Toxicology by John A. Timbrell Publisher: Informa Healthcare
3. Environmental Toxicology by Sigmund F. Zakrzewski, (2002) Publisher: Oxford University Press, USA

Method of Evaluation:

Test I	Test II	Assignment	End Semester Examination	Total	Grade
10	10	5	75	100	

Methods of assessment:

Recall (K1)- Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3)- Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse (K4)- Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas.

Evaluate(K5)-Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create(K6)–Check knowledge in specific or offbeat situations. Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	L	M	M	M	M
CO2	M	M	S	M	M	L	M	S	S	S
CO3	S	S	S	M	M	L	S	S	M	M
CO4	S	M	S	M	M	M	S	S	M	M
CO5	M	S	S	S	S	M	M	M	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215DSC44A	Biosafety, Lab Safety and IPR	4	1	0	3

Pre-requisites, if any: The students should have a basic knowledge of hazards associated with the handling of biological agents and importance of intellectual property from scientific research.

Course Objectives

1. To assimilate the hazards associated with the handling of biological and chemical agents.
2. To understand how to protect from the hazards by the implementation of various safety measures in biochemical laboratories.
3. To implicate the importance of protecting the scientific intellect by filing patent and understand the various offices for filing and maintaining patents
4. To understand the scope of patenting in biological research.
5. To create an awareness of ethics associated with use of genetically modified organisms/cells and its rationale for use in living organisms.

Course Outcomes After completion of the course, the students should be able to:

CO1. To understand and implement various aspects of biosafety and carry out risk assessment of products in biological research

CO2. Understand the basic concepts of ethics and safety that are essential for different disciplines of science and procedures involved and protection of intellectual property and related rights.

CO3. To appreciate the intellectual property rights and its implementation of on the invention related to biological research.

CO4. To understand the statutory bodies that regulate the property rights and its validity in various countries.

CO5. Critique the ethical concerns associated with modern

biotechnology processes and plan accordingly.

Units

- I** Biosafety: Historical background; introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; recommended biosafety levels for infectious agents and infected animals; biosafety guidelines - government of India, roles of IBSC, RCGM, GEAC etc. for GMO applications in food and agriculture; environmental release of GMOs; risk assessment; risk management and communication; national regulations and international agreements.
- II** Laboratory safety - Chemical, electrical and fire hazards; handling and manipulating human or animal cells and tissues, toxic, corrosive or mutagenic solvents and reagents; mouth pipetting, and inhalation exposures to infectious aerosols, Safe handling of syringe needles or other contaminated sharps, spills and splashes onto skin and mucous membranes. Health aspects; toxicology, allergenicity, antibiotic resistance.
History of biosafety microbiology and molecular biology, Risk assessment, Personal protective equipment, Laboratory facilities and safety equipment, Disinfection, decontamination, and sterilization, Regulatory compliance, Laboratory security and emergency response and administrative controls.
- III** Intellectual Property Rights (IPR): Introduction to patents, types of patents, process involved in patenting in India, trademarks, copyright, industrial design, trade secrets, traditional knowledge, geographical indications, history of national and international treaties and conventions on patents, WTO, GATT, WIPO, Budapest Treaty, Patent Cooperation Treaty (PCT) and TRIPS. Patent databases: Searching international databases; analysis and report formation. Indian Patent Act 1970; recent

amendments; filing of a patent application; precautions before patenting disclosure/non-disclosure; procedure for filing a PCT application. The patentability of microorganisms-claims, Characterization and repeatability disposition in the culture collections, legal protection for plants and other higher organisms, new plant varieties by rights, tissue culture protocols

IV Patent filing and infringement: Patent application- forms and guidelines, fee structure, time frames; types of patent applications: provisional and complete specifications; PCT and convention patent applications, International patenting-requirement, financial assistance for patenting-introduction to existing schemes; Publication of patents-gazette of India, status in Europe and US. Research Patenting: Patenting by researchers and scientists-University/organizational rules in India and abroad. Detailed information on patenting biological products, Case studies on patents (basmati rice, turmeric, neem etc.), and patent infringement.

V Bioethics:
Introduction to bioethics, human genome project and its ethical issues, genetic manipulations and their ethical issues, ethical issues in GMOs, foods and crops in developed and developing countries, environmental release of GMOs, ethical issues involved in stem cell research and use, use of animals in research experiments, animal cloning, human cloning and their ethical aspects, testing of drugs on human volunteers.

Self-Study

1. Review of drug patent documents
2. Safety in biological research laboratories

Reading List (Print and Online)

1. V. Shree Krishna, (2007). Bioethics and Biosafety in Biotechnology, New Age International Pvt. Ltd. Publishers. (Unit III, Unit IV and Unit V)
2. Deepa Goel, Shomini Parashar, (2013). IPR, Biosafety and Bioethics, Pearson. (Unit II)
3. R. Ian Freshney, 2016. Culture of Animal Cells: A Manual of Basic

Technique and Specialized Applications, 6th Ed, John Wiley & Blackwell.

4. BAREACT, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., 2007. (Unit I)

- Recommended Texts**
1. Biosafety in Microbiological and Biomedical Laboratories, (2020) 6th Ed. (https://www.cdc.gov/labs/pdf/SF19_308133-A_BMBL6_00-BOOK-WEB-final3.pdf)
 2. Kankanala C., (2007), Genetic Patent Law & Strategy, 1st Edition, Manupatra Information Solution Pvt. Ltd.,

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application (K3) - Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas.

Evaluate (K5) - Longer essay/Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations. Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	S	S
CO2	S	S	S	L	M	M	S	S	S	S
CO3	S	M	M	M	S	M	S	S	S	M
CO4	S	M	M	L	S	L	S	S	S	M
CO5	S	S	S	L	S	M	S	S	S	S

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215DSC44B	Plant Biochemistry	4	1	0	3

Course Prerequisites or Co-requisites A background in plant biology, general biochemistry or chemistry is expected. Note that concurrent registration in any of these courses will NOT meet this requirement. Students must have completed both semesters of O-chem and a biochemistry course that covers general metabolism prior to taking this course.

Course Objectives :

This course covers biochemical processes specific to plants and is aimed to allow students to gain an understanding and appreciation of how biochemical components are synthesized and utilized by plants during growth and development and in their interactions with their environment, as well as how these processes can be manipulated. This course includes topics in photosynthesis, carbohydrates, nitrogen and lipid metabolism, specialized metabolism and plant metabolic engineering. Flux and genomics-based techniques, such as proteomics, transcriptomics and metabolomics are discussed in relation to metabolism.

Unit-I Plant cell: Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins, stomatal movement, transpiration, photoperiodism and biological clocks, plant movement. Photosynthesis: Photosynthetic apparatus, pigments of photosynthesis, Calvin cycle (C3 plants), Hatch Slack (C4 plants) & CAM pathways of carbon reduction and its regulation, Structure, function and regulation of RUBISCO, Crassulacean acid metabolism in plants. Photorespiration: photorespiration pathway and significance, cyanide resistance, relationship between photosynthesis, photorespiration.

Unit-II

Phytohormones: Biosynthesis, transport, physiological effects, mode of action and signal transduction of auxins, gibberlic acid, abscisic acid, ethylene and cytokinins in germination, embryogenesis, growth and development of plant.

Unit III

Nitrogen metabolism: Nitrogen fixation, nitrogenase complex, biochemistry and genetics of nitrogen fixation and ammonium assimilation, structure of 'NIF' genes and its regulation, structural features of nitrate reductase and nitrite reductase, regulation of nitrate and sulphate assimilation.

Unit III: Secondary plant metabolites: Nature, distribution, biosynthesis and function of plant metabolites, biosynthesis of nicotine. Biochemistry of plant toxins, phytohemagglutinins, lathyragens, nitriles, protease inhibitors, protein toxins, role of secondary metabolites in chemical defence.

Unit-IV Revised M.Sc. Biochemistry from 2019 12 Plant stress physiology: Plant stress, plant responses to abiotic and biotic stresses, salinity, water, heat, chilling, anaerobiosis, heavy metals, radiations and their impact on plant growth and metabolism, mechanisms of resistance to biotic stress and abiotic stress, antioxidative defence mechanism. Plant defence:

Unit V: Genetic basis of plant-pathogen interactions, anti R-Avr gene interactions and isolation of R genes, hypersensitive response (HR), systemic acquired resistance (SAR) and induced systemic resistance (ISR).

Books recommended

- Introduction of Plant Biochemistry, by Goodwin T. W. and E. I. Mercer, Pergamon Press, Oxford, 1983.
- Plant Physiology, 5th Edition, by Lincoln Taiz and Eduardo Zeiger, Amazon Press, 2012
- Introduction of Plant Biochemistry, by Goodwin T. W. and E. I. Mercer, Pergamon Press, Oxford.
- Buchanan BB, Gruissem W & Jones RL. 2000. Biochemistry and Molecular Biology of Plants. 2nd Ed. John Wiley.
- Dey PM & Harborne JB. 1997. Plant Biochemistry. Academic Press. • Heldt HS. 1997. Plant Biochemistry and Molecular Biology. Oxford Univ. Press.

CourseCode	CourseTitle	L	T	P	C
23215DSC45A	DevelopmentalBiology	4	1	0	3

Pre-requisites,if any: ComprehensiveKnowledgeofCellBiology

Course Objectives Thecandidatesundertakingthiscoursewillunderstandtheconceptsof developmental biology.

1. To understandthebackgroundofdevelopmentalbiology
2. Togainin-depthknowledgeofvariousmodelorganisms
3. To gaininsightintoaspectsofstemcelltechnology
4. Togaininsightsinto morphogenesisandorganogenesis
5. Toacquirein-depth understandingofcell deathmechanismsand cell fate decision

Course Outcomes

CO1.Graspknowledgeabout thebackgroundofdevelopmentalbiology

CO2.Gain abundant knowledge about model oraganisms and gametogenesis

CO3.Gain knowledge about stem cells and their applications in regenerative therapy

CO4.Goodknowledge aboutorganogenesis

CO5.Learnthebasicsofcelldeath mechanismsand cellfatedecision.

Units

- I** Overview of Developmental biology: Background of Developmental biology - Principles of developmental biology –Potency, commitment, specification, induction, competence, determination and differentiation; morphogeneticgradients;cellfateandcelllineages;stemcells;genomic equivalenceandthecytoplasmicdeterminants;imprinting;mutantsand

transgenics in analysis of development.

II Model organisms

Gametogenesis – production of gametes, Formation of zygote, fertilization and early development: molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination. *Drosophila* Developmental biology- Axis formation, Genes & mutation. *C. elegans*– Vulva formation, Axis formation.

III Regeneration Developmental Biology

Stem cells – Definition, Classification, Embryonic and adult stem cells, properties, identification, Culture of stem cells, Differentiation and dedifferentiation, Stem cell markers, techniques and their applications in modern clinical sciences. Three-dimensional culture and transplantation of engineered cells. Tissue engineering- skin, bone and neural tissues.

IV Morphogenesis & Organogenesis: Cell aggregation and differentiation in Dictyostelium; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis – vulva formation in *Caenorhabditis elegans*, eye lens formation, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development- larval formation, metamorphosis; environmental regulation of normal development; sex determination.

V Cellular senescence and Cell fate decision

Cellular senescence – concepts & Frizzled receptor in Development and disease. Diabetes and developmental biology, Cell death pathways in developments. Markers of important diseases.

Reading List (Print and Online) Developmental Biology – Gilbert Scott

<http://bgc.org.in/pdf/study-material/developmental-biology-7th-ed-sf-gilbert.pdf>

Recommended Texts Developmentalbiology:VIIIedition,**Gilbert,SF**;SinauerAssociates,Inc

Methods of assessment:

Recall(K1)-Simple definitions, MCQ, Recall steps, Concept definitions.

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview.

Application(K3)-Suggest idea/concept with examples, Solve problems, Observe, Explain.

Analyse(K4)–Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas.

Evaluate(K5)-Longer essay/Evaluation essay, Critique or justify with pros and cons

Create(K6)–Check knowledge in specific or offbeat situations. Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	L	S	S	M
CO2	M	M	M	M	M	S	M	S	M	M
CO3	M	M	L	M	M	S	L	S	L	L
CO4	S	M	L	S	S	M	S	S	M	M
CO5	S	S	M	S	L	M	M	S	M	M

S-Strong M-Medium L-Low

CourseCode	CourseTitle	L	T	P	C
23215DSC45B	CancerBiology	4	1	0	3

OBJECTIVES:

To enable the students to understand • Basic biology of cancer • Impact of antibodies against cancer in the human body leading to more effective treatments • Enhanced immunology based detection methods and imaging techniques • Development of cell based and cytokine based immunotherapy against cancer.

UNIT I FUNDAMENTALS OF CANCER BIOLOGY

Regulation of cell cycle, mutations that cause changes in signal molecules, effects on receptor, signal switches, tumour suppressor genes, modulation of cell cycle in cancer, different forms of cancers, diet and cancer. Cancer screening and early detection, Detection using biochemical assays, tumor markers, molecular tools for early diagnosis of cancer.

UNIT II PRINCIPLES OF CARCINOGENESIS

Theory of carcinogenesis, Chemical carcinogenesis, metabolism of carcinogenesis, principles of physical carcinogenesis, x-ray radiation-mechanisms of radiation carcinogenesis.

UNIT III PRINCIPLES OF MOLECULAR CELL BIOLOGY OF CANCER

Signal targets and cancer, activation of kinases; Oncogenes, identification of oncogenes, retroviruses and oncogenes, detection of oncogenes. Oncogenes/protooncogene activity. Growth factors related to transformation. Telomerases.

UNIT IV PRINCIPLES OF CANCER METASTASIS

Clinical significances of invasion, heterogeneity of metastatic phenotype, metastatic cascade, basement membrane disruption, three step theory of invasion, proteinases and tumour cell invasion.

UNIT V NEW MOLECULES FOR CANCER THERAPY

Different forms of therapy, chemotherapy, radiation therapy, detection of cancers, prediction of aggressiveness of cancer, advances in cancer detection. Use of signal targets towards therapy of cancer; Gene therapy.

TOTAL: 45 PERIODS

OUTCOMES: The course would facilitate the students

- To appreciate the role of immune system in cancer
- To describe self –tolerance machinery and immune surveillance
- To understand the cancer microenvironment and its influence on immune cells
- To have awareness on medical applications of cytokines and immune cells against cancer

TEXTBOOKS:

1. Weinberg, R.A. “The Biology of Cancer” Garland Science, 2007
2. McDonald, Fetal., “Molecular Biology of Cancer” IIrd Edition. Taylor & Francis, 2004.

REFERENCES:

1. King, Roger J.B. “Cancer Biology” Addison Wesley Longman, 1996.
2. Ruddon, Raymond W. “Cancer Biology” IIIrd Edition. Oxford University Press, 1995.



PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

SCHOOL OF ARTS AND SCIENCE

B.SC., BIOCHEMISTRY

NEW COURSES

2023-2024

SEMESTER - I					
Course Code	Course Title	L	T	P	C
THEORY					
23110AEC11/ 23111AEC11/ 23132AEC11/ 23135AEC11	Tami - I/Advanced English-I/Hindi-I/ French - I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23115AEC13	Nutritional Biochemistry	4	1	0	3
23114GEC14	Chemistry - I	4	1	0	3
PRACTICAL					
23115SEC15L	Nutritional Biochemistry Lab	0	0	3	3
23114SEC16L	Chemistry Lab-I	0	0	3	3
Skill Enhancement Course					
23115SEC17	Medicinal Diet (Non-Major Elective)	2	0	0	2
23115SEC18	Foundation Course (FC)	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
2311AECCINC	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	-	-	-	1
	Total	20	4	6	25
SEMESTER – II					
Course Code	Course Title	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Tami - II/Advanced English-II/Hindi-II/ French - II	3	1	0	3
23111AEC22	English-II	3	1	0	3
23115AEC23	Cell Biology	4	1	0	3
23114AEC24	Chemistry - II	4	1	0	3
PRACTICAL					
23115SEC25L	Cell Biology Lab	0	0	3	3
23114GEC26L	Chemistry Lab - II	0	0	3	3
Skill Enhancement Course					
23115SEC27	Lifestyle Diseases (Non-Major Elective)	2	0	0	2
23115SEC28	First Aid	2	0	0	2
Ability Enhancement Compulsory course (AECC1)					
231AECCMS	Communication Skills	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioural Etiquette	-	-	-	1
	Total	20	4	6	25
SECOND YEAR					
SEMESTER – III					
23110AEC31/	Tamil - III/Hindi-III/Advanced English-III/ French -	3	1	0	3

23132AEC31/ 23111AEC31/ 23135AEC31	III				
23111AEC32	English-III	3	1	0	3
23115AEC33	Biomolecules	4	1	0	3
23116GEC34	Microbiology-I	4	1	0	3
	PRACTICAL				
23115SEC35L	Biomolecules Lab	0	0	3	3
23116SEC36L	Microbiology Lab-I	0	0	3	3
Skill Enhancement Course					
23115SEC37	Basics of Forensic science	2	0	0	1
23115SEC38	Medical Laboratory technology	2	0	0	2
Ability Enhancement Compulsory course					
23115RMC39	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	-	-	-	1
	Total	20	4	6	24
SEMESTER – IV					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV	3	0	0	3
23111AEC42	English-IV	3	0	0	3
23115AEC43	Biochemical Techniques	4	1	0	3
23116GEC44	Microbiology II	4	1	0	3
PRACTICAL					
23115SEC45L	Biochemical Techniques Lab	0	0	3	3
23116SEC46L	Microbiology Lab-II	0	0	3	3
Skill Enhancement Course					
23115SEC47_	Biomedical Instrumentation Or Tissue Culture	2	0	0	2
23115SEC48_	Medical Coding Or Microbial techniques	2	0	0	2
Ability Enhancement Compulsory course					
23115BRC49	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	0	0	2
AUDIT COURSE					
231LCSCLS	Leadership and Management Skills	0	0	0	1
	Total	22	2	6	27
SEMESTER – V					
23115AEC51	Enzymes	5	1	0	4
23115AEC52	Intermediary Metabolism	5	1	0	4

23115AEC53	Clinical Biochemistry	5	1	0	4
23115DSC54__	Discipline Specific Elective –I Immunology OR Biochemical Pharmacology OR Disaster Management	4	0	0	3
Skill Enhancement Course					
23115SEC55L	Clinical Biochemistry Lab	0	0	3	3
23115SEC56L	Enzyme and Immunology Lab	0	0	3	3
23115SEC57	Internship/Industrial Visit/Field Visit	0	0	0	2
AUDIT COURSE					
231ACLSPSL	Professional Skills	-	-	-	1
231AECCVED	Value Education	2	0	0	2
	Total	21	3	6	26
Third year					
SEMESTER – VI					
23115AEC61	Molecular Biology	5	0	0	4
23115AEC62	Human Physiology	5	0	0	4
23115DSC63__	Biotechnology Or Bioinformatics Or Bioentrepreneurship OR Plant Biochemistry and plant Therapeutics	5	0	0	3
23115PRW64	Project	0	0	13	4
23115SEC65	Professional Competency Skill- General awareness for competitive examination	2	0	0	2
231EXACT	Extension activity	-	-	-	1
AUDIT COURSE					
231ACSIKWS	Indian Knowledge System	-	-	-	2
	Total	17	0	13	20
Total Credits - Programme					140
Total Credits - Audit Courses					08
Total Credits					148

Discipline Specific Electives

Semester	Discipline Specific Elective Courses-I
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V	a) 23115DSC54A – Immunology b) 23115DSC54B – Biochemical Pharmacology c) 23115DSC54C- Disaster Management
	Discipline Specific Elective Courses-II
VI	a) 23115DSC63A- Biotechnology b) 23115DSC63B - Bioinformatics c) 23115DSC63C - Bioentrepreneurship d) 23115DSC63D- Plant Biochemistry and plant Therapeutics

Credit Distribution

Sem	AEC	SEC	GEC	DSC	AECC	Research	Others	Total
I	9	10	3	-	2	-	-	24
II	9	10	3	-	2	-	-	24
III	9	9	3	-	-	2		23
IV	12	10	-	-	-	2	2	26
V	12	8	-	3	2	-	-	25
VI	8	2	-	3	-	4	1	18
Total	59	49	9	6	6	8	3	140

AUDIT COURSE CREDIT DISTRIBUTION

Semester	Audit
I	1
II	1
III	1
IV	1
V	1
VI	2
Total	7

SEMSTER I

NUTRITIONAL BIOCHEMISTRY

Course Code	Course Name	L	T	P	C
23115AEC13	Nutritional Biochemistry	4	1	0	

Course Objectives

The objectives of this course are to

- Create awareness about the role of nutrients in maintaining proper health
- Understand the nutritional significance of carbohydrates, lipids and proteins.
- Understand the importance of a balanced diet.
- Study the effect of additives, emulsifiers, flavour enhancing substances in food.
- Study the significance of nutraceuticals.

Unit I: Concepts of food and nutrition.

12 Hrs

Basic food groups-energy yielding, body building and functional foods. Modules of energy. Calorific and nutritive value of foods. Measurement of Calories by bomb calorimeter. Basal metabolic rate (BMR)- definition, determination of BMR and factors affecting BMR. Respiratory quotient (RQ) of nutrients and factors affecting the RQ. SDA-definition and determination- Anthropometric measurement and indices – Height, Weight, chest and waist circumference BMI.

Unit II:

12 Hrs

Physiological role and nutritional significance of carbohydrates, lipids and protein. Evaluation of proteins by nitrogen balance method- Biological value of proteins- Digestibility coefficient, Protein Energy Ratio and Net Protein Utilization. Protein energy malnutrition – Kwashiorkar and Marasmus, Obesity-Types and preventive measures.

Unit III:

12 Hrs

Balanced diet, example of low and high-cost balanced diet- for infants, children, adolescents, adults and elderly people. ICMR classification of five food groups and its significance food pyramid. Junk foods- definition and its adverse effects.

Unit IV: Food additives:

12 Hrs

Structure, chemistry, function and application of preservatives, emulsifying agents, buffering agents, stabilizing agents, natural and artificial sweeteners, bleaching, starch modifiers, antimicrobials, food emulsions, fat replacers, viscosity agents, gelling agents and maturing agents. Food colors, flavors, anti-caking agent, antioxidants. Safety assessment of food additives.

Unit V: Nutraceuticals and Functional Foods: 12 Hrs

Definition, properties and function of Nutraceuticals, food Supplements, dietary supplements prebiotics and probiotics, and functional Foods. Food as medicine. Natural pigments from plants– carotenoids, anthocyanins and its benefits.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Cognizance of basic food groups viz. Carbohydrates, proteins and lipids and their nutritional aspects as well as calorific value	PO1, PO5
CO2	Identify and explain nutrients in foods and the specific functions in maintaining health.	PO1
CO3	Classify the food groups and its significance	PO1, PO2
CO4	Understand the effect of food additives	PO1, PO2
CO5	Describe the importance of nutraceuticals and pigments	PO1, PO5, PO6

Text books

1. Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd-Bredbenner. 2013. Wardlaw's Perspectives in Nutrition: A Functional Approach. McGraw-Hill, Inc., NY, USA.
2. M. Swaminadhan (1995) Principles of Nutrition and Dietetics. Bappco.
3. Tom Brody (1998). Nutritional Biochemistry (2nd ed), Academic press, USA
4. Garrow, JS, James WPT and Ralph A (2000). Human nutrition and dietetics(10thed)
5. Churchill Livingstone.
6. Andreas M.Papas (1998). Antioxidant Status, Diet, Nutrition, and Health (1sted) CRC

Reference Books

1. Branen, A.L., Davidson PM &Salminen S. 2001. Food Additives.2nd Ed. Marcel Dekker.
2. Gerorge, A.B. 1996. Encyclopaedia of Food and Color Additives. Vol. III. CRC Press.
3. Advances in food biochemistry, Fatih Yildiz (Editor), CRC Press, Boca Raton, USA, 2010
4. Food biochemistry & food processing, Y.H. Hui (Editor), Blackwell Publishing, Oxford, UK, 2006.

5. Geoffrey Campbell-Platt. 2009. Food Science and Technology. Wiley-Blackwell, UK.

Web resources

1. <http://old.noise.ac.in/SecHmsicour/english/LESSON O3.pdf>
2. <https://study.com/academy/lesson/energy-yielding-nutrients-carbohydratesfat-protein.html>.
3. <https://www.nhsinform.scot/healthy-living/food-and-nutrition/eatingwell/vitamins-and-minerals>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3				2		3	3	3	3
CO 2	3						3	3		3
CO 3	3	2					3	1		3
CO 4	3	2					3	3		3
CO5	3				2	2	3	3		3

S-Strong (3)

M-Medium (2)

L-Low (1)

CHEMISTRY 1

Course Code	Course Name	L	T	P	C
23114AEC12	Chemistry 1	4	1	0	3

Course Objectives:

- To understand the various theories of coordination chemistry.
- To study the various concepts of resonance and halogen compounds.
- To study the properties of aromatic compounds and organic reactions.
- To learn the concepts of solid-state chemistry.

Course Outcomes:

Upon successful completion of this course the students would be able:

- To describe structure and functions of biologically important coordination compounds.
- To apply eletromeric and resonance effect to predict reactivity and stability of organic compounds
- To classify the drugs based on their mode of actions.
- To predict conditions for spontaneous and non-spontaneous reactions.

- To calculate Gibb's free energy, work function and entropy of a reaction

UNIT I: COORDINATION CHEMISTRY AND INDUSTRIAL CHEMISTRY:

1.1 Coordination Chemistry: Nomenclature-Werner's, Sidwick and Pauling's theories. Chelation-industrial importance of EDTA, Biological role of hemoglobin and Chlorophyll

1.2 Industrial Chemistry: Fuelgases – Watergas, producer gas, LPG gas, Gobar gas and natural gas. Fertilizers - NPK and mixed Fertilizers- soaps and detergents.

UNIT II: ELECTRON DISPLACEMENT EFFECTS AND HALOGEN COMPOUNDS:

2.1 Polar effects: Inductive effect - Relative Strength of Aliphatic monocarboxylic acid and aliphatic amines. Resonance - Condition for resonance. Consequences of resonance - resonance of energy. Basic property of aniline and acidic property of phenol. Hyper conjugation – Heat of hydrogenation – Bond length and dipole moment. Steric effect.

2.2 Halogen containing compounds: Important chloro-hydrocarbons use dissolvent. Pesticides–Dichloromethane, chloroform, carbon tetrachloride, DDT and BHC Types of solvents: -Polar, Non-polar.

UNIT – III AROMATIC COMPOUNDS AND ORGANIC REACTIONS:

3.1 Aromatic compounds: Structure, stability resonance and aromaticity of benzene. Substitution reaction: Nitration, Halogenations, Alkylation. Naphthalene – Isolation, properties and uses.

3.2 Organic reaction: Biuret, Decarboxylation, Benzoin, Perkin, Cannizaro, Claisen and Halo form reactions

3.3 Chemotherapy: Explanation with two examples each for analgesics, antibacterial, anti - inflammatory, antibiotics, antiseptic and disinfectant, anesthetics local and general (Structures not necessary).

UNIT – IV SOLIDSTATE, ENERGETICS AND PHASERULE:

4.1 Solidstate: Typical crystal lattices - unit cell, elements of symmetry, Bragg's equation, Weiss Indices, Miller indices, simple body centered and face centered lattices

4.2 Energetics: First law of thermodynamics – state and path function – need for the second law – Carnot cycle and thermo- dynamic scale of temperature, spontaneous and Non-spontaneous processes–entropy – Gibbs free energy.

4.3 Phase rule: Phase, component, degree of Freedom, phase rule definitions – one component system–water system.

UNIT – V CHEMICAL EQUILIBRIUM AND CHEMICAL KINETICS:

5.1 Chemical equilibrium: Criteria of homogeneous and heterogeneous equilibria, - decomposition of HI, N_2O_4 , $CaCO_3 + Pd_5$.

5.2 Chemical Kinetics: Order of reaction and their determinations-activation energy, effects of temperature on reaction rate.

REFERENCES:

1. Gopalan R, Text Book of Inorganic Chemistry, 2nd Edition, Hyderabad, Universities Press, (India), 2012.
2. Morrison R.T. and Boyd R.N., Bhattacharjee S.K. Organic Chemistry (7th edition), Pearson India, (2011).
3. Puri B.R., Sharma L.R. and Pathania M.S. (2013), Principles of Physical Chemistry, (35thedition), New Delhi: Shoban Lal Nagin Chandand Co.
4. <https://gascnagercoil.in/wp-content/uploads/2020/12/allied-chemistry-book.pdf>

NUTRITIONAL BIOCHEMISTRY LAB

Course Code	Course Name	L	T	P	C
23115AEC15L	Nutritional Biochemistry Lab	0	0	3	3

Course objectives

The objectives of this course are to

- Impart hands-on training in the estimation of various constituents by titrimetric method
- Prepare Biochemical preparations
- Determine the ash content and extraction of lipid

TITRIMETRY

20hrs

1. Estimation of ascorbic acid in a citrus fruit.
2. Estimation of calcium in milk.
3. Estimation of glucose by Benedict's method in honey.
4. Estimation of phosphorous (Plant source)

BIOCHEMICAL PREPARATIONS

15 Hrs

Preparation of the following substances and its qualitative tests

5. Lecithin from egg yolk.
6. Starch from potato.
7. Casein and Lactalbumin from milk.

GROUP EXPERIMENT

10Hrs

8. Determination of ash content and moisture content in food sample
9. Extraction of lipid by Soxhlet's method.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Estimate the important biochemical constituents in the food samples.	PO1, PO3
CO2	Prepare the macronutrients from the rich sources.	PO1, PO3
CO3	Determine the ash and moisture content of the food samples	PO1, PO3
CO4	Extract oil from its sources	PO1, PO3, PO6

Text books

1. Laboratory manual in Biochemistry, J. Jayaraman, 2nd edition, NewAge International Publishers, 2011,
2. An Introduction to Practical Biochemistry, David T. Plummer, 3rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.

Reference books

1. Biochemical Methods, Sadasivam S and Manickam A, 4th edition, NewAge International Publishers, 2016
2. Essentials of Food and Nutrition, Vol. I & II, M.S. Swaminathan.
3. Bowman and Robert M. 2006. Present Knowledge in Nutrition. 9th edition, International Life Sciences Publishers.
4. Indrani TK. 2003. Nursing Manual of Nutrition and Therapeutic Diet, 1st edition Jaypee Brothers medical publishers.
5. Martha H. and Marie A. 2012. Biochemical, Physiological, and Molecular Aspects of Human Nutrition. 3rd edition. Chand Publishers.

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3		3				3	3	3	3
CO 2	3		3				3	3	3	3
CO 3	3		3				3	3	3	3
CO 4	3		3			3	3	3	3	3

S- Strong (3) M-Medium (2) L-Low (1)

ALLIED CHEMISTRY PRACTICAL - I

Course Code	Course Title	L	T	P	C
23114SEC16L	Allied Chemistry Practical - I	0	0	3	2

Course Objectives:

1. To learn the techniques of titrimetric analyses.
2. To know the estimation of several cations and anions.
3. To learn the techniques of qualitative analysis of organic compounds

Volumetric Analysis:

1. Acidimetry and alkalimetry:
 - (a) Strong acid VS strong base
 - (b) Weak acid VS strong base
 - (c) Determination of hardness of water.
2. Permanganometry:
 - (a) Estimation off ferrous sulphate
 - (b) Estimation of oxalic acid
3. Iodometry:
 - (a) Estimation of potassium dichromate
 - (b) Estimation of potassium permanganate

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

1. To understand the use of volumetric pipette, burette and analytical balance.
2. To explain the principles of volumetric analysis.

MEDICINAL DIET (NON-MAJOR ELECTIVE)

Course Code	Course Title	L	T	P	C
23115SEC17	Medicinal Diet (Non-Major Elective)	2	0	0	2

Learning Objectives

The main objectives of this course are to

- Provide basic knowledge about diet
- Understand of diet modification for GI diseases
- Plan a diet for liver diseases
- Prepare diet chart for Infectious diseases
- Plan a diet for Diabetes, Renal and Cardio-vascular diseases

Unit I: Principles of Therapeutic Diet: Definitions of Normal diet, Therapeutic diet, soft Diet and Liquid diet. Objectives of Diet Therapy. Advantages of using normal diet as the basis for Therapeutic diet. Normal Diet-therapeutic modification of normal diet. 6 Hrs

Unit II: Diet modification in Gastrointestinal diseases: Peptic ulcer, Diarrhea, Lactose intolerance, Constipation and Malabsorption syndrome 6 Hrs

Unit III: Diet Modification in liver and gall bladder in diseases: Etiology, symptoms and dietary treatment in jaundice, hepatitis, cirrhosis of liver and hepatic coma. 6 Hrs

Unit IV: Diet Modification in Infectious Diseases: Fevers, Typhoid, Tuberculosis and Viral Hepatitis. Dietary modifications in Tuberculosis. 6 Hrs

Unit V: Diet Modification in Diabetes, Renal and Cardio-vascular Diseases-Diabetes, acute & chronic glomerulonephritis, nephrosis, renal failure, kidney stone and Hypertension.6 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Possess basic knowledge about diet	PO1
CO2	Sketch diet plan for GI diseases	PO1, PO4, PO5, PO6
CO3	Sketch diet plan for liver diseases	PO1, PO4, PO5, PO6
CO4	Sketch a diet plan for Infectious diseases	PO1, PO4, PO5, PO6
CO5	Prepare diet chart for Diabetes Renal and Cardio-vascular diseases	PO1, PO4, PO5, PO6

Text Books

1. M. Raheena Begum, A Text Book of Foods, Nutrition and Dietetics, Sterling Publishers Pvt. Ltd.
2. M.V. Raja Gopal, Sumati. R., Mudambi, Fundamentals of foods and Nutrition, Wiley Eastern Limited, Year-1990.
3. William S.R Nutrition and Diet Therapy, 1985, 5thedition, Mosly Co. St. Louis.

Reference books

1. Rodwell Williams Nutrition and Diet Therapy, 1985, the C.V Mosly St. Louis.
2. M.V. Krause & M.A. Mohan, Food Nutrition and Diet Therapy, 1992 by W.B Saunders Company, Philadelphia, London.
3. Davidson and Passmore, Human Methods and Diabetics, 1976 the English Language Book Society and Churchill.

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2						3	3		3
CO 2	2			2	3	2	3	3		3
CO 3	2			2	3	2	3	3		3
CO 4	2			2	3	2	3	3		3
CO 5	2			2	3	2	3	3		3

S-Strong (3) M-Medium (2) L-Low (1)

INDIAN CONSTITUTION

Course Code	Course Title	L	T	P	C
231AECCICN	Indian Constitution	2	-	-	2

Aim:

The aim of the constitution is mentioned in the *preamble that is to constitute* India into a sovereign, socialist, democratic republic and it's the provision of the rights of citizens.it's primary objective is to provide economic, social & political justice.

Course Objectives:

- To make the students understand about the democratic rule and parliamentary administration
- To appreciate the salient features of the Indian constitution
- To know the fundamental rights and constitutional remedies
- To make familiar with powers and positions of the union executive,union parliament and the supreme court
- To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Course outcome:

1. Democratic values and citizenship training are gained

2. Awareness on fundamental rights is established
3. The function of union government and state government are learnt
4. The power and functions of the judiciary are learnt thoroughly
5. Appreciation of democratic parliamentary rule is learnt

Unit I: The making of Indian constitution

The constitution assembly organization - character -work salient features of the constitution- written and detailed constitution -socialism - secularism-democracy and republic.

Unit II: Fundamental rights and fundamental duties of the citizens

Right of equality -right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies -fundamental duties.

Unit III: Directive principles of state policy

Socialistic Principles-Gandhi a principles-liberal and general principles -differences between fundamental rights and directive principles

Unit IV: The union executive, union parliament and Supreme Court

Powers and positions of the president - qualification - method of election of president and vice president -prime minister -Rajya Sabah -Lok Sabah. The supreme court -high court - functions and position of supreme court and high court

Unit V: State council -election system and parliamentary democracy in India

State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.

References:

- 1) Palekar. S.A. Indian constitution government and politics, ABD publications, India
- 2) Aiyer, Alladi Krishnaswami, Constitution and fundamental rights 1955.
- 3) Markandan. K.C. Directive Principles in the Indian constitution 1966.
- 4) Kashyap. Subash C, Our parliament, National book trust, New Delhi 1989

UNIVERSAL HUMAN VALUES

Course Code	Course Title	L	T	P	C
231LSCUV	Universal Human Values	-	-	-	1

Aim:

This course aims at making learners conscious about universal human values in an integral manner, without ignoring other aspects that are needed for learner's personality development.

Course Objectives:

- The present course deals with meaning, purpose and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials.

Course Outcomes:

By the end of the course the learners will be able to:

- Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.
- Learn from case studies of lives of great and successful people who followed and practiced human values and achieved self-actualization.
- Become conscious practitioners of human values.
- Realize their potential as human beings and conduct themselves properly in the ways of the world.

Unit I: Introduction - What is love? Forms of love for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living Love and compassion and inter-relatedness Love, compassion, empathy, sympathy and non-violence Individuals who are remembered in history for practicing compassion and love. Narratives and anecdotes from history, literature including local folklore Practicing love and compassion: What will learners learn gain if they practice love and compassion? What will learners lose if they don't practice love and compassion? Sharing learner's individual and/or group experience(s). Simulated Situations. Case studies

Unit II: Introduction - What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others). Individuals who are remembered in history for practicing this value. Narratives and anecdotes from history, literature including local folklore. Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?. Learners' individual and/or group experience(s). Simulated situations Case studies

Unit III: Introduction - What is non-violence? Its need. Love, compassion, empathy, sympathy for others as pre-requisites for non-violence. Ahimsa as non-violence and non-killing. Individuals and organisations that are known for their commitment to non-violence. Narratives and anecdotes about non-violence from history, and literature including local folklore. Practicing non-violence: What will learners learn/gain if they practice non-violence? What will learners lose if they don't practice it? Sharing learner's individual and/or group experience(s) about non-violence. Simulated situations. Case studies

Unit IV: Introduction - What is righteousness? Righteousness and *dharma*, Righteousness and Propriety. Individuals who are remembered in history for practicing righteousness - Narratives and anecdotes from history, literature including local folklore. Practicing

righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it? Sharing learners' individual and/or group experience(s). Simulated situations. Case studies

Unit V: Introduction - What is peace? Its need, relation with harmony and balance. Individuals and organisations that are known for their commitment to peace. Narratives and Anecdotes about peace from history, and literature including local folklore. Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it? Sharing learner's individual and/or group experience(s) about peace. Simulated situations. Case studies

CELL BIOLOGY

Course Code	Course Title	L	T	P	C
23115AEC23	Cell Biology	4	1	0	3

Learning Objectives

The main objectives of this course are to

- Provide basic understanding of architecture of cells and its organelles.
- Understand the organization of prokaryotic and eukaryotic genome.
- Educate on the structural organization of bio membrane and transport mechanism
- Impart knowledge on cell cycle, cell division and basics of cells
- Familiarize the concept of mechanism of cell-cell interactions.

Unit I: Architecture of cells- Structural organization of prokaryotic and eukaryotic cells microbial, plant and animal cells. The ultrastructure of nucleus, mitochondria, RER, SER, golgi apparatus, lysosome, peroxisome and their functions 12 Hrs

Unit II: Cytoskeleton- microfilament, microtubules and intermediary filament- structure, composition and functions. Organization of Genome -prokaryotic, and eukaryotic genome. Organization of chromatin - histones, nucleosome concept, formation of chromatin structure. Special types of chromosomes - lamp brush chromosomes, polytene chromosomes. 12 Hrs

Unit III: Bio membranes - Structural organization of bilipid layer model and basic functions - transport across cell membranes- uniport, symport and antiport. Passive and active transport. 12Hrs

Unit IV: Cell cycle - Definition and Phases of Cell cycle - Cell division - Mitosis and Meiosis and its significance, Cancer cells- definition, types and characteristics of cancer cells. 12 Hrs

Unit V: Extracellular matrix – Collagen, laminin, fibronectin and proteoglycans- structure and biological role. Structure and role of cadherin, selectins, integrins, Cell -cell interactions- Types-gap junctions, tight junctions and Desmosomes. 12 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Explain the structure and functions of basic components of prokaryotic and eukaryotic cells, especially the organelles.	PO1
CO2	Familiarize the cytoskeleton and chromatin	PO1, PO2
CO3	Illustrate the structure, composition and functions of cell membrane related to membrane transport	PO1, PO2
CO4	Elaborate the phases of cell cycle and cell division-mitosis and meiosis and characteristics of cancer cells.	PO1, PO2
CO5	Relate the structure and biological role of extra cellular matrix in cellular interactions	PO1, PO2

Text books

1. Arumugam. N, Cell biology. Saras publication (10ed, paperback), 2019
2. Devasena. T. Cell Biology. Oxford University Press India-ISBN: 9780198075516, 0198075510, 2012.
3. Bruce Alberts and Dennis Bray. 2013, Essential Cell Biology. (4th ed). Garland Science.

Reference books

1. S.C.R. Cell Biology. Newage Publishers -ISBN-10: 8122416888/ISBN-13: 978-8122416886, 2008
2. Cooper. G.A. The Cell: A Molecular Approach. Sinauer Associates, Inc -ISBN10: 0878931066 / ISBN 13: 9780878931064, 2013
3. E.M.F. D.R. Cell and Molecular Biology. Lippincott Williams & Wilkins Philadelphia - ISBN: 0781734932 9780781734936, 2006.
4. LodishH. A, Berk C.A, Kaiser M, Krieger M.P, Scott A, Bretscher H, Ploegh and Matsudaira. 2007. Molecular Cell Biology, 6th Edition, WH. Freeman Publishers, New York, USA.

Web resources

1. <https://nicholls.edu/biol-ds/bio1155/Lectures/Cell%20Biology.pdf>
2. <https://www.medicalnewstoday.com/article/320878.php>
3. <https://biologydictionary.net/cell>

Mapping with Program Outcome

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3	3					3			3
CO 3	3	3					3			3
CO 4	3	3					3	3		3
CO5	3	3					3			3

S-Strong (3) M-Medium (2) L-Low (1)

ALLIED CHEMISTRY - II

Course Code	Course Title	L	T	P	C
23114GEC24	Allied Chemistry - II	4	1	0	3

Course Objectives:

1. To learn the basics of nuclear chemistry and metallic bond.
2. To understand the properties and applications of carbohydrates, amino acids and proteins.
3. To study the basic concepts of polymers, heterocyclic compounds and stereoisomerism.

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

1. To explain theory of nuclear chemistry and chemical bonding.
2. To classify carbohydrates and proteins.
3. To synthesise polymers and hetero cyclic compounds.

4. To apply conductivity measurements to determine degree of dissociation of weak electrolyte and pH of buffer solution.

5. To explain preparation and applications of emulsion and gels in chromatography.

UNIT I: Nuclear Chemistry and Metallic bond:

1.1 Nuclear Chemistry: Fundamental particles of nucleus- isotopes, isobars, isotones and isomers – differences between chemical reactions and nuclear reactions, nuclear fusion and fission- radioactive series.

1.2 Metallic bond: Electron gas, Pauling and band theories, semiconductors – intrinsic, extrinsic – type and p – type semiconductors.

1.3 Compounds of sulphur and sodiumthiosulphate

UNIT II: Carbohydrates, Amino Acids and Proteins:

2.1 Carbohydrates: classification –glucose and fructose–preparation and properties – structure of glucose –Fischer and Haworth cyclic structures.

2.2 Amino acids and proteins: Amino acids – Classification based on structure. Essential and non – essentials amino acids – preparation, properties and uses – peptides (elementary treatment only) – proteins – Classification based on physical properties and biological functions. Structure of proteins–primary and secondary (elementary treatment).

UNIT III: Polymers, Heterocyclic Compound and Stereoisomerism:

3.1 Synthetic polymers: preparation, properties and uses of Teflon, epoxy resins, polyester resin.

3.2 Heterocyclic compounds: Furan, pyrrole and pyridine –preparation, properties and uses – basic properties of pyridine and pyrrole.

3.3 Stereoisomerism: Optical isomerism – Lactic and tartaric acid – racemic mixture and resolution. Geometrical isomerism–maleic and fumaricacids.

Unit IV: Surface and photochemistry:

4.1 Surface Chemistry: Emulsions, gels–preparation, properties - Electrophoresis and applications, chromatography – Column, paper and thin layer Chromatography.

4.2 Photochemistry: Laws of photochemistry and applications.

Unit V: Electrochemistry, pH and Buffer

5.1 Electrochemistry: Specific and equivalent conductivity–their determination – effect of dilution on conductivity. Ostwald's Dilution law, Kohlrausch law, conductivity measurements, and conduct metric titrations.

5.2 pH and buffer: Importance of Ph and buffers –pH determination by colorimetric and electrometric methods.

REFERENCES:

1. B.R. Puri, L.R. Sharma, K.C. Kalia, 'Principles of Inorganic Chemistry', 21st edition, Vallabh Publications, 2004-2005.
2. Bahl, B.S. and Bahl, A., Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (2010).
3. Puri B.R., Sharma L.R. and Pathania M.S. (2013), Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin Chand and Co.
4. <https://oms.bdu.ac.in/ec/browse.php?type=UG>

CELL BIOLOGY LAB

Course Code	Course Title	L	T	P	C
23115SEC25L	Cell Biology Lab	0	0	3	3

Learning Objectives

The aim objectives of this course are to

- Learn the parts of microscope
- Investigate the cells under microscope.
- Image the cells using different stains
- Identify the cells, organelles and stages of cell division
- Identify the spotters

I MICROSCOPY AND STAINING TECHNIQUES

1. Study the parts of light and compound microscope
2. Preparation of Slides and Micrometry
3. Examination of prokaryotic and eukaryotic cell
4. Visualization of animal and plant cell by methylene blue
5. Visualization of nuclear fraction by acetocarmine stain
6. Staining and visualization of mitochondria by Janus green stain

II GROUP EXPERIMENT

1. Identification of different stages of mitosis in onion root tip
2. Identification of different stages of meiosis in onion bulb

III SPOTTERS

9. a) **Cells:** Nerve, plant and Animal cell
- b) **Organelles:** Mitochondria, Chloroplast, Endoplasmic reticulum,
- c) **Mitosis stages** – Prophase, Anaphase, Metaphase, Telophase

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Identify the parts of microscope.	PO1, PO2
CO2	Preparation of Slides	PO1, PO2
CO3	Identify the stages of mitosis & meiosis	PO1, PO2
CO4	Visualize nucleus and mitochondria by staining methods	PO1, PO2
CO5	Identify the spotters of cells, organelles and stages of cell division	PO1, PO2

Text books

1. Rickwood, Dand J.R. Harris cell Biology: Essential Techniques, Johnwikey 1996.
3. Davis, J.M. Basic Cell culture: A practical approach, IRL 1994.
4. Ganesh M.K. and Shivashankara A.R. 2012. Laboratory Manual for Practical Biochemistry Jaypee publications, 2nd edition.

Reference books

1. Essential practical handbook of Cell biology, Genetics and Microbiology - A Practical manual - Debarati Das Academic publishers
2. Cell biology Practical, Dr. Venugupta. Prestige publisher
3. Cell and Molecular biology, DeRobertis, 8th edition, 1st June, 1987

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3					3	3	3	3
CO 2	2	3					3	3	3	3
CO 3	2	3					3	3	3	3
CO 4	2	3					3	3	3	3

S-Strong (3) M-Medium (2) L-Low (1)

CHEMISTRY LAB-II

Course Code	Course Title	L	T	P	C
23114GEC26L	Chemistry Lab - II	0	0	3	3

COURSE OBJECTIVES:

1. To learn the techniques of titrimetric analyses.
2. To know the estimation of several cations and anions.
3. To learn the techniques of qualitative analysis of organic compounds

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

1. To understand the use of volumetric pipette, burette and analytical balance.
2. To explain the principles of volumetric analysis,

Organic Analysis:

Analyse the following organic Compounds.

1. Carbohydrate
2. Amide
3. Aldehyde
4. Ketone
5. Acid
6. Amine

The students may be trained to perform the specific reactions like tests for aliphatic or aromatic, saturated or unsaturated and functional group present and record their observations.

REFERENCES:

1. R. Gopalan, Elements of analytical chemistry, S. Chand, New Delhi, 2000.
2. N.S. Gnanapragasam and G. Ramamurthy, Organic Chemistry lab manual, S. Viswanathan and Co. Pvt. Ltd. Chennai-1998

LIFESTYLE DISEASES (NON-MAJOR ELECTIVE)

Skill Enhancement Course

Course Code	Course Title	L	T	P	C
23115SEC27	Lifestyle Diseases (Non-Major Elective)	2	0	0	2

Learning Objectives

- The objectives of this course are to
- Create awareness on life style diseases among adolescents.

- List out the lifestyle diseases.
- Explain the common lifestyle diseases and their prevention.
- Acquaint the disorders associated with women's health.
- Impart life skills so as to prevent lifestyle diseases.

Unit I: Lifestyle diseases: Definition, Factors contributing to lifestyle diseases - Physical inactivity, Poor food habits, disturbed biological clock, sleep deprivation. 6Hrs

Unit II: Top lifestyle diseases, Impact of Lifestyle diseases on family, society and economy of country. 6 Hrs

Unit III: Causes, symptoms, types, preventive measures and treatment of Obesity, cardiovascular diseases, diabetes and cancer. 6 hrs

Unit IV: Women's lifestyle diseases: Polycystic Ovarian Disease, Infertility, Breast and cervical cancer and Osteoporosis. 6 hrs

Unit V: Prevention of lifestyle diseases: Balanced diet, sufficient intake of water, physical activity, sleep-wake cycle, stress management and meditation. 6Hrs

Course outcomes

CO	On completion of the course the students will be able to	Program Outcomes
CO1	Define Life style diseases and describe the contributing factors	PO1
CO2	Enumerate the top lifestyle diseases and its impact on life.	PO1, PO4, PO5
CO3	Elaborate the treatment and prevention measures of common lifestyle diseases.	PO1, PO4, PO5
CO4	Highlight the lifestyle diseases that affects the women's health	PO1, PO4, PO5
CO5	Illustrate the various measures for prevention of lifestyle diseases	PO1, PO4, PO5

Textbooks

1. JamesM R, Lifestyle Medicine, 2nd Edition, CRC Press, 2013
2. Akira Miyazaki, New Frontiers in Lifestyle-Related Disease, Springer, 2008

Reference books

1. Steyn K, Life style and related risk factors for chronic diseases
2. Willett WC, Prevention of chronic disease by means of diet and lifestyle.

3. Kumar M & R. Kumar, Guide to prevention of lifestyle diseases. Deep & Deep publications

Web resources

1. <https://youtu.be/jDdL2bMQXfE>
2. <https://youtu.be/7WnpSB14nDM>
3. <https://youtu.be/ollz9MqtW-U>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2						3	3		3
CO 2	2			2	3		3	3		3
CO 3	2			2	3		3	3		3
CO 4	2			2	3		3	3		3
CO 5	2			2	3		3	3		3

S-Strong (3) M-Medium (2) L-Low (1)

FIRST AID

Course Code	Course Title	L	T	P	C
23115SEC28	First Aid	2	0	0	2

Learning Objectives

The main objectives of this course are to:

- Provide knowledge on the basics of first aid.
- Perform first aid during various respiratory issues.
- Demonstrate the first aid to treat injuries.
- Learn the first aid techniques to be given during emergency.
- Familiarize the first aid during poisoning.

Unit I: Aims and important rules of first aid, dealing with emergency, types and content of a first aid kit. First aid technique – Dressing and Bandages, fast evacuation technique, transport techniques. 6 Hrs

Unit II: Basics of Respiration – CPR, first aid during difficult breathing, drowning, choking, strangulation and hanging, swelling within the throat, suffocation by smoke or gases and asthma. 6 Hrs

Unit III: Common medical aid - first aid for wounds, cuts, head, chest, abdominal injuries, shocks, burns, amputations, fractures, dislocation of bones. 6Hrs

Unit IV: First aid related to unconsciousness, stroke, fits, convulsions - seizures, epilepsy. 6Hrs

Unit V: First aid in poisonous bites (Insects and snakes), honey bee stings, animal bites, disinfectant, acid and alkali poisoning. 6Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Discuss on the rules of first aid, dealing during emergency and first aid techniques	PO1, PO4, PO5
CO2	Understand the first aid techniques to be given during different types of respiratory problems	PO1, PO4, PO5
CO3	Provide first aid for injuries, shocks and bone injury	PO1, PO4, PO5
CO4	Detail on the first aid to be given for unconsciousness, stroke, fits and convulsions	PO1. PO4, PO5
CO5	Gain expertise in giving first aid for insect bites and chemical poisoning	PO1. PO4, PO5

Text books

- 1) First aid and health Dr. Gauri Goel, Dr. Kumkum Rajput, Dr. Manjul Mungali, ISBN 978-93-92208-19-5
- 2) Indian First Aid Manual-<https://www.indianredcross.org/publications/FA-manual.pdf>
- 3) Red Cross First Aid/CPR/AED Instructor Manual

Web resources

1. <https://www.redcross.org/take-a-class/first-aid/first-aid-training/first-aid-online>
2. <https://www.firstaidforfree.com/>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2						3	3	3	3
CO 2	2			3	3		3	3	3	3
CO 3	2			3	3		3	3	3	3
CO 4	2			3	3		3	3	3	3
CO5	2			3	3		3	3	3	3

S-Strong (3) M-Medium (2) L-Low (1)

COMMUNICATION SKILLS

Course Code	Course Title	L	T	P	C
231AECCMS	Communication Skills	2	0	0	2

Aim: The aim to develop communication skills

Course Objectives:

This course has been developed with the following objectives:

- Identify common communication problems that may be holding learners back
- Identify what their non-verbal messages are communicating to others
- Understand role of communication in teaching-learning process
- Learning to communicate through the digital media
- Understand the importance of empathetic listening
- Explore communication beyond language.

Course Outcome:

- By the end of this program, participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.

Unit I: Techniques of effective listening, Listening and comprehension, Probing questions, Barriers to listening, Pronunciation, Enunciation, Vocabulary, Fluency, Common Errors.

Unit II: Techniques of effective reading, gathering ideas and information from a given text, Identify the main claim of the text, Identify the purpose of the text, Identify the context of the text, Identify the concepts mentioned. Evaluating these ideas and information - Identify the arguments employed in the text, Identify the theories employed or assumed in the text.

Interpret the text - To understand what a text says, to understand what a text does, To understand what a text means

Unit III: Clearly state the claims, Avoid ambiguity, vagueness, unwanted generalizations and over simplification of issues, Provide background information, Effectively argue the claim, Provide evidence for the claims, Use examples to explain concepts, Follow convention, Be properly sequenced, Use proper signposting techniques, Be well structured. Well-knit logical sequence - Narrative sequence, Category groupings, Different modes of Writing - E-mails, Proposal writing for Higher Studies, Recording the proceedings of meetings, Any other mode of writing relevant for learners

Unit IV: Role of Digital literacy in professional life, Trends and opportunities in using digital technology in the workplace, Internet Basics, Introduction to MS Office tools: Paint, Office, Excel, Power point. Introduction to social media websites, Advantages of social media, Ethics and etiquettes of social media, How to use Google search better, Effective ways of using Social Media, Introduction to I Marketing

Unit V: Meaning of non-verbal communication, Introduction to modes of non-verbal communication, Breaking the misbeliefs, Open and Closed Body language, Eye Contact and Facial Expression, Hand Gestures, Do's and Don'ts, Learning from experts, Activities-Based Learning

Reference:

1. Sen Madhu Chanda (2010), An Introduction to Critical Thinking, Pearson, Delhi
2. Silvia P. J. (2007), How to Read a Lot, American Psychological Association, Washington DC

AUDIT COURSE

Course Code	Course Title	L	T	P	C	
231SSCBE	Basic Behavioural Etiquette	-	-	-	1	

Objectives:

Training is mainly focused on discipline, grooming, career planning and building personality. As it is the first year of the university, students are given awareness about the job market right from the start so that they prepare accordingly at their own pace and potential.

Eliminating negative thought, developing enriching habits, unlocking individual potentials and well-versed communication is the aim of this program. The module consists of

- a) Communication Skills
- b) Goal Setting
- c) Career Planning

- d) Reaching your Potential
- e) Time Management
- f) Stress Management
- g) Grooming and Discipline
- h) Learning skills
- i) Listening Skills
- j) Team Building

Reference Book

- 1 Barbara Pachter, Marjorie Brody. Complete Business Etiquette Handbook. Prentice Hall, 2015.
- 2 Dhanavel, S.P. English and Soft Skills. Hyderabad: Orient BlackSwan, 2021.
- 3 Koneru, Aruna. Professional Communication. Delhi: McGraw, 2008.
- 4 Mahanand, Anand. English for Academic and Professional Skills. Delhi: McGraw, 2013. Print.
- 5 Nancy Mitchell. Etiquette Rules : A Field Guide to Modern Manners. Wellfleet Press, 2015.
- 6 Rani, D Sudha, TVS Reddy, D Ravi, and AS Jyotsna. A Workbook on English Grammar and Composition. Delhi: McGraw, 2016.

SECOND YEAR: SEMESTER III

BIOMOLECULES

Course Code	Course Title	L	T	P	C
23115AEC33	Biomolecules	4	1	0	3

Learning objectives

- The main objectives of this course are to:
- Introduce the structure, properties and biological significance of carbohydrates
- Comprehend the classification, functions and acid base properties of amino acids
- Elucidate the various levels of organization of Proteins.
- Impart knowledge on the classification, properties and characterization of lipids.

- Acquaint with the classification, structure, properties and functions of nucleic acids

Unit I: Carbohydrates-Classification and biological significance, physical properties - stereo isomerism, optical isomerism, anomers, epimers and mutarotation. Monosaccharides: Occurrence, linear and cyclic structure, Reactions of monosaccharides due to the presence of hydroxyl, aldehyde and keto groups. Disaccharides: Structure and properties of reducing disaccharides (lactose and mannose), non-reducing disaccharide(sucrose). Polysaccharides: Homopolysaccharides - Occurrence, structure and biological significance of starch, glycogen and cellulose. Heteropolysaccharides - Structure and biological significance of mucopolysaccharides - hyaluronic acid, chondroitin sulphate and heparin. (Structural elucidation not needed). **12 hrs**

Unit II: Amino acids -Classification based on composition of side chain and nutritional significance. General structure of amino acids. 3 - and 1- letter abbreviations. Modified amino acids in protein non - protein amino acids. Physical properties of amino acids, isoelectric point, titration curve (alanine, lysine, glutamic acid), optical activity. Chemical reactions due to carboxyl group, amino group and side chains. Colour reactions of amino acids. **12Hrs**

Unit III: Proteins-Classification based on shape, composition, solubility and functions. Properties of proteins - Ampholytes, isoelectricpoint, salting in and salting out, denaturation and renaturation, UV absorption. Levels of Organization of protein structure- Primary structure, Formation and characteristics of peptide bond, phi and psi angle, Secondary structure- α helix (egg albumin), β - pleated sheath (keratin), triple helix (collagen). Tertiary structure - with reference to myoglobin. Quaternary structure with reference to haemoglobin. **12 Hrs**

Unit IV: Lipids- Lipids: Bloor's classification, chemical nature and biological functions. Fatty acids: classification, nomenclature, structure and properties of fatty acids. Simple and mixed triglycerides: structure and general properties, Characterization of fats- iodine value, saponification value, acid number, acetyl number, polensky number, Reichert-Meissl number along with their significance. Compound lipids-Structure and functions of phospholipids and glycolipids. Derived lipids-Structure and functions of cholesterol, bile acids and bile salts. **12Hrs**

Unit V: Nucleic Acids-Structure of purine and pyrimidine bases, nucleosides and nucleotides and their biological importance. Types of DNA: A, B, C, Z DNA, structure and biological significance, super helicity. Types of RNA: mRNA, tRNA, rRNA, hnRNA, snRNA, Secondary and tertiary structure of tRNA. Properties of DNA-Hypochromic and hyperchromic effect, melting temperature, viscosity. Denaturation and annealing. **12Hrs**

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
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CO1	Classify, illustrate the structure and explain the physical and chemical properties of carbohydrates.	PO1
CO2	Indicate the classification, structure, properties and biological functions of amino acids.	PO1
CO3	Explain the classification and elucidate the different levels of structural organization of proteins.	PO1
CO4	Elaborate on classification, structure, properties, functions and characterization of lipids	PO1, PO4
CO5	Describe the structure, properties and functions of different types of nucleic acids	PO1

Textbooks

1. Biochemistry, U. Sathyanarayana & U. Chakrapani, 2013, 5th edition Elsevier India Pvt. Ltd., Books & Allied Pvt. Ltd.
2. Fundamentals of Biochemistry, J.L. Jain, Sunjay Jain, Nitin Jain, 2013, 7th edition S. Chand & Company Ltd.
3. Text book of Medical Biochemistry, M.N. Chatterjea, Rana Shinde, 2002, 8th edition, Jaypee Brothers.

Reference books

1. David L. Nelson, Michael M. Cox, 2005, Principles of Biochemistry, 4th edition W.H. Freeman and Company.
2. Voet. D, Voet. J.G. and Pratt, C.W, 2004, Principles of Biochemistry, 4th edition John Wiley & Sons, Inc.
3. Zubay G.L, *et.al.*, 1995, Principles of Biochemistry, 1st edition, WmC. Brown Publishers.

Web resources

1. <https://www.britannica.com/science/biomolecule>
2. <https://en.wikipedia.org/wiki/Biomolecule><https://www.khanacademy.org/science/biology/macromolecules>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3

CO 3	3						3			3
CO 4	3			2			3	2		3
CO5	3						3			3

S-Strong (3) M-Medium (2) L-Low

MICROBIOLOGY-I

Course Code	Course Title	L	T	P	C
23116GEC34	Microbiology-I	4	1	0	3

Aim:

Students should have knowledge about the history and development of Microbiology

Objectives:

The contents of this course will help students understand history, biology of microorganisms, growth and control of microbes. Thus the beginners are rightly exposed to foundation of Microbiology which would lead them towards progressive advancement of the subject

Outcomes:

On the successful completion of the course, student will be able to:

1. Understand the history of microbiology
2. Analyze the types of microscopes
3. Understand the general characteristics of microbes
4. Evaluate the success of understanding the characterization and cultivation of microbes.

Unit I: History of microbiology - Historical development of Microbiology- Theories of spontaneous generation - The scope of Microbiology - prokaryotic and eukaryotic microorganisms. General principles and nomenclature - Haeckel's three kingdom concept, Whittaker's five kingdom concept- Carl Woese three domain classification.

Unit II: Microscopy - Microscopy: Principles and applications of bright field, dark field, phase contrast, fluorescent SEM and TEM. Principles and types of staining - Simple, differential (Gram, Spore, AFB) Capsule staining (Negative), Sterilization: Principles and methods – physical moist heat, dry heat, filtration (Membrane and HEPA).

Unit III: General characteristics of microbes - General characteristics and nature of Archaeobacteria, Cyanobacteria, Mycoplasma, Rickettsiae, Chlamydia, Spirochaetes,

Actinobacteria, Protozoa, Algae, Fungi and Viruses. Basic understanding of classification of viruses, algae, fungi and protozoa.

Unit IV: Classification of bacteria - Outline classification for bacteria as per the Bergey's Manual of Systematic Bacteriology - Structural organization of bacteria - Size, shape and arrangement of bacterial cells -Ultrastructure of a bacterial cell - cell wall, cell membrane, ribosomes, nucleoid, slime, capsule, flagella, fimbriae, spores, cysts, plasmid, mesosomes and cytoplasmic inclusions.

Unit V: Cultivation of microbes - Cultivation of microbes- Types of culture media with specific examples for each type. Aerobic and Anaerobic culture techniques-Pure culture techniques (Tube dilution, Pour plate, Spread plate and Streak plate).

REFERENCES

1. Alcamo IE. Fundamentals of Microbiology, sixth edition, Addison wesley Longman, Inc. California. 2001.
2. Alexopoulos CJ, Mims CW and Blackwell M. Introductory Mycology. Fifth edition John Wiley and Sons. Chichester. 2000.
3. Atlas RA and Bartha R. Microbial Ecology. Fundamentals and Application, Benjamin Cummings, New York. 2000.
4. Black JG. Microbiology-principles and explorations, 6th edition. John Wiley and Sons, Inc. New York. 2005.
5. Cappuccino and Sherman. Microbiology – A Laboratory Manual. 7th edition, Dorling Kindersley (India) Pvt. Ltd., New Delhi. 2012.

Text Book

1. Dubey RC and Maheswari DK. A Text Book of Microbiology. S Chand, New Delhi. 2010
2. Johri RM, Snehlatha, Sandhya Shrama. A Textbook of Algae. Wisdom Press, New Delhi. 2010.
3. Kanika Sharma. Textbook of Microbiology – Tools and Techniques. 1st edition, Ane Books Pvt. Ltd., New Delhi. 2011.
4. Madigan MT, Martinko JM, and Parker J. Biology of Microorganisms, 12th Edition, MacMillan Press, England. 2009.
5. Moselio Schaechter and Joshua Leaderberg. The Desk encyclopedia of Microbiology. Elseiver Academic press, California. 2004.
6. Pelczar MJ, Chan ECS and Kreig NR. Microbiology, fifth edition. McGrawHill. Book Co. Singapore. 2009.

6. Prescott LM, Harley JP, and Klein DA. Microbiology (7th edition) McGraw Hill, Newyork. 2008.
7. Schlegel HG. General Microbiology, Cambridge University Press, U.K. 2008.
8. Tortora GJ, Funke BR and Case CL. Microbiology: An Introduction. 9th Edition, Pearson Education, Singapore. 2009.
9. Rajan S and Selvi Christy R. Essentials of Microbiology, Anjanaa Book House, Chennai, 2015.

BIOMOLECULES LAB

Course Code	Course Title	L	T	P	C
23115SEC35L	Biomolecules Lab	0	0	3	3

Learning Objectives

The main objectives of this course are to

- Identify the biomolecules carbohydrates and amino acids by qualitative test
- Determine the quality of Lipids by titrimetric methods
- Isolate nucleic acids from plant and animal source

I) Qualitative test for 15 Hrs

1) Carbohydrates

a) Glucose b) Fructose c) Arabinose d) Maltose e) Sucrose f) Lactose g) Starch

2) Amino acids

a) Arginine b) Cysteine c) Histidine d) Proline e) Tryptophan f) Tyrosine g) Methionine

II Titrimetric methods 15 Hrs

1) Determination of Saponification value of an edible oil

2) Determination of Iodine number of an edible oil

3) Determination of Acid number of an edible oil

III. Group Experiments 15 hrs

1) Isolation of DNA from plant/animal source.

2) Isolation of RNA from rich source.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Qualitatively analyze the carbohydrates and report the type of carbohydrate based on specific tests	PO1, PO2, PO3
CO2	Qualitatively analyze amino acids and report the type of amino acids based on specific tests	PO1, PO2, PO3
CO3	Determine the Saponification, Iodine and acid number of edible oil	PO1, PO3, PO4
CO4	Isolate the nucleic acid from biological sources	PO1, PO3

Text books

1. David T Plummer, An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw-Hill Edition
2. J. Jayaraman Laboratory Manual in Biochemistry New Age International (P) Limited Fifth edition 2015
3. S. Sadasivam A. Manickam Biochemical Methods New Age International Pvt Ltd publisher's third edition 2018

Reference books

1. Rageeb, Kiran Patil, M. Bakshi Rahman, Sufiyan Ahmad Raees. A Practical book on Biochemistry, Everest publishing house 1st Edition, 2019
2. Introductory practical Biochemistry - S.K. Sawhney, Randhir Singh, 2nd ed, 2005.
3. Biochemical Tests - Principles and Protocols. Anil Kumar, Sarika Garg and Neha Garg. Vinod Vasishtha Viva Books Pvt Ltd, 2012.
4. Harold Varley, Practical Clinical Biochemistry, CBS. 6th edition, 2006.
5. Keith Wilson and John Walker. Principles and Techniques of Practical Biochemistry, 4th edition, Cambridge University press, Britain, 1995.

Web resources

1. <https://www.pdfdrive.com/instant-notes-analytical-chemistry-e912659.html> 14
2. <https://www.pdfdrive.com/analytical-biochemistry-e46164604.html>
3. <https://www.pdfdrive.com/biochemistry-books.html>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3	3				3	3	3	3
3CO 2	2	3	3				3	3	3	3

CO 3	2		3	2			3	3	3	3
CO 4	2		3				3	3	3	3

S-Strong (3) M-Medium (2) L-Low (1)

MICROBIOLOGY LAB-I

Course Code	Course Title	L	T	P	C
23116SEC36L	Microbiology Lab-I	0	0	3	3

1. Safety practices in Microbiological laboratory
2. Microscope and its operation
3. Principles and operations - Autoclave, Hot Air Oven, Filtration, Laminar Air Flow, Incubators, colony counter, Centrifuge, pH meter, Colorimeter and Spectrophotometer
4. Preparation of culture media, cleaning of glassware and sterilization methods
5. Demonstration of ubiquitous nature of microorganisms.
6. Measurement of size of microbes – micrometry.
7. Observation of permanent slides to study the structural characteristics of algae (Anabena, Nostoc, Spirulina, Oscillatoria), fungi (Pythium, Rhizopus, Saccharomyces, Penicillium, Aspergillus, Agaricus) and protozoa (Entamoeba histolytica and Plasmodium spp.).
8. Enumeration of bacterial numbers by Viable count (Plate count) and Total count (Haemo cytometer count)
9. Pure culture techniques - Streak plate, Pour plate and Spread plate.
10. Test for motility of bacteria - Hanging drop method.
11. Staining techniques - Simple staining, Gram's staining, Spore-staining, Capsular staining.
12. Isolation of bacteria, actinobacteria, fungi and cyanobacteria.

BASICS OF FORENSIC SCIENCE

Skill Enhancement Course

Course Code	Course Title	L	T	P	C
23115SEC37	Basics of Forensic science	2	0	0	1

Learning Objectives

The main objectives of this course are to

C1 Gain knowledge on the basic practices of forensic analysis.

C 2 Perform investigation using fresh blood.

C 3 Carry out the analysis using body fluids

C 4 Investigate the presence of forms of drugs and poisons in body fluids.

C5 Execute the identification test on multiple samples.

Unit I: Forensic Science: Definition, History and Development. Crime scene management and investigation; collection, preservation, packing and forwarding of physical and trace evidences for analysis. 6Hrs

Unit II: Blood – grouping and typing of fresh blood samples including enzyme. Cases of disputed paternity and maternity problems, DNA profiling. 6Hrs

Unit III: Analysis of body fluids- Analysis of illicit liquor including methyl and ethyl alcohol in body fluids and breathe. Chemical examination, physiology and pharmacology of Insecticides and pesticides. 6Hrs

Unit IV: Psychotropic drugs -Sedatives, stimulants, opiates and drugs of abuse. Identification of poisons from viscera, tissues and body fluids. 6Hrs

Unit V: Identification tests- Identification of hair, determination of species origin, sex, site and individual identification from hair. Classification and identification of fibers. Examination and identification of saliva, milk, urine and faecal matter 6Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Gain knowledge on basics of forensic science and method for collection and preservation of samples	PO1, PO2, PO6
6CO2	Assess the paternity, maternity problems and DNA profiling	PO1, PO2
CO3	Identify the presence of alcohol, insecticides and pesticides in body fluids	PO1, PO2
CO4	Detail on the test performed to identify the presence of drugs and poisons in body fluids	PO1, PO2
CO5	Identify species and sex from the available body fluids	PO1, PO2

Reference books

1. An Introduction to Forensic DNA Analysis by Norah Rudin & Keith Inman USA, Second edition.
2. Forensic Science Handbook, Volume 2 & 3 by Saferstein, Richard E.
3. Forensics by Embar-Seddon, Ayn and Pass. Allan D.
4. Forensic Medicine by Adelman, Howard C & Kobilinsky, Lawrence Page 24 of 63

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3					3		3	3
CO 2	2	3					3		3	3
CO 3	2	3					3		3	3
CO 4	2	3					3		3	3
CO5	2	3					3		3	3

S-Strong (3) M-Medium (2) L-Low (1)

MEDICAL LABORATORY TECHNOLOGY

Course Code	Course Title	L	T	P	C
23115SEC38	Medical Laboratory technology	2	0	0	2

Learning Objectives

The main objectives of this course are to

- Impart knowledge on specimen collection and disposal of waste.
- Acquaint knowledge on collection, preservation and transfusion of blood.
- Quantify the biomolecules in biological sample
- Understand the significance of various tests and their interpretation in diseased conditions

- Acquaint knowledge on enzymes, hormones and Immunoglobulins as markers for diagnosis.

Unit I: Collection, transport, analysis of specimen – blood, routine urine, feces, sputum, semen, CSF Documentation of samples & results. Disposal of laboratory/ hospital waste- Noninfectious waste, biomedical waste, infected sharp waste disposal, infected non sharp disposal - color coding as per guidelines. 6 Hrs

Unit II: Determination of Blood group and Rh factor -Basic blood banking procedures- cross matching, screening test. Blood transfusion and hazards. 6 Hrs

Unit III: Estimation of blood sugar - Enzymatic method, HbA1C, Qualitative and quantitative analysis of urine sample- NPN-urea, uric acid, creatinine. Mineral, vitamin and CSF analysis. 6 Hrs

Unit IV: Immuno diagnostics - Widal test, VDRL test, ASO, RA, CRP and Complement fixation Test. RIA, ELISA, Skin test - Montaux and Lepramin test. 6 Hrs

Unit V: Assay of clinically important enzymes- Estimation of clinically important hormones - Insulin, Thyroid and Reproductive hormones and its clinical significance. 6 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Collect & preserve of biological samples.	PO1, PO2
CO2	Estimate the various constituents in biological sample	PO1, PO2, PO6
CO3	Perform the routine procedures adopted in blood bank	PO1, PO2, PO6
CO4	Analyze and interpret the values for both normal and disease conditions.	PO1, PO2, PO6
CO5	Assay the enzymes and hormones &interpret clinical implications	PO1, PO2, PO6

Text Books

1. Kanai L Mukherjee and Anuradha Chakravarthy Medical Laboratory Technology IVth edition, Vol I, 2022
2. Ramnik Sood, Text Book of Medical Laboratory Technology, Jaypee Publishers, 2006

- Tietz, N. (2018) Fundamentals of Clinical Chemistry and Molecular Diagnostics 8th edition, W.B. Saunders Company

Web Resources

- <https://www.youtube.com/watch?v=QNYIX5Ne9IQ>
- <https://www.slideshare.net/doctorrao/agglutination-tests-and-immunoassys>
- <https://microbenotes.com/introduction-to-precipitation-reaction/>

Mapping with Program Outcome

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3					3	3	3	3
CO 2	2	3				2	3	3	3	3
CO 3	2	3				2	3	3	3	3
CO 4	2	3				2	3	3	3	3
CO5	2	3				2	3	3	3	3

S - Strong (3) M - Medium (2) L -Low (1)

RESEARCH METHODOLOGY

Ability Enhancement Compulsory course

Course Code	Course Title	L	T	P	C
23115RMC39	Research Methodology	2	0	0	2

Aim:

To create a basic appreciation towards research process and awareness of various research publication

Course objectives:

- To understand the steps in research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-bases
- To give exposure to MATLAB platform for effective computational and graphic works required for quality research

Course outcome:

Ability to carry out independent literature survey corresponding to the specific publication type and assess basic computational frameworks used in mathematical researches.

Unit I: Introduction to Research Methodology

Meaning of research – Objectives of research – Types of research – Significance of research – Research approaches

Unit II: Research Methods

Research methods versus methodology - Research and scientific method - Criteria of good research - Problems encountered by researchers in India.

Unit III: Literature Survey

Articles - Thesis - Journals - Patents - Primary sources of journals and patents - Secondary sources - Listing of titles - Abstracts - Reviews - General treatises - Monographs.

Unit IV: Database Survey

Database search - NIST - MSDS - PubMed - Scopus - Science citation index - Information about a specific search.

Unit V: Basic Principles of Laboratory Life Sciences Laboratory

Introduction - Access to Laboratory and Emergency Exits - Basic Biostatistics, Mean, Median, Mode and its Application - Fundamental of Biosafety, Bioethics, Replication – Advantages and Disadvantages, Standard deviation, Standard Error, Preparation of Chemicals – Percentage, Molarity and Normality, Ratio Solution, PPM Solution etc. Ethical Issue in Animal Handling, Basic of DMRT, ANOVA etc.

Reference Book

1. John W. Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods, Approaches, 4th Edition SAGE
2. Sharan B. Merriam & Elizabeth J. Tisdell, Qualitative Research: A Guide to Design and Implementation, 4th Edition, John Wiley & Sons
3. Introductory Statistics. Fifth Edition. (2004) Prem S. Mann. John Wiley and Sons, (ASIA) Pvt. Ltd.
4. Research Methodology Methods and Statistical Techniques - Santosh Gupta
5. Biostatistical analysis. J.H. Zar, 4th edition. Pearson Education, Inc. India.
6. Braun, R.P. Introduction to instrumental analysis, McGraw Hill.
7. Wilson & Walker, Principles and Techniques of Biochemistry and Molecular Biology. 6th Edn, Cambridge Univ. Press.

AUDIT COURSE

Course Code	Course Title	L	T	P	C
231ACLSOAN	Office Automation	-	-	-	1

Course Objectives:

To provide an in-depth training in the use of office automation, internet and internet tools. The course also helps the candidates to get acquainted with IT.

Course Outcomes:

After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with the internet.

Unit I: Knowing the basics of Computers

Unit II: Word Processing (MS word)

Unit III: Spread Sheet (MS XL)

Unit IV: Presentation (MS Power Point)

Unit V: Communicating with Internet

Reference:

1. Fundamentals of computers - V. Rajaraman - Prentice- Hall of India
2. Microsoft Office 2007 Bible - John Walkenbach, Herb Tyson, Faithe Wempen, Cary N. Prague, Michael R Groh, Peter G. Aitken, and Lisa a. Bucki -Wiley India pvt. ltd.
3. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
4. Computer Fundamentals - P. K. Sinha Publisher: BPB Publications

Web Reference

1. <https://en.wikipedia.org>
2. <https://wiki.openoffice.org/wiki/Documentation>
3. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

SEMESTER – IV - TAMIL-IV

BIOCHEMICAL TECHNIQUES

Course Code	Course Title	L	T	P	C
23115AEC43	Biochemical Techniques	4	1	0	3

Learning objectives

The objectives of this course are to

- Introduce the basic principles, types and applications of various sedimentation technique.
- Provide an understanding of the underlying principles of chromatographic techniques
- Demonstrate experimental skills in various electrophoretic techniques.
- Appraise the use of colorimetric and spectroscopic techniques in biology
- Impart knowledge about the measurement of radioactivity and safety aspects of radioactive isotopes.

Unit I: Centrifugation - Basic principles, RCF, Sedimentation coefficient, Svedberg constant. Types of rotors. Preparative centrifugation- differential and density gradient centrifugation, Rate zonal and Isopycnic techniques, construction, working and applications of analytical ultracentrifuge-Determination of molecular weight (Derivation excluded) 9 Hrs

Unit II: Chromatography - adsorption, partition. Principle, instrumentation and applications of paper chromatography, thin layer chromatography, ion-exchange chromatography, gel permeation chromatography and affinity chromatography. 9 Hrs

Unit III: Electrophoresis -General principles, factors affecting electrophoretic mobility. Tiselius moving boundary electrophoresis. Electrophoresis with paper and starch. Principle, instrumentation and applications of agarose gel electrophoresis and SDS-PAGE. 9Hrs

Unit IV: Basics of Electromagnetic radiations- Energy, wavelength, wavenumber and frequency. Absorption and emission spectra, Lambert - Beer Law, Light absorption and transmittance. Colorimetry-Principle, instrumentation and applications. Visible and UV spectrophotometry – Principle, instrumentation and applications - enzyme assay, structural studies of proteins and nucleic acids. 9 hrs

Unit V: Radioactivity - Types of Radioactive decay, half-life, units of radioactivity, Detection and measurement of radioactivity - Methods based upon ionization -Geiger Muller Counter. Methods based upon excitation - Solid & Liquid scintillation counters. Autoradiography. Biological applications and safety aspects of radioisotopes. 9 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Describe types of rotors and identify the centrifugation technique for the separation of biomolecules.	PO1, PO2, PO6

CO2	Demonstrate the principles, operational procedure and applications of planar and column chromatography.	PO1, PO2, PO6
CO3	Specify the factors and explain the separation of DNA and protein using electrophoretic technique.	PO1, PO2, PO6
CO4	State Beer's Law and illustrate the instrumentation and uses of colorimeter and spectrophotometer.	PO1, PO2, PO6
CO5	Enumerate various methods of measurement of radioactivity and safety aspects of radioactive isotopes.	PO1, PO2, PO6

Textbooks

1. Avinash Upadhyay, Kakoli Upadhyay & Nirmalendu Nath, 2002, Biophysical Chemistry, Principles and Techniques, 3rd edition, Himalaya Publishing House.
2. L. Veerakumari, 2009, Bioinstrumentation, 1st edition, MJP Publishers.
3. Keith Wilson & John Walker, 2000, Practical Biochemistry-Principles and techniques, Cambridge University Press, 4th edition.

Reference books

1. Terrance G. Cooper The tools of Biochemistry, 1977, John Wiley & Sons, Singapore.
2. Gurumani, Research Methodology for Biological Sciences, 2011, 1st edition, MJP Publishers.
3. Saroj Dua, Neera Garg, Biochemical Methods of Analysis, 2010, 1st edition, Narosa Publishing house.

Web Resources

1. <https://www.britannica.com/science/chromatography>
2. <https://www.youtube.com/watch?v=xgxFBQZYXIE>
3. <https://www.youtube.com/watch?v=7onjVBsQwQ8>

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3				2	3	3	3	3
CO 2	2	3				2	3	3	3	3
CO 3	2	3				2	3	3	3	3
CO 4	2	3				2	3	3	3	3
CO 5	2	3				2	3	3	3	3

S-Strong (3) M-Medium (2) L-Low (1)

MICROBIOLOGY – II

Course Code	Course Title	L	T	P	C
23116AEC44	MICROBIOLOGY – II	0	0	3	3

Aim:

Students should have knowledge about the microbes and their metabolism

Objectives:

- To equip the students with the real knowledge of working with different types of Microbes.
- To understand the variety of microorganisms and to analyse their true potential.

Outcomes:

On the successful completion of the course, student will be able to:

1. Understand the different types of microbial associations.
2. Analyze the nutritional types of microorganisms
3. Apply the knowledge to enumerate the microorganisms from natural environment.
4. Evaluate the success of understanding the metabolism of microbes.

Unit I: Microbes and its associations: Microbes in Extreme Environment – thermophilic, methanogenic and halophilic. Archaea - live in extreme conditions. Beneficial aspects of microorganisms. Physiology and biochemistry of microbes- Photo-autotrophs, Chemo-autotrophs, Parasitism, Saprophytism, Mutualism and Symbiosis, Commensalisms, endozoic microbes.

Unit II: Nutrition and growth of microorganisms: Nutritional types of microorganisms, nutritional requirements. Factors influencing the growth of microorganisms – temperature, pH, Osmotic pressure, moisture, radiations and different chemicals, Physiology of growth – Significance of various phases of growth. Growth measurements – batch, continuous and synchronous.

Unit III: Microbial enzymes and their Reproduction: Bacterial enzymes – classification, properties, kinetics of enzyme action – Michaelis Menton equation for simple enzymes - coenzymes and cofactors, isozymes. A detailed account of General structure, growth and reproduction of Bacteria, fungi and Virus. Economic and industrial importance of yeast and moulds

Unit IV: Microbial metabolism: Metabolism of carbohydrates: Anabolism – phototsynthesis – oxygenic – an oxygenic, synthesis of carbohydrate – catabolism of glucose – Embden Mayer – Hoff – Parnas pathway – Pentose pathway, Kreb’s cycle (TCA) – electron

transport system and ATP production. Metabolism of protein – synthesis and degradation of amino acids – glycine tyrosine, cysteine, serine, glutamine, synthesis of peptides and proteins – urea cycle.

Unit V: Microbes and their Respiration: Anaerobic Respiration – Nitrate, sulphate and Methane respiration – Fermentations – alcohol, mixed acid, lactic acid fermentation – Metabolism of lipids – biosynthesis of fatty acids and cholesterol – oxidation of fatty acids.

Text Book(s)

1. Pelczar, JR. M. J. (1993). Microbiology: Concepts and Applications. McGraw-Hill. Inc.
2. Prescott, L.M., Harley, J.P and Klein, D. A. Brown (2019). Microbiology. 11th edition, Mc Graw publishers.
3. Stanier, R. Y., Ingraham, J. I., Wheelis, M. I. and Painter, P. R. (2005). General Microbiology. Macmillan Press Ltd. Hampshire.

Reference Books

1. Madigan, M. T., Bender, K. S., Buckley, D. H., Sattley, W. M. and Stahl, D. A. (2017). Brock Biology of Microorganisms. 15th edition. Pearson.
2. Tortora, G. J., Funke, B. R. and Case, C. L. (2016). Microbiology: An introduction. 12th Edition, Pearson.

BIOCHEMICAL TECHNIQUES LAB

Course Code	Course Title	L	T	P	C
23115SEC45L	Biochemical Techniques Lab	0	0	3	3

Learning objectives

The objectives of this course are to:

- Acquaint the students with colorimetric estimations of biomolecules.
- Equip skills on various separation techniques.
- Impart knowledge about the estimation of minerals and vitamins.

I Colorimetry

1. Estimation of amino acid by Ninhydrin method.
2. Estimation of protein by Biuret method.
3. Estimation of DNA by Diphenylamine method.
4. Estimation of RNA by Orcinol method.

5. Estimation of Phosphorus by Fiske and Subbarow method.

II Chromatography

6. Separation and identification of sugars and amino acids by paper chromatography.
7. Separation and identification of amino acids and lipids by thin layer chromatography.

III Demonstration

1. Separation of serum and plasma from blood by centrifugation.
2. Separation of serum proteins by SDS-PAGE.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Estimate the amount of biomolecules by Colorimetric method.	PO1, PO3, PO6
CO2	Quantify the amount of minerals by Colorimetric method	PO1, PO3, PO6
CO3	Separate and identify sugars, lipids and amino acids by chromatography	PO1, PO3
CO4	Operate centrifuge for the separation of serum and plasma	PO1, PO3, PO6
CO5	Demonstrate the separation of proteins electrophoretically	PO1, PO3, PO6

Text books

1. J. Jayaraman, Laboratory Manual in Biochemistry New Age International (P) Limited Fifth edition 2015.
2. Sadasivam A. Manickam Biochemical Methods New Age International Pvt Ltd publishers third edition 2018.
3. Keith Wilson and John Walker Principles and techniques of Practical Biochemistry Cambridge University Press, 2010, Seventh edition.

Reference books

1. S. K. Sawhney and Randhir Singh, Introductory Practical Biochemistry. Alpha Science International, Ltd 2nd edition, 2005.
2. David T. Plummer, 2001, An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw- Hill publishing company limited.
3. Varley's Practical Clinical Biochemistry by Alan H Gowenlock, published by CBS Publishers and distributors, India Sixth Edition, 1988.

MICROBIOLOGY LAB-II

Course Code	Course Title	L	T	P	C
23116SEC46L	Microbiology Lab-II	0	0	3	3

Learning objectives

- 1.Acquire knowledge on bacterial growth
- Gain knowledge on carbohydrates fermentation for bacteria.
- Learn the biochemical identification of the bacteria

Experiments

1. Bacterial growth curve: Cell count/viable count/absorbance (total count)
2. Carbohydrate fermentation tests: Glucose, Lactose, Sucrose and Mannitol.
3. Biochemical test for identification of bacteria: IMViC tests - TSI agar test Urease-Catalase- Oxidase.

Course Outcome

- Describe the bacteria growth
- Explain the carbohydrate test for bacteria characteristics.
- Elaborate on the biochemical test for bacterial identification

BIOMEDICAL INSTRUMENTATION

Course Code	Course Title	L	T	P	C
23115SEC47A	Biomedical Instrumentation	2	0	0	2

Learning Objectives

- The objectives of this course are to
- Provide insights about the blood pressure and its measurement.
- Elaborate the mechanism of instruments related to respiration.
- Highlight the importance of imaging techniques.
- Acquaint students about the basics of medical assisting devices.
- Familiarize about the life saving therapeutic equipment's.

Unit I: Measurement of blood pressure - sphygmomanometer. Cardiac output - Cardiac rate - Heart sound - Stethoscope, ECG - EEG - EMG - ERG. 6 Hrs

Unit II: Monitoring of inspired/expired anaesthetic gases, manograph, inhalators, nebulizers, aspirators, infant respirator, Plethysmography.6 Hrs

Unit III: Medical imaging: X-ray machine - Radio graphic and fluoroscopic techniques – Computed tomography - MRI - PET, Ultrasonography - Endoscopy - Thermography.6 Hrs

Unit IV: Assisting equipment's: Pacemakers - Defibrillators - Ventilators6 Hrs

Unit V: Therapeutic equipment's: Nerve and muscle stimulators - Diathermy - Heart - Lung machine - Audio meters - Dialyzers. 6 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Programme outcome
CO1	Illustrate the functions of instruments used for measuring blood pressure.	PO1, PO2, PO5
CO2	Elaborate the devices required for monitoring of respiratory gases.	PO1, PO2, PO5
CO3	Understand the operation of the imaging and sonographic instruments.	PO1, PO2, PO5
CO4	Differentiate between the action of pacemakers, defibrillators and ventilators.	PO1, PO2, PO5
CO5	Demonstrate the function of therapeutic equipment's	PO1, PO2, PO5

Text books

1. M. Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies.
2. L.A. Geddes and L.E. Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley & Sons.
3. J. Webster, 'Medical Instrumentation', John Wiley & Sons.
4. C. Rajarao and S.K. Guha, 'Principles of Medical Electronics and Biomedical instrumentation', Universities (India) Ltd, Orient Longman Ltd.

Reference books

1. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II Edition, Pearson Education, 2002.

2. R.S. Khandpur, 'Handbook of Bio-Medical instrumentation', Tata McGraw Hill Publishing Co Ltd.,

Web Resources

1. <https://youtu.be/GkUCmb0cKwo?list=PLCZ9KmODEcu138IIVeHClJ4nskArYr1Dg>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3			3		3	3	3	3
CO 2	2	3			3		3	3	3	3
CO 3	2	3			3		3	3	3	3
CO 4	2	3			3		3	3	3	3
CO 5	2	3			3		3	3	3	3

S-Strong (3) M-Medium (2) L-Low

TISSUE CULTURE

Course Code	Course Title	L	T	P	C
23115SEC47B	Tissue Culture	2	0	0	2

Learning Objectives

The objectives of this course are to

- Introduce the tools and techniques used in tissue culture technique.
- Acquire knowledge on preparation of growth medium for culture techniques.
- Impart knowledge on procedures involved gene transfer.
- Acquaint with the process of tissue culture technique.
- Understand the importance of plant and animal tissue culture for the production and evaluation of bioactive compounds

Unit I: Introduction to Tissue culture, Types- seed, embryo, Callus, Organ, Protoplast culture, Advantages and importance of tissue culture, Tools and techniques **6 Hrs**

Unit II: Media and Culture Preparation - pH, temperature, solidifying agents. Role of Micro and macro nutrients. Maintenance of cultures. **6 Hrs**

Unit III: Methods of gene transfer in plants and animals - direct and indirect gene transfer methods. **6 Hrs**

Unit IV: Cell culture technique - Explants selection, sterilization and inoculation. **6 Hrs**

Unit V: Transgenic plants for crop improvement. Transgenic plants for molecular farming. Animal Cloning - an Overview-Applications of animal cell culture **6 Hrs**

Course outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Introduction to plant tissue culture	PO1, PO2, PO3
CO2	Brief knowledge on preparation of tissue culture media	PO1, PO2
CO3	Understanding on different methods of gene transfer	PO1, PO2, PO3
CO4	Gain knowledge on plant and animal cell culture techniques	PO1, PO2, PO3
CO5	Study of applications of genetically modified plants and animals.	PO1,PO2,PO3

Text books

1. Trivedi, P.C.2000. Applied Biotechnology: Recent Advances. PANIMA Publishing corporation.
2. Ignacimuthu. 1996. Applied Plant Biotechnology. Tata McGraw – Hill.
3. Lycett, G.W. and Grierson, D. (ed). 1990. Genetic Engineering of crop plants.
4. Grierson and Covey, S.N.1988. Plant Molecular biology. Blackie.
5. Chawla, H.S., “Introduction to Plant Biotechnology”, 3rd Edition, Science Publishers, 2009.

Reference books

1. Gamburg OL, Philips GC, Plant Tissue & Organ Culture fundamental Methods, arias Publications. 1995.
2. Stewart Jr., C.N., “Plant Biotechnology and Genetics: Principles, Techniques and Applications” Wiley-Interscience, 2008.
3. Freshney, R. I. (2010). Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications. Wiley-Blackwell, 2010. 6th Edition.
4. Davis, J. M. (2008). Basic Cell Culture. Oxford University Press. New Delhi.
5. Davis, J. M. (2011). Animal Cell Culture. John Willy and Sons Ltd. USA.6Freshmen R. I. (2005). Culture of Animal Cells. John Willy and Sons Ltd. USA.
6. Butler, M. (2004). Animal Cell Culture and Technology. Taylor and Francis. Keywork USA.

7. Verma, A. S. and Singh, A. (2014). Animal Biotechnology. Academic Press, ELSEVIER, USA

Web Resources

1. <https://www.britannica.com/science/tissue-culture>
2. https://en.wikipedia.org/wiki/Plant_tissue_culture
3. <https://microbeonline.com/animal-cell-culture-introduction-types-methods-applications/>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3	3				3	3	3	3
CO 2	2	3					3	3	3	3
CO 3	2	3	3				3	3	3	3
CO 4	2	3	3				3	3	3	3
CO5	2	3	3				3	3	3	3

S - Strong (3) M - Medium (2) L -Low (1)

MEDICAL CODING

Course Code	Course Title	L	T	P	C
23115SEC48A	Medical Coding	2	0	0	2

Course objectives

The objectives of this course are to

- Understand the basic concept of medical coding
- Familiarize the student about medical terminology
- Understand about the classification of diseases based on WHO/AHA
- Understand about the CPT code used for diseases as per American Medical Association (AMA)

Unit I: Introduction to Medical coding, coding theory, Healthcare Common Procedure Coding, First Aid and CPR 6Hrs

Unit II: Introduction to Medical Terminology, specialization I & II, Diagnostic coding, factors affecting diagnostic coding 6Hrs

Unit III: Documenting medical records- Importance of Documentation, Types of dictation formats. 6Hrs

Unit IV: Introduction to Human Anatomy and Coding, ICD-10- CM classification system. 6Hrs

Unit - V: Introduction to CPT coding, types of CPT coding Medical Law and Ethics. 6hrs

Course Outcome

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Explaining the basic concept of coding and its application. Possess the knowledge about the First aid and CPR	PO1, PO2, PO6
CO2	Possess the knowledge about medical terminology used in medical coding industry	PO1, PO2, PO6
CO3	Possess the knowledge about the ICD-10 CM international classification of diseases based on WHO	PO1, PO2, PO6
CO4	Possess the knowledge about the CPT codes used for diseases as per American Medical Association (AMA)	PO1, PO2, PO6
CO5	Understand CPT coding and its types	PO1, PO2, PO6

Text books

1. Understanding Medical Coding, A comprehensive guide Sandra L Johnson Robin Linker.
2. Buck’s Step – by – step Medical Coding Elsevier reference

Reference books

1. Terry Tropin M Shai, RHIA, CCS-P, AHIMAICD-10-CMcoding guidelines made easy 2017.
2. Besty J Shiland - Medical terminology and anatomy for ICD-10.

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3				3	3		2	3
CO 2	2	3				3	3		2	3
CO 3	2	3				3	3		2	3
CO 4	2	3				3	3		2	3
CO5	2	2				2	3		2	3

S - Strong (3) M - Medium (2) L -Low (1)

MICROBIAL TECHNIQUES

Course Code	Course Title	L	T	P	C
23115SEC48B	Microbial techniques	2	0	0	2

Learning objectives

The objectives of this course are to

- Study the growth of bacteria
- Know the parts & uses of microscope
- Learn staining methods to identify microbes
- Learn different types of culture methods
- Study food preservation methods

Unit I: Growth of bacteria- Definition, growth phases, factors affecting growth (pH, temperature, and oxygen), cell count (hemocytometer, Bacterial cell- *Bacillus subtilis*), fungal cell (*Saccharomyces*) and human blood cell. 6 Hrs

Unit II: Microscopy- Principle, types - Compound microscope, electron microscope - TEM, SEM, use of oil immersion objective. 6 Hrs

Unit III: Stains and staining- Principles of staining, simple staining, negative staining, Differential staining, Gram and acid-fast staining, flagella staining, capsule and endospore Staining. Staining of yeast (methylene blue), lactophenol cotton blue, staining of mold (*Penicillium*, *Aspergillus*), *Agaricus*. 6 Hrs

Unit IV: Cultivation of bacteria - Types of growth media (natural, synthetic, complex, enriched, selective- definition with example), culture methods (streak plate, spread plate, pour plate, stab culture, slant culture, liquid shake culture, anaerobiosis) - aerobic and Anaerobic bacteria. 6 Hrs

Unit V: Food microbiology- Microbiological examination of food: microscopic examination and culture, phosphatase test of Pasteurized milk. Preservation of food- High temperature (boiling, pasteurization, appreciation), low temperature (freezing), dehydration, osmotic pressure, chemical preservations, radiation. Microorganisms as food SCP. 6 Hrs

Course Outcome

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Understand the growth of bacteria and to perform cell count	PO1, PO2
CO2	Acquire knowledge of microscope and its uses	PO1, PO2

CO3	Identify the microbes by staining methods	PO1, PO2, PO6
CO4	Culture microbes by various methods	PO1, PO2, PO6
CO5	Preserve foods at high and low temperature	PO, PO2, PO6

Text books

1. Sherris Medical Microbiology, 7th Edition by Authors: Kenneth Ryan, C. George Ray, Nafees Ahmad, W. Lawrence Drew, Michael Lagunoff, Paul Pottinger, L. Barth Reller and Charles R. Sterling
2. Food Microbiology: Fundamentals and Frontiers, 5th Edition by Editor(s): Michael P. Doyle, Francisco Diez-Gonzalez, Colin Hill
3. Text book of microbiology by Ananthanarayan and Panicker's
4. Textbook of microbiology by P.C. Trivedi Sonali Pandey Seema Bhadauria.
5. Prescott's Microbiology, 10th Edition by Authors: Joanne Willey, Linda Sherwood and Christopher J. Woolverton

Reference books

1. Bailey & Scott's Diagnostic Microbiology, 14th Edition by Author: Patricia Title
2. Medical Microbiology, 7th Edition Authors: Patrick R. Murray, Ken S. Rosenthal and Michael A. Pfaller
3. Microbiology: Laboratory Theory and Application, 3rd Edition Authors: Michael J. Leboffe and Burton E. Pierce

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3					3	3	3	3
CO 2	2	3					3	3	3	3
CO 3	2	3				2	3	3	3	3
CO 4	2	3				2	3	3	3	3
CO5	2	3				2	3	3	3	3

S - Strong (3) M - Medium (2) L -Low (1)

Ability Enhancement Compulsory course

ENVIRONMENTAL STUDIES

Course Code	Course Title	L	T	P	C

231AECCEVS	Environmental Studies	2	0	0	2
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Aim

Creating awareness about the environmental problems among people. Imparting basic knowledge about the environment and its allied problems

Course Objectives:

- Creating the awareness about environmental problems among people.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating public to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.
- Striving to attain harmony with Nature.

Course Outcomes:

Students who graduate with a major in environmental science will be able to:

CO1: Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale;

CO2: Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment;

CO3: Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community;

CO4: Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues; and

CO5: Understand how politics and management have ecological consequences.

Unit I: Nature of Environmental Studies - Definition, scope and importance. Multidisciplinary nature of environmental studies. Need for public awareness.

Unit II: Natural Resources and Associated Problems. Forest resources: Use and over - exploitation, deforestation, dams and their effects on forests and tribal people. Water resources: Use and over - utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer - pesticide problems. Energy resources: Growing energy needs, renewable and non - renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.

Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individuals in conservation of natural resources.

Unit III: Ecosystems. Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem: a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit VI: Biodiversity and its conservation

Introduction - Definition: genetic, species and ecosystem diversity. Bio - geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega - diversity nation. Western Ghat as a biodiversity region. Hot - spot of biodiversity. Threats to biodiversity habitat loss, poaching of wildlife, man - wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In - situ and Ex - situ conservation of biodiversity.

Unit V: Environmental Pollution. Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of a individual in prevention of pollution. **Social Issues and the Environment.** Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions. Global waming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products.

Field Work

Visit to a local area to document environmental assets - River / Forest / Grassland / Hill / Mountain.

or

Visit to a local polluted site - Urban / Rural / Industrial / Agricultural.

or

Study of common plants, insects, birds.

or

Study of simple ecosystems - ponds, river, hill slopes, etc.

References:

1. Agarwal, K.C,2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.

2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt, Ltd., Ahmedabad 380013, India, Email: rn4pin@icenet.net (R)
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clank R.S., Marine Pollution, Clarendon Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Western Ltd.
7. Down to Earth, Centre for Science and Environment, New Delhi. (R)
8. Gleick, H., 1993, Water in crisis, Pacific Institute for studies in Dev., Environment & Security. Stockholm Env Institute. Oxford Univ. Press 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bompay (R)
10. Heywood, V.K. & Watson, R.T.1995, Global Biodiversity Assessment, Cambridge Univ. Press 1140 p.
11. Jadhav, H. and Bhosale, V.J. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.
12. Mickinney, M.L. and School. R.M. 1196, Environmental Science Systems and Solutions, Web enhanced edition, 639p.
13. Miller T.G. Jr. Environmental Science. Wadsworth Publications Co. (TB).
14. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574zp.
15. Rao M.N. and Dana, A.K. 1987, Waste Water Treatment, Wxford & IBH Publ. Co. Pvt. Ltd., 345p
16. Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse, Meerut
17. Survey of the Environment, The Hindu (M)
18. Townsend C., Harper, J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)

AUDIT COURSE

Course Code	Course Title	L	T	P	C
231LCSCLS	Leadership and Management Skills	0	0	0	1

Aim:

The aim of the course cultivating and nurturing the innate leadership skills of the youth so that they may transform these challenges into opportunities and become torch bearers of the future by developing creative solutions.

Course Objective:

The Module is designed to:

Help students to develop essential skills to influence and motivate others

- Inculcate emotional and social intelligence, and integrative thinking for effective leadership
- Create and maintain an effective and motivated team to work for the society
- Nurture a creative and entrepreneurial mindset
- Make students understand the personal values and apply ethical principles in professional and social contexts.

Course Outcomes:

Upon completion of the course, students will be able to:

- Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision
- Learn and demonstrate a set of practical skills such as time management, self-management, handling conflicts, team leadership, etc.
- Understand the basics of entrepreneurship and develop business plans
- Apply the design thinking approach to leadership
- Appreciate the importance of ethics and moral values for making of a balanced personality.

Unit I: Leadership Skills: Understanding Leadership and its Importance - What is leadership? - Why Leadership required? - Whom do you consider as an ideal leader? - Traits and Models of Leadership - Are leaders born or made? - Key characteristics of an effective leader - Leadership styles - Perspectives of different leaders - Basic Leadership Skills – Motivation – Teamwork Negotiation – Networking.

Unit I: Managerial Skills: Basic Managerial Skills - Planning for effective management - How to organize teams? - Recruiting and retaining talent - Delegation of tasks - Learn to coordinate – Conflict management - Self-Management Skills - Understanding self-concept – Developing self – awareness - Self-examination - Self-regulation

Unit III: Entrepreneurial Skills: Basics of Entrepreneurship - Meaning of entrepreneurship - Classification and types of entrepreneurs - Traits and competencies of entrepreneur - Creating Business Plan - Problem identification and idea generation - Idea validation – Pitch making

Unit IV: Innovative Leadership and Design Thinking: Innovative Leadership - Concept of emotional and social intelligence - Synthesis of human and artificial intelligence - Why does culture matter for today's global leaders – Design Thinking - What is design thinking? - Key elements of design thinking: Discovery – Interpretation - Ideation - Experimentation -

Evolution. How to transform challenges in to opportunities? - How to develop human-centric solutions for creating social good?

Unit V: Ethics and Integrity - Learning through Biographies - What makes an individual great? - Understanding the persona of a leader for deriving holistic inspiration - Drawing insights for leadership - How leaders sail through difficult situations? - Ethics and Conduct - Importance of ethics - Ethical decision making - Personal and professional moral codes of conduct - Creating a harmonious life

Book

- Ashokan, M. S. (2015). Karmayogi: A Biography of E. Sreedharan. Penguin, UK.
- Brown, T. (2012). Change by Design. Harper Business
- Elkington, J., & Hartigan, P. (2008). The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World. Harvard Business Press.
- Goleman D. (1995). Emotional Intelligence. Bloomsbury Publishing India Private Limited
- Kalam A. A. (2003). Ignited Minds: Unleashing the Power within India. Penguin Books India
- Kelly T., Kelly D. (2014). Creative Confidence: Unleashing the Creative Potential WithinUsAll. William Collins

E-Resources

- HowtoBuildYourCreativeConfidence,TedTalkbyDavidKelly
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - . "A Leader Should Know How to Manage Failure" <https://www.youtube.com/watch?v=laGZaS4sdeU>
- Martin, R. (2007). How Successful Leaders Think. Harvard Business Review, 85(6):60.

SEMESTER V

Course Code	Course Title	L	T	P	C
23115AEC51	Enzymes	5	1	0	4

Course objectives

The main objectives of this course are to

- Provide fundamental knowledge on enzymes and their properties.

- Understand the mechanism of action of enzymes and the role of coenzymes in catalysis.
- Introduce the kinetics of enzymes and determine the K_m and V_{max} .
- Explain the effect of inhibitors on enzyme activity
- Understand the role of enzymes in clinical diagnosis and industries.

Course outcome

- To explain basic properties and basic functions of enzymes
- To explain working principle of enzymes and the relationship between enzyme and substrate
- To explain the properties of enzyme-catalysed reactions, Michaelis-Menten kinetics and the Lineweaver-Burke graphic
- To define the mechanisms of enzyme activity regulation, allosteric regulation
- To explain the Industrial applications of enzymes

Unit I: Introduction to enzymes: Nomenclature and Classification based on IUB with examples, enzyme as catalyst-Activation energy, Enzyme specificity-absolute, Group, linkage and stereo specificities. Concept of Active site, Lock and key hypothesis and induced fit theory, Enzyme expression Units-IU, turnover number, katal and specific activity. **12 Hrs**

Unit II: Mechanism of enzyme catalysis - Acid Base catalysis, covalent catalysis, electrostatic catalysis, metal ion catalysis, proximity and orientation effect. Coenzymes - Definition, types, co-enzymatic forms of vitamins- NAD/NADP, FAD, FMN, Coenzyme A TPP, PLP, lipoic acid and biotin. Multienzyme complexes - Pyruvate dehydrogenase complex. Isoenzyme with reference to LDH and CK. **12 Hrs**

Unit III: Enzyme kinetics - Definition of kinetics, Factors affecting enzyme activity - temperature, pH, substrate and enzyme concentration, activators-cofactors, Derivation of Michaelis-Menton equation for unisubstrate reactions, Lineweaver - Burk plot, Eadie - Hofstee plot Significance of K_m and V_{max} and their determination using the plots. **12 Hrs**

Unit IV: Enzyme inhibition - Reversible and irreversible inhibition-types of reversible inhibitors, competitive, non-competitive, un-competitive inhibitors. Graphical representation by L-B plot, (Kinetic derivations not required), Determination of K_m and V_{max} in the presence and absence of inhibitors. Allosteric enzymes - Sigmoidal curve, positive and negative modulators. **12 Hrs**

Unit V: Applications of enzymes -Immobilized enzymes - methods of immobilization-adsorption, covalent bonding, crosslinking, encapsulation, entrapment and applications of immobilized enzymes. Biosensors – e.g. Glucose sensors. Industrial applications of enzymes

- Food, textile and pharmaceutical industries. 12Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Programme outcome
CO1	Identify the major classes of enzymes, differentiate between a chemical catalyst and a biocatalyst and define the units of enzymes.	PO1
CO2	Explain the mechanism of enzyme catalysis and the role of coenzymes in enzyme action.	PO1, PO2
CO3	Illustrate the steady state kinetics, interpret MM plot and LB plot based on kinetics data, and determine Km and Vmax.	PO1, PO3
CO4	Distinguish the types of inhibition along with its importance in biochemical reactions.	PO1, PO3
CO5	Comprehend the various methods for production of immobilized enzymes and discuss the application of enzymes in clinical diagnosis and various industries.	PO1, PO2, PO6

Textbooks

1. U. Sathyanarayana & U. Chakrapani, 2013, Biochemistry, 4th edition, Elsevier India Pvt. Ltd., Books & Allied Pvt. Ltd.
2. Dr. G.R Agarwal, Dr. Kiran Agarwal & O.P. Agarwal, 2015, Textbook of Biochemistry (Physiological chemistry), 18th edition, Goel Publishing House,
3. T. Devasena, 2010, Enzymology, 1st edition, Oxford University Press.

Reference books

1. Trevor Palmer, 2008, Enzymes: Biochemistry, Biotechnology, Clinical Chemistry, 2nd edition, East West Press Pvt. Ltd.
2. David L. Nelson, Michael M. Cox, 2005, Principles of Biochemistry, 4th edition W.H. Freeman and Company,
3. Voet. D, Voet. J.G. and Pratt, C.W, 2004, Principles of Biochemistry, 4th edition John Wiley & Sons, Inc.
4. Zubay G.L, et. al., 1995, Principles of Biochemistry, 1st edition, WmC. Brown Publishers.

Web resources

1. www.biologydiscussion.com/notes/enzymes-notes

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3	2					3			3
CO 3	3		2				3			3

CO 4	3		2				3			3
CO 5	3	2				2	3	3	3	3

S-Strong(3) M-Medium (2) L-Low (1)

INTERMEDIARY METABOLISM

Course Code	Course Title	L	T	P	C
23115AEC52	Intermediary Metabolism	5	1	0	4

The main objectives of this course are to

- Review the basic concepts of free energy transformation and describe biological oxidation.
- Illustrate the pathways of carbohydrate metabolism.
- Explain the pathways of oxidation and biosynthesis of lipids.
- Detail the catabolism of amino acids and synthesis of specialized products from amino acids.
- Acquaint the metabolism of nucleic acids and its regulation

Unit I: Bioenergetics-High energy compounds: Role of high energy compounds, free energy hydrolysis of ATP and other organophosphates, ATP-ADP cycle.

Biological Oxidation: Electron transport chain -its organization and function. Inhibitors of ETC. Oxidative phosphorylation, P/O ratio, Peter Mitchell's chemiosmotic hypothesis. Mechanism of ATP synthesis, uncouplers of oxidative phosphorylation, substrate level phosphorylation with examples. **15 Hrs**

Unit II: Metabolism of carbohydrates - Glycolysis, TCA Cycle, Amphibolic nature and integrating role of TCA cycle. Anaplerosis, Pentose Phosphate Pathway (HMP shunt), Gluconeogenesis, Glycogenesis, Glycogenolysis and its regulation, glyoxylate cycle, Entner-Doudoroff pathway and Coricycle. **15 Hrs**

Unit III: Metabolism of lipids - Oxidation of fatty acids - α , β and ω -oxidation of saturated fatty acids, Oxidation of fatty acids with odd number of carbon atoms and unsaturated fatty acids, Ketogenesis, Biosynthesis of saturated fatty acids and unsaturated fatty acids, Biosynthesis and degradation of triglycerides, phospholipids and cholesterol. **15 Hrs**

Unit IV: Metabolism of amino acid- Metabolic nitrogen pool, Catabolism of amino acid: Oxidative deamination, non-oxidative deamination, transamination and decarboxylation, Biogenic amines, Urea cycle and its regulation. **15 Hrs**

Unit V: Metabolism of nucleotides - Biosynthesis of purines and pyrimidines, - de novo synthesis and salvage pathways, Degradation of purines and pyrimidines, Conversion of ribonucleotide to deoxyribonucleotide. **15 Hrs**

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	State the concepts of bioenergetics and illustrate the mechanism of flow of electrons and the production of ATP.	PO1, PO2
CO2	Elaborate the biochemical reactions and integration of pathways of carbohydrate metabolism.	PO1,
CO3	Sketch the oxidation and biosynthesis of fatty acids, phospholipids, triglycerides and cholesterol with suitable examples	PO1
CO4	Explain catabolism of amino acids, synthesis of non-essential amino acids and specialized products from amino acids.	PO1
CO5	Describe the metabolism of nucleic acids with necessary illustrations and its regulation.	PO1

Textbooks

1. U. Sathyanarayana & U. Chakrapani, 2015, Biochemistry, 4th Elsevier India Pvt. Ltd.,
2. M.N. Chatterjea and Rana Shinde, 2002, Textbook of Medical Biochemistry, 5th edition Jaypee Brothers Medical Publishers Pvt. Ltd.

Reference books

1. Lehninger Principles of Biochemistry, David L. Nelson, Michael M. Cox, 2008, 5th edition, W.H. Freeman and Company.
2. Robert K. Murray, Daryl K. Granner, Victor W. Rodwell, 2006, Harper's Illustrated Biochemistry, 27th edition, McGraw Hill Publishers.
3. Principles of Biochemistry. Voet. D. Voet, J.G. Voet and Pratt C.W. 2010, Fourth edition, John Wiley & Sons, Inc.,
4. Principles of Biochemistry, Geoffrey L. Zubay, William W. Parson, Dennis E. Vance, 1995, 2nd Edition, Wm.C. Brown Publishers.
5. Biochemistry, Garret, R.H. and Grisham, C.M. 2005, 3rd Edition. Thomson Learning INC.

Web resources

1. <https://nptel.ac.in/courses/104/105/104105102/>
2. <http://www.nptelvideos.in/2012/11/biochemistry-i.html>

3. https://www.saddleback.edu/faculty/jzoval/mypptlectures/ch15_metabolism/lecture_notes_ch15_metabolism_current-v2.0.pdf

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3	2					3			3
CO 2	3						3			3
CO 3	3						3			3
CO 4	3						3			3
CO 5	3						3			3

S-Strong (3) M-Medium (2) L-Low (1)

CLINICAL BIOCHEMISTRY

Course Code	Course Title	L	T	P	C
23115AEC53	Clinical Biochemistry	5	1	0	4

Learning objectives

The main objectives of this course are to

- Comprehend the basic concepts and disorders of carbohydrate metabolism
- Explain the disorders of lipid metabolism.
- Elucidate the liver function test and kidney function test.
- Designate the gastric function test.
- Familiarize the clinical enzymology.

Unit I: Disorders of carbohydrate metabolism: Maintenance of blood glucose by hormone with special reference to insulin and glucagon. Abnormalities in glucose metabolism: Diabetes mellitus; types, causes, biochemical manifestations, diagnosis and treatment, glycosuria, Fructosuria, Pentosuria, Galactosemia and Glycogen storage diseases. 15 hrs

Unit II: Disorders of Lipid Metabolism: Lipid Profile, Atherosclerosis, Fatty liver and hyperlipidemia. Hyper cholesterolemia, Lipidosis and Xanthomatosis, Tay-Sach`s disease, Niemann-Pick disease, lipotropic agents. **15 Hrs**

Unit III: Liver Function Tests: Bilirubin metabolism and jaundice, Estimation of conjugated and total bilirubin in serum (Diazo method). Detection of bilirubin and bile salts in urine (Fouchet`s test and Hay`s Sulphur test). Thymol turbidity test, prothrombin time, serum enzymes in liver disease serum transaminases (SGPT & SGOT) and lactate dehydrogenase (LDH). **15 Hrs**

Kidney Function Tests: Measurement of urine pH, volume, specific gravity, osmolality, sediments in urine, inulin, urea and creatinine clearance tests. Concentration and dilution tests. Phenol red test. Levels of plasma protein and its significance related to kidney function. Proteinuria. 15Hrs

Unit VI: Gastric Function test: Composition of gastric juice, collection of gastric contents, examination of gastric residuum, fractional test meal (FTM), stimulation test-alcohol and histamine stimulation, Tubeless gastric analysis **1.5 Hrs**

Unit V: Clinical enzymology: Enzymes of diagnostic importance- LDH, creatine kinase, transaminases, phosphatases, Isoenzymes of lactate dehydrogenase. **15 Hrs**

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Explain the concepts of hormones and their importance to maintain glucose and types of Diabetes, diagnosis and treatment.	PO1, PO3, PO6
CO2	Analyze the lipid profile and different deficiency state.	PO1, PO3, PO6
CO3	Describe the liver and kidney functions and specific diagnostic methods used for biological sample.	PO1, PO3, PO6
CO4	Detail about the composition of gastric juice and special test for diagnosis.	PO1, PO3, PO6
CO5	Elaborate the enzyme markers used for diagnostic studies.	PO1, PO3, PO6

Text books

1. M.N. Chatterjee and Rana Shinde, Text Book of Medical Biochemistry, Jaypee Brothers Medical Publishers (P) LTD, New Delhi, 8th Edition, 2012

- Ambika Shanmugam's Biochemistry for medical students, 8th edition, published by Wolters Kluwer India Pvt. Ltd.

Reference books

- Philip. D. Mayne, Clinical Chemistry in diagnosis and treatment. ELBS Publication, 6th edition, 1994.
- Thomas M. Devlin (2014) Text book of Biochemistry with clinical correlations (7th ed). John Wiley and sons.
- Tietz Fundamentals of clinical chemistry and molecular Diagnostics (2014) (7th ed) Saunders.

Web Resources

- <https://www.britannica.com/science/metabolic-disease/Disorders-of-carbohydrate-metabolism>
- <https://www.slideshare.net/MohitAdhikary/gastric-and-pancreatic-function-tests>
- https://onlinecourses.nptel.ac.in/noc20_ge13/preview

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3		3			2	3	2	2	3
CO 2	3		3			2	3	2		3
CO 3	3		3			2	3	3	2	3
O 4	3		3			2	3	3	2	3
CO 5	3		3			2	3	3	2	3

S-Strong (3) M-Medium (2) L-Low (1)

IMMUNOLOGY

Course Code	Course Title	L	T	P	C
23115DSC54__	Immunology	4	0	0	3

Learning Objectives

The objective of this course are to

- Introduce the structure and functions of lymphoid organs and cells of the immune system
- Illustrate the structure and classification of antibodies and adaptive immune response
- Impart knowledge on the types of immunity and uses of vaccines
- Provide an understanding of immune related diseases and transplantation
- Study the Ag-Ab interaction and immunological techniques to identify antigens and antibodies

Unit I: Structure and function of primary lymphoid organs (thymus, bone marrow), secondary lymphoid organs (spleen, lymph node), Cells involved in immune system-Functions-Phagocytosis -Inflammation 15 Hrs

Unit II: Antigens - Nature, Immunogens, haptens, cross reactions - Immunoglobulin- types-structure and function. Cells involved in antibody formation, Clonal selection theory, Co-operation of T-cell with B-cell. Differentiation of T and B lymphocyte - Humoral and cell mediated immunity. Monoclonal antibody – Production and application in biology. 15Hrs

Unit III- Immunity and its types-Innate, Acquired, active and passive. - Natural and Artificial - Commonly used toxoid vaccines, killed vaccines, live attenuated vaccines, rDNA Vaccines, DNA and subunit vaccines 15Hrs

Unit IV: Hypersensitivity – Immediate (Type 1) and Delayed (Type IV), Auto- immune diseases with examples. Organ specific and systemic autoimmunity. SLE, RA. Transplantation – Types of Grafts, structure& functions of MHC, graft Vs host reaction, immunosuppressive Agents. 15Hrs

Unit V: Antigen-antibody reactions, General features of Antigen Antibody reactions. Precipitation, Immuno diffusion, SID and DID - Oudin Procedure, Oakley Fulthrope Procedure, Radio immune diffusion, Ouchterlony double diffusion, CIE, Rocket electrophoresis, Agglutination-Coomb’s test Complement Fixation test-Wasserman’s reaction, RIA, ELISA. 15Hr

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Associate structure and function of the organs involved in our body’s natural Defence	PO1
CO2	Classify antigens and antibodies and the role of lymphocytes in defending the host	PO1, PO2
CO3	Describe the types of immunity and the uses of vaccines	PO1, PO4
CO4	Understand the immune related diseases and mechanism of transplantation	PO1, PO2

CO5	Examine the immunological tests and relate it to the immune status of an Individual	PO1, PO3
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Text Books

1. Kuby, J. (2018). Immunology (5th ed). W.H. Freeman - ISBN-10 : 1319114709 / ISBN-13 : 978-1319114701
2. Rao, C. V. (2017). Immunology (3rd ed). Chennai: Alpha Science Int. Ltd - ISBN-10 : 1842652559/ ISBN 13:978-1842652558
3. Tizard (1995). An Introduction to Immunology. Harcourt Brace College Publications

References Books

1. Kenneth M. Murphy, Paul Travers, Mark Walport - (2007), Janeway's Immunobiology, 7th edition, Garland Science.
2. Abul K. Abbas, Andrew H. Lichtman, Jordan S. Pober - (1994), Cellular and molecular immunology, 2nd edition, B. Saunders Company.
3. Basic Immunology Functions and Disorders of the Immune System, 6th Edition - January 25, 2019 Authors: Abul Abbas, Andrew Lichtman, Shiv Pillai, ISBN: 9780323549431 eBook ISBN: 9780323639095
4. Peter Delves, Seamus Martin, Dennis Burton, Ivan Roitt - (2006), Roitt's Essential Immunology, 11th edition, Wiley-Blackwell

Web resources

1. https://onlinecourses.nptel.ac.in/noc22_bt40/preview
2. https://onlinecourses.swayam2.ac.in/cec20_bt05/preview
3. <https://youtu.be/8uahFPl6ny8>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3		2				3			3
CO 3	3			2			3	3		3
CO 4	3	2					3	1		3
CO 5	3		3				3	3	3	3

S-Strong (3) M-Medium (2) L-Low (1)

BIOCHEMICAL PHARMACOLOGY

Course Code	Course Title	L	T	P	C
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23115DSC54__	Biochemical Pharmacology	4	0	0	3
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Learning Objectives

The objectives of this course are to

- Introduce the basic concepts of pharmacology.
- Explain the metabolism of drugs and factors responsible for metabolism.
- Acquaint the adverse response and side effects of drugs.
- Familiarize important drugs used for common metabolic disorders.
- Provide an understanding about the action of antibiotics.

Unit I: Drugs – classification based on sources, routes of drug administration - Oral/Enteral, Parenteral and Local application. Absorption of drugs, factors influencing drug absorption, distribution and excretion of drugs. 15 Hrs

Unit II: Drug metabolism - Phase I and Phase II reactions, role of cytochrome P₄₅₀, non-microsomal reactions of drug metabolism. Factors influencing drug metabolism. Therapeutic index. 15 Hrs

Unit III: Drug allergy, Drug tolerance - IC₅₀, LD₅₀ of a drug, Drug intolerance, Drug addiction, Drug abuses and their biological effects. Drug resistance - biochemical mechanism. 15 Hrs

Unit IV: Therapeutic Drugs - Analgesics and Non-steroidal anti-inflammatory drugs (NSAIDs) - Aspirin and Acetaminophen. Insulin, Oral antidiabetic drugs - Sulfonylureas, Biguanides. Antihypertensive drugs - ACE inhibitors, Calcium channel blockers. Anti-cancer agents - Antimetabolites. 15 Hrs

Unit V: Antibiotics - Definition, Examples and Biochemical mode of action of penicillin, streptomycin, tetracyclines and chloramphenicol. 15 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Classify the different routes of drug administration, describe the absorption, distribution, metabolism and excretion of drugs.	PO1
CO2	Illustrate the metabolism of drugs, classify the microsomal and non-microsomal reactions and explain the role of cytochromes.	PO1

CO3	List out the various adverse response and side effects of drugs.	PO1, PO2, PO4
CO4	Justify the use of synthetic drugs and elucidate its pharmacological actions and its adverse effects for different disease.	PO1, PO4
CO5	Highlight the importance and explain the mode of action of important antibiotics.	PO1, PO4

Text Books

1. N. Murugesh, A concise text book of Pharmacology - Sathya Publishers.
2. Jayashree Ghosh, A Textbook of Pharmaceutical chemistry –S. Chand & Company Ltd.
3. S.C. Metha, Ashutosh Kar, Pharmaceutical Pharmacology - New Age International (P) Limited, Publishers.

References Books

1. Lippincott's illustrated Reviews- Pharmacology by Mary J. Mycek, Richard A. Harvey,
2. Pamela C. Champe, Lippincott – Raven publishers, New Delhi.
3. David. E. Golan, Principles of Pharmacology, Wolters Kluwer (India) Pvt. Ltd.
4. R.S. Satoskar, S. B. Elsevier Pharmacology and pharmacotherapy. - ISBN-10: 9788131248867 / ISBN-13: 978-8131248867, 2017.
5. Tripathi, K. Essentials of Medical Pharmacology. Jaypee Publishers- ISBN-10: 9350259370 / ISBN-13: 978-9350259375, 2018.

Web Resources

1. <https://slideplayer.com/slide/3728296/64/video/What+is+bioremediation%3F.mp4>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3	2		2			3	2		3
CO 4	3			2			3	2		3
CO 5	3			2			3	2		3

S-Strong (3) M-Medium (2) L-Low (1)

DISASTER MANAGEMENT

Course Code	Course Title	L	T	P	C
23115DSC54__	Disaster Management	4	0	0	3

Course Objectives:

- To provide students an understanding the need for studying the disaster management
- Develop an understanding about the various types of disasters.
- To expose students to the risk and vulnerability analysis
- To create awareness about disaster prevention and risk reduction
- To establish relationship between disasters and developments.
- To understand Rehabilitation, Reconstruction and Recovery in the event of Disaster
- To gain knowledge on Climate Change Adaptation and IPCC Scenario and Scenarios in the context of India.

Course Outcomes:

CO1: Understand the need and significance of studying disaster management

CO2: Understand the different types of disasters and causes for disasters.

CO3: Gain knowledge on the impacts Disasters on environment and society

CO4: Study and assess vulnerability of a geographical area.

CO5: Students will be equipped with various methods of risk reduction measures and risk mitigation.

CO6: Understand the role of Information Technology in Disaster Management

CO7: Understand Geographical Information System applications in Disaster Management

Content of Course

Unit I: Introduction to Disasters

Chapter No.1: Disaster: Concept, Meaning, and Definition

Chapter No.2: History of Major Disaster Events in India

ChapterNo.3: Types of Disasters - Natural Disasters: Famine, Drought, Flood, Cyclone, Tsunami, Earthquake

Unit II: Disaster Mitigation and Disaster Management

Chapter No.4: Man-made Disasters: Riots, Blasts, Industrial, Militancy

Chapter No.5: Profile, Forms and Reduction of Vulnerability

Chapter No. 6: Disaster Mitigation: Concept and Principles

Unit III: Impact of Disaster

Chapter No.7: Disaster Management: Concept and Principles

Chapter No.8: Pre-disaster-Prevention and Preparedness

Chapter No.9: Physical, Economic, Social, Psycho-socio Aspects, Environmental Impacts

Unit IV: Disaster Process and Intervention

Chapter No.10: During Disaster – Rescue and Relief

Chapter No.11: Post-disaster – Rehabilitation and Reconstruction

Chapter No.12: Victims of Disaster-Children, Elderly, and Women

Chapter No.13: Displacement-Causes, Effects and Impact

Unit V: Disaster Intervention

Chapter No.14: Major Issues and Dynamics in the Administration of Rescue, Relief, Reconstruction and Rehabilitation

Chapter No.15: Components of Rescue, Relief, Reconstruction; Rehabilitation

Chapter No.16: Disaster Policy in India; Disaster Management Authority-NDMA, SDMA, DDMA; Disaster Management Act, 2005

References:

1. Anil Sinha (2001), Disaster Management-Lessons Drawn and Strategies for Future. New Delhi, Jain Publications.
2. Backer, C.W. and Chapman, W. (ed.). (1969), Man and Society in Disasters, New Delhi,
3. Clarke, J.I., Peter Curson, et.al. (ed.) (1991), Population and Disaster, Oxford, Basil Blackwell Ltd.
4. Cuny, Frederick (1984), Disasters and Development, Oxford, Oxford University Press. Disaster Management Act 2005
5. Garb, S. and Eng.E (1969), Disasters Hand Book, New York, Springer.
6. Gupta, M.C, L.C. Gupta, B. K. Tamini and Vinod K. Sharma (2000), Manual on Natural Disaster Management in India, New Delhi, National Institute of Disaster Management. Hoff, A (1978), People in Crisis-Understanding and Helping, California, Addison Wesley.
7. Maskrey Andrew (1989), Disaster Mitigation: A Community Based Approach, Oxford, Oxfarm.
8. Narayan, Sachindra (ed.) (2000), Anthropology of Disaster Management, New Delhi, Gyan Publishing House.
9. Nidhi G Dhawan (2014), Disaster Management and Preparedness, New Delhi, Jain Publications.
10. Parasuraman, S. and Unnikrishnan, P.V. (2000), India Disasters Report: Towards Policy Initiative, New Delhi, Oxford University Press.

Course Code	Course Title	L	T	P	C
23115SEC55L	Clinical Biochemistry Lab	0	0	3	3

Course Objectives:

The objectives of this course are to

- Introduce the methods of sample collection (blood & urine) for analytical purpose.
- Impart practical knowledge on the assay of activity of various diagnostically important enzymes
- Understand the estimation procedure for various important biomolecules.
- Help students learn the routine qualitative analysis of urine sample for diagnostic purpose.
- Train students on various hematological tests and its significance.

EXPERIMENTS

80 Hrs

1. Collection and preservation of blood and urine samples.
2. Estimation of creatinine by Jaffe's method (serum & urine)
3. Estimation of urea by diacetyl monoxime method (serum & urine)
4. Estimation of uric acid (serum & urine)
5. Estimation of cholesterol by Zak's method
6. Estimation of Glucose by Ortho Toluidine method
7. Estimation of Protein by Lowry's method
8. Estimation of Hemoglobin by Shali's/Drabkins method
9. Assay of SGPT and SGOT

Qualitative analysis of normal constituents of urine

Urea, Creatinine, Phosphorus, Calcium

Abnormal constituents

Calcium

Sugar (Glucose, fructose, pentose)

Protein

Amino acids (Tyrosine, Histidine, Tryptophan)

Ketone bodies

Bile pigments with clinical significance.

DEMONSTRATION EXPERIMENTS (10 Hrs)

HEMATOLOGY

- a) RBC Counting
- b) Total and differential count of white blood cells
- c) Packed cell volume
- d) Erythrocyte sedimentation rate
- e) Blood clotting time
- f) Blood grouping

Course Outcomes

CO	On completion of this course, students will be able to	Programme outcome
CO1	Acquaint knowledge on collection of biological samples (urine, blood) and their preparation for diagnostic purpose.	PO1, PO2
CO2	Assay the activity of various clinically important enzymes and relate their clinical importance.	PO1, PO2
CO3	Estimate the important biomolecules in biological samples and relate their clinical significance	PO1, PO2, PO3, PO6
CO4	Qualitatively analyze urine sample for normal and abnormal constituents in urine and interpret the results	PO1, PO2, PO3
CO5	Perform the routine haematological tests.	PO1, PO2, PO3, PO6

Text Books

1. Manickam. S.S. (2018). Biochemical Methods (3rd ed.). Newage International Pvt Ltd publishers.
2. Plummer. D.T. An Introduction to Practical Biochemistry. Tata McGraw Hill.
3. Alan H Gowenlock. 1998. Varley's Practical Clinical Biochemistry, 6th edition, CBS Publishers, India.
4. Godkar, B. 2020. Textbook of Medical Laboratory Technology Vol 1 & 2 Paperback, 3rd edition, Bhalani Publishers.
5. Kanai L Mukerjee. 1996. Medical Lab Technology, Vol I& II, 1st edition, Tata Mcgraw Hill, Pennsylvania.
6. Ranjna Chawla. 2014. Practical Clinical Biochemistry Methods and interpretations 58 (Paperback). 4th edition, Jaypee Brothers Medical Publishers, New York.

Reference books

1. Singh, S.K. (2005). Introductory Practical Biochemistry (2nd ed.). Alpha Science International, Ltd
2. Ashwood, B. a. (2001). Tietz Fundamentals of Clinical chemistry. WB Saunders Company, Oxford Science Publications USA

Web resources

1. <https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors>
2. <http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/ Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf>
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y
4. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3	3					3	3	3	3
CO 2	3	3					3	3	3	3
CO 3	3	3	3			3	3	3	3	3
CO 4	3	3	2				3	3	3	3
CO 5	3	3	3			3	3	3	3	3

S-Strong (3) M-Medium (2) L-Low (1)

ENZYME AND IMMUNOLOGY LAB

Course Code	Course Title	L	T	P	C
23115SEC55L	Enzyme and Immunology Lab	0	0	3	3

Course Objective

Upon successful completion students will -

- To promote critical thinking among students;
- To provide students with a foundation in immunological processes;
- To provide students with knowledge on how the immune system works building on their previous knowledge from biochemistry, genetics, cell biology and microbiology;

Course Outcome

- Study the principle and applications of various immuno techniques ranging from precipitation and agglutination reactions to ELISA, Radio immunoassay
- Besides, students will get an opportunity to learn diffusion and electrophoresis.
- To estimate the mineral content in food
- To know the sources of enzymes and study the extraction and partial purification of enzyme acid phosphatase
- To standardize the optimum pH, optimum substrate concentration required for the maximum activity of acid phosphatase
- To analyse the inhibition pattern by various competitive inhibitors for the enzyme acid phosphatase purified from germinated mung bean
- To assay the activity of Lactate dehydrogenase and glucose-6-phosphate dehydrogenase enzymes

EXPERIMENTS

ENZYMES

1. Determination of Alkaline Phosphatase Activity.
 - a. Effect of PH
 - b. Effect of Temperature.
 - c. Specific Activity
 - d. Km (Saturation Method).
2. Determination of Salivary Amylase Activity.
 - a. Effect of PH
 - b. Effect of Temperature.
 - c. Specific Activity
 - d. Km (Saturation Method).

IMMUNOLOGY

1. Double Immunodiffusion
2. Single Radial Immuno diffusion
3. Rocket Immuno electrophoresis
4. Direct ELISA
5. Hemagglutination tests for identification of human blood groups
6. Detection by viral fever by slide agglutination tests.
7. Dialysis.

REFERENCES:

1. Manuals in Biochemistry - Dr.J.Jayaraman.
2. Practical Biochemistry - Plummer.
3. Manuals in Biochemistry - Dr.S.Ramakrishnan.
4. Klemir and others: Practical Biological Chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry – Sawhney (2000)
7. Varley’s Practical Clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London,1988).

**AUDIT COURSE
PROFESSIONAL SKILLS**

Course Code	Course Title	L	T	P	C
231ACLSPSL	Professional Skills	-	-	-	1

Course Objectives:

The Objectives of the course are to help students/candidates:

- Acquire career skills and fully pursue to partake in a successful career path
- Prepare a good resume, prepare for interviews and group discussions
- Explore desired career opportunities in the employment market in consideration of an individual SWOT.

Course Outcomes:

At the end of this course the students will be able to:

- Prepare their resume in an appropriate template without grammatical and other errors and using proper syntax

- Participate in a simulated interview
- Actively participate in group discussions towards gainful employment
- Capture a self - interview simulation video regarding the job role concerned
- Enlist the common errors generally made by candidates in an interview
- Perform appropriately and effectively in group discussions
- Explore sources (online/offline) of career opportunities
- Identify career opportunities in consideration of their own potential and aspirations
- Use the necessary components required to prepare for a career in an identified occupation (as a case study).

Unit I: Resume Skills: Preparation and Presentation, Introduction of resume and its importance, Difference between a CV, Resume and Biodata, Essential components of a good resume, Resume skills: common errors, Common errors people generally make in preparing their resume, prepare a good resume of her/his considering all essential components

Unit II: Interview Skills: Preparation and Presentation, Meaning and types of interviews (F2F, telephonic, video, etc.). Dress Code, Background Research, Do's and Don'ts, Situation, Task, Approach and Response (STAR Approach) for facing an interview. Interview procedure (opening, listening skills, closure, etc.). Important questions generally asked in job interview (open and closed ended questions).

Unit III: Interview Skills: Simulation Observation of exemplary interviews Comment critically on simulated interviews, Interview Skills: Common Errors: Discuss the common errors generally candidates make in interview Demonstrate an ideal interview

Unit IV: Group Discussion Skills: Meaning and methods of Group Discussion, Procedure of Group Discussion, Group Discussion-Simulation, Group Discussion - Common Errors.

Unit V: Exploring Career Opportunities: Knowing yourself - personal characteristics, Knowledge about the world of work, requirements of jobs including self-employment. Sources of career information, preparing for a career based on their potentials and availability of opportunities,

VALUE EDUCATION

Course Code	Course Title	L	T	P	C
231AECCVED	Value Education	2	0	0	2

Course Objectives

- Provide insights into the central dogma of molecular biology and explain the mechanism of DNA replication.
- Elaborate the mechanism of transcription and reverse transcription.

- Highlight the characteristics of genetic code and describe the process of protein synthesis.
- Introduce the concept of regulation of gene expression in prokaryotes
- Familiarize the different types of mutations and explain the mechanism of DNA repair.

Course Content:

UNIT I: Central Dogma of molecular Biology, DNA as the unit of inheritance. Experimental evidences by Griffith's transforming principle, Avery, McLeod and McCarthy's experiment, and Hershey and Chase Experiment. Replication in prokaryotes: Modes of replication, Meselson and Stahl's experimental proof for semiconservative replication. Mechanism of Replication – Initiation, events at Ori C, Elongation – replication fork, semi discontinuous replication, Okazaki fragments, and termination. Bidirectional replication, Inhibitors of replication. Models of replication-theta, rolling circle and D loop model.

UNIT II: Transcription - Mechanism of transcription: DNA dependent RNA polymerase(s), recognition, binding and initiation sites, TATA/ Pribnow box, elongation and termination. Post-transcriptional modifications; inhibitors of transcription. RNA splicing and processing of mRNA, tRNA and rRNA. Reverse transcription.

UNIT III: Genetic Code and its characteristics, Wobble hypothesis. Translation: Adaptor role of tRNA, Activation of amino acids, Initiation, elongation and termination of protein synthesis, post-translational modifications and inhibitors of protein synthesis

UNIT IV: Regulation of Gene Expression In Prokaryotes - Principles of gene regulation, negative and positive regulation, concept of operons, regulatory proteins, activators, repressors, regulation of lac operon and trp operon.

UNIT V: Mutation: Types-Nutritional, Lethal, Conditional mutants. Missense mutation and other point mutations. Spontaneous mutations; chemical and radiation – induced mutations. DNA repair: Direct repair, Photo reactivation, Excision repair, Mismatch repair, Recombination repair and SOS repair.

Course Outcomes

- Illustrate the Central Dogma of molecular biology, explain the multiplication of DNA in the cell and describe the types and modes of replication.
- Elaborate the mechanism of transcribing DNA into RNA, discuss the formation of different types of RNA.
- Decipher the genetic code and summarize the process of translation.
- Comprehend the principles of gene expression and explain the concept of operon in prokaryotes.
- Distinguish the types of mutations and explain the various mechanisms of DNA repair.

Text Books (Latest Editions)

1. Veer Bala Rastogi, 2008, Fundamentals of Molecular Biology, 1st edition, Anebooks India.
2. David Friefelder, 1987, Molecular Biology, 2nd edition, Narosa Publishing House.
3. Dr. P.S. Verma and Dr. V.K. Agarwal, 2013, Cell biology, Genetics, Molecular Biology, Evolution and Ecology, 1st edition, S. Chand & Company Pvt. Ltd.

References Books

1. Karp, G., 2010, Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons. Inc.
2. DeRobertis, E.D.P. and De Robertis, E.M.F., 2010, Cell and Molecular Biology, 8th edition, Lippincott Williams and Wilkins, Philadelphia.
3. James. D. Watson, 2013, Molecular Biology of the Gene 7th edition, Benjamin Cummings.

SEMESTER: VI MOLECULAR BIOLOGY

Course Code	Course Title	L	T	P	C
23115AEC61	Molecular Biology	5	0	0	4

Learning Objectives

- The objectives of this course are to
- Provide insights in to the central dogma of molecular biology and explain the mechanism of DNA replication.
- Elaborate the mechanism of transcription and reverse transcription.
- Highlight the characteristics of genetic code and describe the process of protein synthesis.
- Introduce the concept of regulation of gene expression in prokaryotes
- Familiarize the different types of mutations and explain the mechanism of DNA repair.

Unit I: Central Dogma of molecular Biology, DNA as the unit of inheritance. Experimental evidences by Griffith's transforming principle, Avery, McLeod and McCarthy's experiment, and Hershey and Chase Experiment. Replication in prokaryotes: Modes of replication,

Meselson and Stahl's experimental proof for semiconservative replication. Mechanism of Replication – Initiation, events at Ori C, Elongation – replication fork, semi discontinuous replication, Okazaki fragments, and termination. Bidirectional replication, Inhibitors of replication. Models of replication-the rolling circle and D loop model. **15 Hrs**

Unit II: Transcription - Mechanism of transcription: DNA dependent RNA polymerase(s), recognition, binding and initiation sites, TATA/ Pribnow box, elongation and termination. Post-transcriptional modifications; inhibitors of transcription. RNA splicing and processing of mRNA, tRNA and rRNA. Reverse transcription. **15 Hrs**

Unit III: Genetic Code and its characteristics, Wobble hypothesis. Translation: Adaptor role of tRNA, Activation of amino acids, Initiation, elongation and termination of protein synthesis, post-translational modifications and inhibitors of protein synthesis. **15 Hrs**

Unit IV: Regulation of Gene Expression In Prokaryotes–Principles of gene regulation, negative and positive regulation, concept of operons, regulatory proteins, activators, repressors, regulation of lac operon and trp operon. **15 Hrs**

Unit V: Mutation: Types-Nutritional, Lethal, Conditional mutants. Missense mutation and other point mutations. Spontaneous mutations; chemical and radiation – induced mutations. DNA repair: Direct repair, Photo reactivation, Excision repair, Mismatch repair, Recombination repair and SOS repair. **15 Hrs**

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Illustrate the Central Dogma of molecular biology, explain the multiplication of DNA in the cell and describe the types and modes of replication.	PO1
CO2	Elaborate the mechanism of transcribing DNA into RNA, discuss the formation of different types of RNA.	PO1
CO3	Decipher the genetic code and summarize the process of translation.	PO1
CO4	Comprehend the principles of gene expression and explain the concept of operon in prokaryotes.	PO1, PO2
CO5	Distinguish the types of mutations and explain the various mechanisms of DNA repair.	PO1, PO2

Textbooks

1. Veer Bala Rastogi, 2008, Fundamentals of Molecular Biology, 1st edition, Anebooks India.

2. David Friefelder, 1987. Molecular Biology, 2nd edition, Narosa Publishing House.
3. Dr.P.S.Verma and Dr.V.K.Agarwal, 2013, Cell biology, Genetics, Molecular Biology Evolution and Ecology, 1st edition, S.Chand & Company Pvt .Ltd.

Reference books

1. Karp, G., 2010, Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons. Inc.
2. DeRobertis, E.D.P. and DeRobertis, E.M.F., 2010, Cell and Molecular Biology, 8th edition, Lippincott Williams and Wilkins, Philadelphia.
3. James. D. Watson, 2013, Molecular Biology of the Gene 7th edition, Benjamin Cummings.
4. George M. Malacinski, 1992, Freifelder's Essentials of Molecular Biology, 4th edition, Narosa publishing House.

Web resources

1. www.mednotes.net/notes/biology
2. <https://www.onlinebiologynotes.com/repair-mechanism-of-mutation/>
3. <https://teachmephysiology.com/biochemistry/protein-synthesis/dna-translation/>

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3						3			3
CO 4	3	2					3			3
CO 5	3	2					3	1		3

S-Strong (3) M-Medium (2) L-Low (1)

HUMAN PHYSIOLOGY

Course Code	Course Title	L	T	P	C
23115AEC62	Human Physiology	5	0	0	4

Learning Objectives

The main objectives of this course are to

- Aid in understanding the physiology of respiratory and circulatory systems
- Explain the structure and physiology of the nervous and muscular system
- Explicate the functions of digestive and excretory system of the body.
- Impart knowledge about the process of reproduction.
- Emphasize the importance of various endocrine factors that regulate metabolism, growth, homeostasis and reproduction.

Unit I: Respiratory System – Overview of respiratory system, Types of respiration, Transport of respiratory gases, Exchange of respiratory gases in lungs and tissues –Chloride Shift & Bohr’s effect, Lung surfactant. Circulatory System-Structure and functions of the Heart. Arterial and venous system, Cardiac cycle, Pace maker, Blood pressure and Factors affecting blood pressure. **15Hrs**

Unit II: Nervous system- Structure of neuron, synaptic transmission, reflex action, neurotransmission- Resting membrane and Action potential. Neuro transmitters- acetyl choline, Noradrenaline, Dopamine, Serotonin, Histamine, GABA, Substance P.Muscular system-structure and types of muscles - skeletal, smooth and cardiac muscles, muscle proteins- types and functions, mechanism of muscle contraction. **15Hrs**

Unit III: Digestive system- composition, functions of saliva, gastric pancreatic intestine and bile secretions, structure of digestive system, Digestion, absorption of carbohydrates, lipids, proteins. Excretory system- Structure of nephron, mechanism of urine formation, Concentration and acidification of Urine. Role of kidneys in the maintenance of acid base balance. **15Hrs**

Unit IV: Reproductive system: Oogenesis, spermatogenesis, capacitation and transport of sperm, blood-testis barrier. Fertilization, early development, Implantation, Placentation and Parturition. **15Hrs**

Unit V: Endocrinology- Classification of hormones, endocrine glands and their secretions, structure and functions of Insulin, thyroxine. Steroid hormones - Corticosteroids, Sex hormones - testosterone and estrogen, menstrual cycle. **15Hrs**

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Explain the exchange of gases, design of blood vessels and cardiac cycle.	PO1

CO2	Summarize the events in transmission of nerve impulses and mechanism of muscle contraction.	PO1
CO3	Elaborate the structure and functions of digestive system, structure of nephron and mechanism of urine formation and role of kidney in maintenance of pH.	PO1
CO4	Describe the process of Oogenesis, Spermatogenesis, Fertilization, and Parturition.	PO1, PO2
CO5	Understand the role of different hormones that regulate metabolism, growth, glucose homeostasis and reproductive function.	PO1, PO2

Textbooks

1. K. Sembulingam & Prema Sembulingam, 2016, Essentials of Medical Physiology, 7th edition, Jaypee Brothers Medical Publishers (P) Ltd.
2. Chatterjee. C.C., 1988, Human Physiology-Vol I & II, 1st edition, Medical Allied Agency.
3. Animal Physiology-Mariakuttikan and Arumugam, Saras publication, 2017.

Reference books

1. Text book of medical biochemistry physiology- MN. Chatterjee and Rana shinde, 7th edition, Jaypee brothers- medical publishers, 2007.
2. Meyer, Meyer & Meij, 2002, Human Physiology, 3rd edition, A.I.T.B.S Publishers.
3. Guyton and Hall, 2011, Text book of Medical Physiology, 12th edition, W.B. Saunders Company.
4. Text book of Medical Physiology–Guyton & Hall, 12th edition, Saunders Publishers, 2010
5. Human anatomy and physiology-Elaine N. Marieb, 3rd edition, Benjamin/Cummings (a Pearson education company), 1995.

Web resources

1. <https://www.youtube.com/watch?v=6qnSsV2syUE>
2. https://www.youtube.com/watch?v=9_h0ZXx1lFw
3. <https://slideplayer.com/slide/9431799/>

BIOTECHNOLOGY

Course Code	Course Title	L	T	P	C
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23115DSC63__	Biotechnology	5	0	0	3
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Course objectives

The main objectives of this course are to

- Impart knowledge on gene manipulation and gene transfer technologies
- Make the students understand the procedures involved in plant tissue culture.
- Acquire knowledge on animal cell culture and stem cell technology.
- Improve the employability skills of students by providing knowledge in recent techniques such as PCR, blotting, ELISA etc.
- Understand the application of fermentation technology.

Unit I: Recombinant DNA technology

Recombinant DNA technology - Principles of gene cloning: restriction endonucleases and other enzymes used in manipulating DNA molecules. Ligation of DNA molecules, DNA ligase, linkers and adapters, homopolymer tailing. end labeling and construction maps of PBR322, λ bacteriophage. 15 Hrs

Unit II: Plant Tissue culture

Plant tissue culture- basic requirements for culture, M S medium, callus culture, protoplast culture. Vectors – Ti plasmid (cointegration vector and binary vector), Viral vectors- TMV, CaMV and their applications. Transgenic plants – pest resistant, herbicide resistant and stress tolerant plants. 15 Hrs

Unit III: Animal Tissue culture

Animal cell lines and organ culture - culture methods and applications. Transgenic animals: transgenic mice- Production and its applications. Stem cell technology: definition, types, and applications. 15 Hrs

Unit IV: Molecular Techniques

PCR – Principle, types and its application in clinical diagnosis and forensic science. Southern blotting, Northern blotting and DNA finger printing Technique-principle and their applications. 15 Hrs

Unit V: Fermentation technology

Fermentation technology – Fermentors - general design, fermentation processes - Media used, downstream processing. Production and applications of ethanol, Streptomycin and Proteases. Production of edible vaccines. 15 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Acquire knowledge on rDNA technology, DNA manipulation, and use of restriction endonuclease	PO1, PO3
CO2	Get acquainted with the use of cloning and vectors in plant tissue culture.	PO1, PO2, PO3
CO3	Understand the methods for production of proteins using recombinant DNA technology and their applications, basics of tissue culture, transgenesis, stem cell technology, risks, and safety aspects and patenting in biotechnology	PO1, PO3
CO4	Gain knowledge about the importance of gene and gene manipulation technologies	PO1, PO3
CO5	Know the concept fermentation technology and its applications.	PO1, PO3

Text Books

1. James D. Watson, Amy A. Caudy, Richard M. Myers, Jan Witkowski (2006) Recombinant DNA: Genes and Genomes - a Short Course (3rd ed), W.H. Freeman & Co
2. Satyanarayana U (2008), Biotechnology, Books & Allied (P) Ltd.
3. Cassida L (2007) Industrial Microbiology, New Age International

Reference books

1. Reed G (2004) Prescott and Dunn's Industrial Microbiology, CBS Publishers & Distributors
2. Biotechnology: applying the genetic revolution- David P. Clark, Pazdernik N. J, Elsevier (2009).
3. Click B.R. and Pasternak J.J (2010). Molecular Biotechnology: Principles and Applications of Recombinant DNA. (4th ed) American Society for Microbiology

Web Sources

1. NPTEL Certification course - Gene Therapy by Sachin Kumar
<https://nptel.ac.in/courses/102/103/102103041/>
2. Coursera Certification course –Vaccines
3. <https://futureoflife.org/background/benefits-risks-biotechnology/>
4. <https://www.sciencedirect.com/topics/neuroscience/genetic-engineering>

5. <http://www.biologydiscussion.com/biotechnology/techniques-biotechnology/important-techniques-of-biotechnology-3-techniques/15683>
6. <https://iopscience.iop.org/book/978-0-7503-1347-6/chapter/bk978-0-7503-1347-6ch1>
7. https://www.slideshare.net/zeal_eagle/fermentation-technology
8. https://www.slideshare.net/zeal_eagle/fermentation-technology
9. <https://www.slideshare.net/Chepkitwai/blotting-techniques-6129300>

BIOINFORMATICS

Course Code	Course Title	L	T	P	C
23115DSC63__	Bioinformatics	5	0	0	3

The objective of this course are to

- Impart knowledge on bioinformatics and applications
- Learn about biological databases
- Understand the local and global sequence alignment
- Provide insights on BLAST and Microarray
- Familiarize about structural genomics and visualization tools

Unit I: Introduction to Bioinformatics - Bioinformatics and its applications. - Genome, Metabolome - Definition and its applications. Metabolome - Metabolome Database - E. coli metabolome database, Human Metabolome database. Transcriptome - Definition and applications. **15 Hrs**

Unit II : Biological Databases - definition, types and examples –, Nucleotide sequence database (NCBI, EMBL, Gene bank, DDBJ) Protein sequence database- SwissProt, TrEMBL, Structural Database - PDB, Metabolic database-KEGG **15 Hrs**

Unit III: Sequence Alignment-Local and Global alignment-Dot matrix analysis, PAM, BLOSUM. Dynamic Programming, Needleman- Wunch algorithm, Smith waterman algorithm. Heuristic methods of sequence alignment. **15 Hrs**

Unit IV: BLAST - features, types (BLASTP, BLASTN, BLASTX), PSI BLAST, result format. DNA Microarray - Procedure and applications. **15 Hrs**

Unit V: Structural Genomics-Whole genome sequencing (Shotgun approach), Comparative genomics-tools for genome comparison, VISTA servers and precomputed tools. Molecular visualization tools. RASMOL, Swiss PDB viewer. Nutrigenomics - Definition and applications **15 Hrs**

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Introduce the fundamentals of Bioinformatics and its applications Genome, metabolome & Transcriptome.	PO1
CO2	Classify biological database and to correlate the different file formats used by nucleic acid, protein database, structural and metabolic database.	PO1, PO2, PO3
CO3	Develop algorithms for interpreting biological data.	PO1, PO2
CO4	Discuss the concepts of sequence alignment and its types. Understand the tool used to detect the expression of genes	PO1, PO2, PO3
CO5	Apply the various tools employed in genomic study and protein visualization. Analyse the entire genome by shot gun method.	PO1, PO2

Text books

1. Basic of Bioinformatics by Rui Jiang Xuegong Zhang and Michael Q. Zhang Editors
2. Bioinformatics for Beginners Genes, Genomes, Molecular Evolution, Databases and Analytical Tools By: Supratim Choudhuri (Author)
3. Bioinformatics by Saras publication
4. Introduction to Bioinformatics by Arthur Lesk

Reference books

1. Computation in Bioinformatics Multidisciplinary Applications S Balamurugan, Anand T. Krishnan, Dinesh Goyal, Balakumar Chandrasekaran
2. Chemoinformatics and Bioinformatics in the Pharmaceutical Sciences
3. Navneet Sharma PhD Pharmaceutics, Himanshu Ojha, Pawan Raghav, Ramesh K. Goyal

Web resources

1. <https://nptel.ac.in/courses/102/106/102106065/>
2. <http://www.digimat.in/nptel/courses/video/102106065/L65.html>
3. <https://www.slideshare.net/sardar1109/bioinformatics-lecture-notes>

BIO ENTREPRENEURSHIP

Course Code	Course Title	L	T	P	C
23115DSC63__	Bio entrepreneurship	5	0	0	3

Learning Objectives

The objective of this course are to

- Impart knowledge on bio entrepreneurship and the types of industries
- Learn about business plan, proposal and funding agencies
- Understand the market strategy and the role of information technology in expansion of business
- Provide insights on legal requirement and accounting to establish as Bio entrepreneurship
- Familiarize about business bio incubators centres

Unit I: Introduction to Bio entrepreneurship; Types of industries – Biopharma, Bio agriculture and CRO; Introduction to Trademarks, Copyrights and patents. 15 Hrs

Unit II: Business Plan, Budgeting and Funding Idea or opportunity; Business proposal preparation; funds/support from Government agencies like MSME/banks, DBT, BIRAC, Start-up and make in India Initiative; dispute resolution skills; external environment changes; avoiding/managing crisis; Decision making ability. 15 Hrs

Unit III: Market Strategy- Basics of market forecast for the industry; distribution channels – franchising, policies, promotion, advertising, branding and market; Introduction to information technology for business administration and Expansion. 15 Hrs

Unit IV: Legal Requirements, Finance and Accounting; Registration of company in India; Ministry of Corporate Affairs (MCA); basics in accounting: introduction to concepts of balance sheet, profit and loss statement, double entry, bookkeeping; finance and break-even analysis; difficulties of entrepreneurship in India. 15 Hrs

Unit V: Role of knowledge centres such as universities, innovation centres, research institutions (public & private) and business incubators in Entrepreneurship development; quality control and quality assurance; Definition, role and importance of CDSCO, NBA, GLP, GCP, GMP. 15 Hrs

Course Outcomes

After completion of the course the students will be able to

CO	On completion of this course, students will be able to	Program outcomes
CO1	Understand the concept and scope for entrepreneurship	PO1
CO2	Identify various operations involved in a venture creation	PO1, PO5, PO6
CO3	Gather funding and launching a winning business	PO1, PO5, PO6
CO4	Nurture the organization and harvest the rewards	PO1, PO5, PO6
CO5	Illustrate about the Business incubator centres and Bio entrepreneurship	PO1, PO5, PO6

Text books

1. Adams, D. J. (2008). Enterprise for life scientists: Developing innovation and entrepreneurship in the biosciences. Bloxham: Scion - ISBN 10: 1904842364 / ISBN 13: 9781904842361
2. Shimasaki, C. (2014). Biotechnology Entrepreneurship: Starting, managing, and Leading Biotech Companies. Academic London Press - ISBN 10: 0124047300 / ISBN 13: 9780124047303
3. Onetti, A. &. (2015). Business modeling for life science and biotech companies: Creating value and competitive advantage with the milestone bridge. Routledge - ISBN 10: 1138616907 / ISBN 13: 9781138616905
4. Kapeleris, D. H. (2006). Innovation and entrepreneurship in biotechnology: Concepts, theories & cases - ISBN-13: 978-1482210125, ISBN-10: 1482210126

Reference books

1. Desai, V. (2009). The Dynamics of Entrepreneurial Development and Management New Himalaya. New Himalaya House Delhi:pub - ISBN : 9789350440810 9350440814

2. Ono, R. D. (1991). The Business of Biotechnology, From the Bench of the Street. Butterworth-Heinemann - ISBN 10: 1138616907 / ISBN 13: 9781138616905
3. Jordan, J. F. (2014). Innovation, Commercialization, and Start-Ups in Life Sciences. London: CRC Press - ISBN-10 : 812243049X ,ISBN-13 : 978-8122430493

Web sources

1. <http://www.simplynotes.in/e-notes/mbabba/entrepreneurship-development/>
2. <https://openpress.usask.ca/entrepreneurshipandinnovationtoolkit/chapter/chapter-1-introductionto-entrepreneurship/>

PLANT BIOCHEMISTRY AND PLANT THERAPEUTICS

Course Code	Course Title	L	T	P	C
23115DSC63__	Plant Biochemistry and plant Therapeutics	5	0	0	3

Learning Objectives

The main objective of this course are to

- Convey the knowledge of photosynthesis.
- Detail the structure and types of secondary metabolites.
- Impart the idea on various plant hormones.
- Emphasize the effects of free radicals and the importance of antioxidants
- Understand the role of medicinal plants in treating diseases.

Unit I: Photosynthesis - Photosynthesis apparatus, pigments of photosynthesis, photo chemical reaction, photosynthetic electron transport chain, and path of carbon in photosynthesis - Calvin cycle, Hatch - lack pathway (4 ways) CAM path way, significance of photosynthesis. 15Hrs

Unit II: Secondary metabolites: Structure, Types, Sources, Biosynthesis and function of phenolics, tannins, lignins, terpenes and alkaloids. Medicinal properties of secondary metabolite. 15Hrs

Unit III: Plant hormones Structure and function of plant hormones such as ethylene, cytokinins, auxins, Absicic acid, Florigin and Gibberlins. 15Hrs

Unit IV: Free radicals, types, production, free radical induced damages, lipid peroxidation, reactive oxygen species, antioxidant defense system, enzymatic and non-enzymatic

antioxidants, role of antioxidants in prevention of disease, phytochemicals as antioxidants.
15Hrs.

Unit V: Plant therapeutics: Bioactive principles in herbs, plants with antidiabetic, anticancer, antibacterial, antiviral, anti-malaria and anti-inflammatory properties. 15Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Gain knowledge on photosynthetic apparatus, pigments present, pathways, and significance of photosynthesis	PO1
CO2	Learn in detail about the structure, types, sources, biosynthesis and functions of secondary metabolites.	PO1,PO3
CO3	Understand the structure and functions of plant hormones.	PO1
CO4	Discuss about free radicals, types and its harmful effects. Role of enzymatic and non-enzymatic antioxidant in defence mechanism, prevention in disease.	PO1,PO2,PO3
CO5	Identify the plants with antidiabetic, anticancer, antibacterial, antiviral, anti-malaria and anti-inflammatory properties.	PO1, PO2,PO3

Text books

1. Singh M.P and Panda. H 2005. Medicinal Herbs with their formulations, Daya publishing house, Delhi
2. Plant Physiology – Devlin N. Robert and Francis H. Witham, CBS Publications
3. Molecular activities of plant cell – An Introduction to Plant Biochemistry. John. W.
4. Anderson and John Brardall, Black well Scientific Publications, 1994.

Reference books

1. Khan, I. A and Khanum. A 2004. Role of biotechnology in medicinal and aromatic plants, Vol.1 and Vol.10, Ukka2 publications, Hyderabad.
2. Plant Biochemistry and Molecular Biology - Hans Walter Heldt, Oxford University, 4th Edition, 2010
3. Plant biochemistry (2008), Caroline bowsher, Martin steer, Alyson Tobin, garland science.

4. Plant physiology and development (sixth edition) by Lincoln Taiz, Eduardo Zeiger , Ian Max Moller and Angus Murphy publisher ; Oxford university press

Web resources

1. <https://www.intechopen.com/books/secondary-metabolites-sources-and-applications/anintroductory-chapter-secondary-metabolites>
2. <https://www.toppr.com/guides/biology/plant-growth-and-development/plantgrowth>

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3		2				3	3		3
CO 3	3						3			3
CO 4	3	3	3				3	3		3
CO5	3	3	3				3	3		3

S-Strong (3) M-Medium (2) L-Low (1)

AUDIT COURSE INDIAN KNOWLEDGE SYSTEM

Course Code	Course Title	L	T	P	C
231ACSIKWS	Indian Knowledge System	-	-	-	2

Course Objectives:

The course design seeks to address the following issues:

- To introduce to the students the overall organization of IKS
- To develop an appreciation among the students the role and importance of Veda, Vedāngas, Upa Vedas and Purāṇas
- To show case the multi-dimensional nature of IKS and their importance in the contemporary society
- To motivate the students to take up a detailed study of some of these topics and explore their application potential

Course Outcomes:

CO1: Explain the historicity of Indian Knowledge System and the broad classification of Indian philosophical systems

CO2: Explain the potential of Sanskrit in natural language processing

CO3: Explain the features of Indian numeral system and its role in science & technology advancement

CO4: Illustrate the basic elements of the Indian calendar and the components of Indian Panchanga

CO5: Outline the science, engineering & technology heritage of ancient and medieval India

Syllabus

Unit I: Introduction to Indian Knowledge System (IKS), Definition, Concept and Scope of IKS (4).

Definition, Concept and Scope of IKS. IKS based approaches on Knowledge Paradigms. IKS in ancient India and in modern India

Unit II: IKS and Indian Scholars, Indian Literature (8)

Philosophy and Literature (Maharishi Vyas, Manu, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini). Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhashkaracharya, Varahamihira and Brahmgupta). Medicine and Yoga (Charak, Susruta, Maharishi Patanjali and Dhanwantri). Sahitya (Vedas, Upvedas, Upavedas (Ayurveda, Dhanurveda, Gandharvaveda). Puran and Upanishad and shaddarshan (Vedanta, Nyaya. Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma and Meditation). Shastra (Nyaya, vyakarana, Krishi, Shilp, Vastu, Natya and Sangeet).

Unit III: Indian Traditional/tribal/ethnic communities, their livelihood and local wisdom (6).

Geophysical aspects, Resources and Vulnerability. Resource availability, utilization pattern and limitations. Socio-Cultural linkages with Traditional Knowledge System. Tangible and intangible cultural heritage.

Unit IV: Unique Traditional Practices and Applied Traditional Knowledge (8)

Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives. Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices. Indigenous Bio-resource Conservation, Utilization Practices and Food Preservation Methods, Handicrafts, Wood Processing and Carving, - Fiber Extraction and Costumes. Vaidya (traditional health care system), Tantra-Mantra, Amchi Medicine System. Knowledge of dyeing, chemistry of dyes, pigments and chemicals

Unit V: Protection, preservation, conservation and Management of Indian Knowledge System (4)

Documentation and Preservation of IKS. Approaches for conservation and Management of nature and bio-resources. Approaches and strategies to protection and conservation of IKS.



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

SCHOOL ARTS AND SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

M.Sc. BIOTECHNOLOGY CURRICULUM

REGULATION-2023



M.Sc., Graduate Attributes

- ✓ Research, inquiry and analytical thinking abilities.
- ✓ Capability and motivation for intellectual development.
- ✓ Ethical, social and professional understanding.
- ✓ Communication in intra and inter disciplinary
- ✓ Teamwork, collaborative and management skills in scientific research
- ✓ Information literacy in respective discipline

M.Sc., Program Educational Objectives-PEO

- ✓ PEO-1 To gain and apply knowledge of Biotechnology concept to solve the problems.
- ✓ PEO-2 To identify, analyse and understand the problems related to biotechnology.
- ✓ PEO-3 Ability to design and develop solution to biotechnology.
- ✓ PEO-4 Ability to design, perform experiments, analyse, and interpret data for investigating complex problems.
- ✓ PEO-5 To decide and apply appropriate tools and techniques in biotechnological manipulations

M.Sc., Program Outcome-PO

- **PO1: Problem Solving Skill** - Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.
- **PO2: Decision Making Skill** - Foster analytical and critical thinking abilities for data-based decision-making.
- **PO3: Ethical Value** - Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.
- **PO4: Communication Skill** - Ability to develop communication, managerial and interpersonal skills.
- **PO5: Individual and Team Leadership Skill** - Capability to lead themselves and the team to achieve organizational goals.
- **PO6: Employability Skill** - Inculcate contemporary business practices to enhance employability skills in the competitive environment.
- **PO7: Entrepreneurial Skill** - Equip with skills and competencies to become an entrepreneur



M. Sc Programme Specific Outcomes (Pos and PSOs):

<p>Programme Outcomes (Pos)</p>	<p>PO1: Problem Solving Skill Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.</p> <p>PO2: Decision Making Skill Foster analytical and critical thinking abilities for data-based decision-making.</p> <p>PO3: Ethical Value Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.</p> <p>PO4: Communication Skill Ability to develop communication, managerial and interpersonal skills.</p> <p>PO5: Individual and Team Leadership Skill Capability to lead themselves and the team to achieve organizational goals.</p> <p>PO6: Employability Skill Inculcate contemporary business practices to enhance employability skills in the competitive environment.</p> <p>PO7: Entrepreneurial Skill Equip with skills and competencies to become an entrepreneur.</p> <p>PO8: Contribution to Society Succeed in career endeavors and contribute significantly to society.</p> <p>PO 9 Multicultural competence Possess knowledge of the values and beliefs of multiple cultures and a global perspective.</p> <p>PO 10: Moral and ethical awareness/reasoning Ability to embrace moral/ethical values in conducting one's life.</p>
<p>Programme Specific Outcomes (PSOs)</p>	<p>PSO1 – Placement To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.</p> <p>PSO 2 - Entrepreneur To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.</p> <p>PSO3 – Research and Development Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.</p> <p>PSO4 – Contribution to Business World To produce employable, ethical and innovative professionals to sustain in the dynamic business world.</p> <p>PSO 5 – Contribution to the Society To contribute to the development of the society by collaborating with stakeholders for mutual benefit.</p>



M. Sc - BIOTECHNOLOGY - SYLLABUS – REGULATION 2023

COURSE STRUCTURE

Course Code	Course Title	L	T	P	C
SEMESTER I					
23217AEC11	Biochemistry	5	1	0	4
23217AEC12	Molecular Genetics	5	1	0	4
23217AEC13	Molecular Cell Biology	5	1	0	4
23217SEC14L	Molecular Genetics Cell Biology Lab	0	0	4	4
23217DSC15_	Discipline specific elective courses-I	5	1	0	3
23217RMC16	Research methodology	2	-	-	2
	Total	22	4	4	21
SEMESTER II					
23217AEC21	Microbiology	4	1	0	4
23217AEC22	Plant and Animal Biotechnology	4	1	0	4
23217AEC23	Genetic Engineering	4	1	0	4
23217SEC24L	Plant and Animal Biotechnology Lab	0	0	4	4
23217DSC25_	Discipline specific elective courses -II	4	1	0	3
23217SEC26	Environmental Biotechnology	4	0	0	3
23217BRC27	Participation in bounded Research	2	0	0	2
23217SEC28	Internship	-	-	-	2
	Total	22	4	4	26



SEMESTER III					
23217AEC31	Bioinformatics and Biostatistics	5	1	0	4
23217AEC32	Immunology	4	1	0	4
23217AEC33	Bioprocess Technology	4	1	0	4
2317SEC34L	Immunology and Bioprocess Technology Lab	0	0	4	4
23217DSC35_	Discipline specific elective courses -III	4	1	0	3
23217SEC36	Molecular basis of Disease	4	1	0	3
23217SEC37	Internship in Industries to Biotechnology	-	-	-	2
	Total	21	5	4	24
SEMESTER IV					
23217AEC41	Proteomics	4	1	0	4
23217AEC42	Genomics	4	1	0	4
23217PRW43	Project and viva	0	0	10	4
23217DSC44_	Discipline specific elective courses -IV	4	1	0	3
23217DSC45_	Discipline specific elective courses -V	4	1	0	3
23215SEC46	Industrial Visit	-	-	-	2
	Total	16	4	10	20
	Total Credits for the Programme				91



Discipline specific Electives

Semester	Discipline specific Elective courses -I
I	a) 23217DSC15A - Bioinstrumentation b) 23217DSC15B - Enzymology
II	Discipline specific Elective courses -II
	a) 23217DSC25A- Regulatory affairs and Industrial standards b) 23217DSC25B - Human physiology
III	Discipline specific Elective courses -III
	a) 23217DSC35A-Nanobiotechnology b) 23217DSC35B- Molecular developmental biology
IV	Discipline specific Elective courses -IV
	a) 23217DSC44A- Stem cell Biology b) 23217DSC44B-Bioethics,human rights and social issues
IV	Discipline specific Elective courses – V
	a) 23217DSC45A – Industrial Biotechnology b) 23217DSC45B - Pharmaceutical Biotechnology

Credit Distribution

Semester	AEC	SEC	DSC	OEC	RSB Courses	Others	Total
I	12	4	3	-	2	-	21
II	12	9	3	-	2	-	26
III	12	9	3	-	-	-	24
IV	8	5	3	-	4	-	20
TOTAL	44	27	12	-	08	-	91

HOD

DEAN



SEMESTER I

Course Code	Course Title	L	T	P	C
23217AEC31	BIOCHEMISTRY	5	1	0	4

AIM:

This paper provides the knowledge about different types of microorganisms and their identification techniques in modern biology and there by the usefulness of the techniques in research and commercial purposes.

LEARNING OBJECTIVES:

The paper imparts a thorough knowledge on the basics of all the Biochemical concepts, Metabolic reactions and its regulation. The student will get to understand the core concepts of metabolism and physiological processes of the body in both healthy and disease state.

OUTCOMES:

Course outcomes:

At the end of the Course, the Student will be able to:

- CO-1** To understand the basics of pH and related principles and carbohydrate metabolism
- CO-2** To provide basic knowledge about lipid metabolism and related significance
- CO-3** To enlighten the students on Bio-energetics and Biological oxidation pathways
- CO-4** To update the knowledge on Amino acids and Protein
- CO-5** To assess and appraise the role of Nucleic acids



Unit I

pH, pK . acid, base .Buffers- Henderson- Haselbach equation, biological buffer system – Phosphate buffer system, protein buffer system, bicarbonate buffer system, amino acid buffer system and Hb buffer system. Water, Carbohydrates: Nomenclature, classification, structure, chemical and physical properties of carbohydrates. Metabolisms: glycogenesis, glycogenolysis, gluconeogenesis, pentose phosphate pathway

Unit II

Lipids: Nomenclature, classification, structure, chemical and physical properties of fatty acids. Metabolisms: biosynthesis of fatty acids, triglycerols, phospholipids, glycol lipids. Cholesterol biosynthesis, bile acids and salt formation. Eicosanoids, sphingolipids and steroid hormones.

Unit III

Bioenergetics – Concept of energy, Principle of thermodynamics, Relationship between standard free energy and Equilibrium constant, ATP as universal unit of free energy in Biological systems. Biological oxidation: Electron transport chain, oxidative phosphorylation, glycolysis, citric acid cycle, Cori's cycle, glyoxalate pathway. Oxidation of fatty acids- mitochondrial and peroxisomal β -oxidation, alpha and beta oxidation, oxidation of unsaturated and odd chain fatty acids, ketone bodies. Photosynthesis, urea cycle, hormonal regulation of fatty acids and carbohydrates metabolisms, Mineral metabolism

Unit IV

Amino acids and Protein: Nomenclature, Classification, structure, chemical and physical properties of amino acids and proteins. Metabolisms: Biosynthesis of amino acids. Degradation of proteins, nitrogen metabolisms and carbon skeleton of amino acids. Over all in born error metabolisms

Unit V

Nucleic acids: Nomenclature, Classification, structure, chemical and physical properties of purine and pyrimidines. In de novo and salvage synthesis of purines, pyrimidine bases, nucleosides and nucleotides. Catabolisms of purines and pyrimidines bases. Synthetic analogues of nitrogenous bases



Reference books:

- Philip Kuchel, Simon Easterbrook-Smith, Vanessa Gysbers, Jacqui M. Matthews, 2011. Schaum's Outline of Biochemistry, Third Edition (Schaum's Outline Series), McGraw-Hill.
- Sathyanarayana.U and U.Chakrapani., 2011. Biochemistry. Books and Allied private limited, Kolkata.
- Jeremy M. Berg, John L. Tymoczko, Lubert Stryer, 2010. Biochemistry, Seventh Edition, W. H. Freeman.
- Albert Lehninger, David L. Nelson Voet Donald, Judith G.Voet and Charlotte W.Pratt., 2008. Principles of Biochemistry. John Wiley and sons, Inc., New Jersey.
- Michael M. Cox, 2008. Lehninger Principles of Biochemistry, Fifth Edition, W. H. Freeman
- Food Microbiology – W.C. Frazier and D.C. Westhoff, Tata Mcgra Hill Publication
- Microbial Biotechnology – Alexander N. Glazer, Hiroshni-Kaido, W.H. Freeman and Co. 1995.
- Chemical Microbiology – Antony H. Rose, Butterworths, 3rd Edition, Plenum Press, 1976. publishers.

Useful web sites:

- mcdm-webarchive.mcdm.ucsb.edu/.../biochemistry/.../website-tourf.htm
 - www.biochemweb.org/
 - <http://golgi.harvard.edu/biopages.html>
- webarchive.mcdm.ucsb.edu/sears/biochemistry/info/website-



Course Code	Course Title	L	T	P	C
23217AEC12	Molecular genetics	5	1	0	4

Learning outcome:

The paper imparts a thorough knowledge on the basics of all the Genetics concepts, molecules and its regulation. The student will get to understand the core concepts of molecules and genetics.

Course outcomes:

At the end of the Course, the Student will be able to:

CO-1 To acquire good knowledge about the molecular mechanisms of gene expression and understand the theories behind the organization and functions of genetic material in the living world.

CO-2 Identify and distinguish genetic regulatory mechanisms at different levels and explain the processes behind mutations and other genetic changes and study various chromosomal abnormalities.

CO-3 Make the students understand different range of DNA damage and range of their tools for their detection an.

CO-4 Learn the concepts of the transposons and their applications.

CO-5 Detects the Allele frequencies and genotype frequencies in populations and describe the concepts behind the theory of evolution

Unit I

Gene as the unit of mutation and recombination. Identification of DNA as the genetic material. Mutations: Molecular nature, mutagenesis by nitrous acid, hydroxylamine, alkylating agents, intercalators and UV, origin of spontaneous mutations and control, parasexual process in bacteria, transformation, transduction and conjugal gene transfer the phenomena, mechanisms and applications. Fine structure genetic analysis with examples.



Unit II

Recombinations – Control, models and mechanisms. Gene as the unit of expression. Gene – cistron relationship in prokaryotes and eukaryotes. Colinearity of gene and polypeptide. Elucidation of the genetic code. Wobble base pairing. Suppression of nonsense, missense and frame shift mutations. Regulation of gene expression in prokaryotes and eukaryotes. The operon concept – positive and negative control, attenuation control. Control sequences, promoter, operator, terminator and attenuator, DNA methylation and epigenic regulation.

Unit III

DNA damage and repair DNA damage by UV, alkylating agents, cross linkers. Mechanisms of repair – photoactivation, excision repair, recombinational repair. The SOS and adoptive responses and their regulation, heat shock response.

Unit IV

Extrachromosomal heredity, Biology of plasmids – discovery, types and structure of RTF, col-factors and Ti. Replication and partitioning. Incompatibility and copy number control. Natural and artificial plasmid transfer and their applications. Transposable genetic elements: discovery, early experiments of McClintock in maize. Insertion sequences in prokaryotes. Complex transposons – Tn 10, Tn 5, Tn 9 and Tn 3 as examples. Mechanisms control, consequences and applications of transposition by simple and complex elements. Retro elements.

Unit V

Genetics of Eukaryotes: Gene linkage and chromosome mapping, crossing over, three point cross, tetrad analysis. Complementation. Organization of chromosomes, specialized chromosomes. Chromosome abnormalities, quantitative inheritance, population genetics. Developmental genetics using *Drosophila* as model system. Somatic cell genetics.

Reference Books:

- Microbial Genetics – S.R. Maloy, J.E. Cronan and D. Friefelde 1994. Jones and Barlett Publishers.
- Molecular Genetics of Bacteria – J.W. Dale 1994 John Willey and Sons.
- Concepts of Genetics – W.S. Klug and M.R. Cummings Prentice Hall, 1997.
- Introduction of Genetic Analysis of Griffiths – Freeman Co., 1996.
- Advanced Molecular Biology of the Gene – Watson J.D. Hopkins NH, Roberts, J.W. Steitz. J.A.



Course Code	Course Title	L	T	P	C
23217AEC13	MOLECULAR CELL BIOLOGY	5	1	0	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of all the Cell biology concepts, molecules and its regulation. The student will get to understand the core concepts of molecules and cell biology.

Course outcomes:

- CO-1 To understanding of the molecular machinery of living cells and the principles that govern the structures of macromolecules and their participation in molecular recognition.
- CO-2 Identify the structures and purposes of basic components in prokaryotic and eukaryotic cells and their molecular mechanism
- CO-3- Demonstrate knowledge and understanding of the principles and basic mechanisms of nuclear envelope and its functions.
- CO-4 Understand the metabolic pathways and the process of transmission of extracellular signals
- CO-5 Demonstrate the operation of various microscopes and microtomy in the laboratory

Unit I

Introduction to cell Biology- Basic properties of cells-Cellular dimension-Size of cells and their composition-Cell origin and Evolution (Endosymbiotic theory)–Microscopy- Light Microscopy, Electron Microscopy, Application of Electron Microscopy in cell biology, Phase Contrast Microscopy, Fluorescence Microscopy, Flow Cytometry and FRET .Organelles of the eukaryotic cell and its functions; Biomembranes - structural organization, transport across membrane (Passive, Active and Bulk transport); Cell-Cell adhesion- Cell junctions (Tight junctions, gap junctions, desmosomes, adherens); Extra cellular matrix (ECM)- components and role of ECM in growth.

Unit II

Carbohydrate – types, structure and functions of carbohydrates, biosynthesis, lipid biosynthesis, C2, C3, C4 cycles. Biosynthesis of fatty acids and triacyl glycerol.Secondary metabolites – occurrence, classification and functions of phenolics, terpenes, flavonoids, alkaloids, saponins, glycosides. Applications of secondary metabolites in food, dairy, agricultural, cosmetics and pharmaceutical Industries. peroxisome - protein glycosylation – mechanism and regulation of



vesicular transport – golgi and post-golgi sorting and processing – receptor mediated endocytosis; Synthesis of membrane lipids.

Unit III

Nucleus: Nuclear envelope – Nuclear pore complexes-nuclear matrix – organization of chromatin – supercoiling, linking number, twist - nucleosome and high order of folding and organization of chromosome(Solenoid and Zigzag model)-Global structure of chromosome – (Lamp brush and polytene chromosomes).

Unit IV

Molecular basis of eukaryotic cell cycle, Regulation and cell cycle check points; Programmed cell death (Apoptosis); Cell-Cell signaling-signaling molecules, types of signaling, signal transduction pathways (GPCR-cAMP, IP3 , RTK, MAP Kinase, JAK-STAT, Wnt Pathway).

Unit V

Cancer Biology: Multistage cancer development Mitogens, carcinogens, oncogenes and proto-oncogenes, tumor suppressor genes-Rb, p 53, Apoptosis and significance of apoptosis

References

- Karp, G., 2009, Cell and Molecular Biology, Sixth edition, John Wiley & Sons, New York.
- David E.Sadva., 2009. Cell biology organelles structure and function, CBS publishers and distributors, New Delhi.
- Prakash S. Lohar , 2009. Cell and Molecular Biology.
- Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, 2007.,Molecular Biology of the Cell, Fifth edition. Garland Science.
- Lodish,H., Berk, A., Zipursky, S.L., Matsudaira, P., Kaiser, A., Krieger, Scott and Darnell, J. 2007. Molecular Cell Biology. Media Connected, sixth edition. W.H.Freeman and Company
- Geoffrey.M.Cooper, Robert.E.Hausman.2007.The Cell-A Molecular Approach, Fourth edition. Sinauer Associates.
- Luiz Carlos Uchoa, Janqueira, Jose, Carneiro. 2005. Basic HistologyText and Atlas. McGraw-Hill Professional.
- Paul A, 2001, Text Book Of Cell And Molecular Biology 2edition Niyogi Books •
- T.Fleming. 2002. Cell interactions: A practical approach Second edition.
- Alberts B, Molecular Cell Biology. 8. Casimeris et al., Lewin's cells. Jones and Bartlett.
- Plopper, Principles of cell Biology. Jones and Bartlett.
- Gartner, Cell Biology and Histology. LWW.
- Pollard et al., Cell Biology. Saunders.
- Copper, The Cell a Molecular approach. Sinauer



Course Code	Course Title	L	T	P	C
23217SEC14L	MOLECULAR GENETICS CELL BIOLOGY LAB	0	0	4	4

Learning Outcome:

The practical will establish basic study skills on the subject and will improve the student's ability to calculate and improve their practical skill and knowledge.

Course outcomes:

On successful completion of the course the students will be able to

- CO 1 (K2) Illustrate basic biochemistry procedures
- CO 2 (K3) study the methods of estimation of biomolecules
- CO 3 (K4) isolate & Analyze DNA, RNA & protein
- CO 4 (K5) critically analyze the isolated biomolecules
- CO 5 (K5) evaluate the quality and purity of DNA, RNA & Protein

1. Culture media preparation liquid and solid media.
2. Selective differential media
3. Methods of sterilization and testing of sterility
4. Enumeration of bacteria, fungi and actinomycetes from soil
5. Pure culture techniques – Pour, spread and looping methods
6. Maintenance and preservation of cultures
7. Staining of Bacteria – gram, spore and AFB, Fungal wet mount – LPB
8. Motility test – hanging drop and soft agar inoculation
9. Water quality test – MPN
10. Effect of different parameters on bacterial growth kinetics (Substrate, pH, Temperature)



11. Single colony – isolation and checking for genetic markers, measurements of growth rate one step growth curve using T7 phage.
12. Induced mutagenesis and isolation of antibiotic resistant and auxotrophic mutants enrichment methods for auxotrophic and antibiotic resistant mutants.
13. Genetic mapping by p1 transduction, genetic mapping of conjugation and transformation.
14. Transposon mutagenesis of chromosomal DNA, Transposon mutagenesis of plasmid DNA
15. Experiments with gene fusion.

Book references:

- Sadasivam, S. and Manickam A. Biochemical Methods, 2nd Edition, New age International Private Ltd. Publishers.
- Laboratory Techniques in Biochemistry and Molecular Biology.
- A short Course in Bacterial Genetics – J.H. Miller 1992, Cold Spring Harbour Laboratory.
- Methods for Genetics and Molecular Bacteriology – RGF Murray, W.A. Wood &
- N.B. Krig 1994 American Society for Microbiology.



Course Code	Course Title	L	T	P	C
23217DSC15A	DISCIPLINE SPECIFIC ELECTIVE I BIOINSTRUMENTATION	5	1	0	3

Learning Outcome:

The paper imparts a thorough knowledge on the basics of all the instrumentation concepts, in biology. The student will get to understand the core concepts of biological instruments and their principles.

Course outcomes:

At the end of the Course, the Student will be able to:

- CO-1 Introduction and various types of Microscopic techniques
- CO-2 Impart understanding on centrifugation instruments and techniques
- CO-3- Separation of Biomolecules
- CO-4 Analytical methods on Spectroscopic Analysis
- CO-5 Understand the application and Detection on Bioinstrumentation

Unit I

Microscopic Techniques: Principles and Applications: Compound, Light, Stereo, Phase Contrast, Fluorescent Microscopy, Scanning and Transmission Electron Microscopy, Scanning Electron Microscopy, Atomic Force Microscopy, Confocal Microscopy, FRET and Flow Cytometry.

Unit II

Centrifugation: pH meter, Principle and Applications of various types of centrifugation, Sedimentation Coefficient, Svedberg unit, RCF, Density Gradient Centrifugation. Chromatography Techniques: Principle and Application of Paper Chromatography, TLC, Gel Filtration Chromatography, Ion Exchange Chromatography, Affinity Chromatography, GC & HPLC.

Unit III

Electrophoretic Techniques: Principle and Application of Agarose Gel Electrophoresis, 2D-gel Electrophoresis, PAGE- NATIVE & SDS PAGE, Iso-electric Focusing, High resolution



Electrophoresis, Immuno Electrophoresis (Immunofixation EP), ELISA, RIA, Southern, Northern and Western Blotting. Electro blotting, PCR and RT-PCR, Microarray (DNA, Proteins)

Unit IV

Spectroscopic Techniques: Theory and Application of UV and Visible Spectroscopy, Fluorescence Spectroscopy, Mass Spectroscopy, IR Spectroscopy NMR, ESR, Atomic Absorption Spectroscopy, X- ray Spectroscopy, Laser Spectroscopy and Raman Spectroscopy

Unit V

Radio-isotopic Techniques: Introduction to Radioisotopes, Uses and their Biological Applications, Radioactive Decay – Types and Measurement , Principles and Applications of GM Counter, Solid and Liquid Scintillation Counter, Autoradiography, RIA, Radiation Dosimetry, Health effects of Radiations.

Reference books

- M.H. Fulekar and Bhawana Pandey Bioinstrumentation, Wiley
- Keith Wilson, John Walker, 2010. Principles and Techniques of Biochemistry and Molecular Biology (7th Edition), Cambridge University Press •
- David L. Nelson, Michael M. Cox. Menninger (2008). Principles of Biochemistry, Fifth edition W. H. Freeman, New York. •
- Experiments in Biochemistry: A Hands-On Approach by Shawn O. Farrell, Ryan T. Ranallo, Paperback: 324 pages, Publisher: Brooks Cole. 20 •
- Metzler D.E. 2001, the chemical reactions of living cells –Academic Press. 2nd edition.
- Stryer L,1999, Biochemistry-W.H. Freeman & Company, New York. 1. • 4th edition
- L.Veerakumari (2006) Bioinstrumentation MJP Publisher Kindle edition
- Jeffrey. M., Backer el al., 1996. Biotechnology- A Laboratory Course. Academic Press, New York.
- Holcapek, M., Byrdwell, Wm. C. 2017. Handbook of Advanced Chromatography /Mass Spectrometry Techniques, Elsevier



Course Code	Course Title	L	T	P	C
23217DSC15B	ENZYMOLGY	5	1	0	3

Learning Outcome:

The subject imparts knowledge on the fundamentals of enzyme structure and its kinetics. The student will be provided with a basic knowledge and understanding about the functions of enzyme as well as the industrial application of enzymes.

Course outcomes:

- CO-1 Explain the basics of enzyme nomenclature and properties
- CO-2 Classify and Cognize the native and immobilized enzyme
- CO-3 Examine the equations of steady state kinetics
- CO-4 Assess extraction and downstream processing of enzymes
- CO-5 Compile the uses of enzymes and design enzymes for Industrial and Clinical application

Unit 1:

Introduction to enzymes, Classification, nomenclature and general properties like effects of pH, substrate and temperature on enzyme catalysed reactions. Extraction Isolation and purification of enzymes by precipitation, centrifugation, chromatography and electrophoresis and liquid-liquid extraction methods

Unit 2:

Kinetics of catalysed reaction : Single substrate reactions, bisubstrate reactions, concept of Michaelis - Menten, Briggs Haldane relationship, Determination and significance of kinetic constants, Limitations of Michaelis-Menten Kinetics, line weaver burk plot, Hanes wolf equation, Eadie hoofstee equation ,Inhibition of enzyme activity

UNIT 3 :

Enzyme catalysis: enzyme specificity and the concept of active site, determination of active site. Stereospecificity of enzymes. Mechanism of catalysis: Proximity and orientation effects, general acid-base catalysis, concerted acid - base catalysis, nucleophilic and electrophilic attacks, catalysis by distortion, metal ion catalysis



UNIT 4:

Theories on mechanism of catalysis.-Mechanism of enzymes action: mechanism of action of lysozyme, chymotrypsin, carboxypeptidase and DNA polymerase. Multienzymes system, Mechanism of action and regulation of pyruvate dehydrogenase and fatty acid synthetase complex

UNIT 5 :

Coenzyme action. Enzyme regulation: General mechanisms of enzyme regulation, Allosteric enzymes, sigmoidal kinetics and their physiological significance, Symmetric and sequential modes for action of allosteric enzymes. Reversible and irreversible covalent modification of enzymes, Immobilized enzymes and their industrial applications. Clinical and industrial applications of enzymes, Enzyme Engineering.

Reference Books

- Nicholas C.Price and Lewis Stevens., 2010. Fundamentals of Enzymology. Oxford University Press, New Delhi
- Lehninger, Nelson and Cox, 2005, Principles of Biochemistry - 4th edition, WH Freeman and Company, New York, USA
- Principles of Biochemistry with human focus - Garrett and Grisham, 2002, Harcourt College Publishers, Orlando, Florida, USA.
- Geoffrey L, Zubay, Biochemistry -, 1998, 4th edition. 23
- Donald Voet, Judith Voet and Pratt, 1995, Fundamentals of Biochemistry, 2nd edition.
- Harper.s Biochemistry - Murray et al, 2000, 25th edition, Appleton and Lange Publishers.
- Enzymes – Trevor Palmer 2002.

Useful Websites

- www.lsbu.ac.uk/biology/enztech/
- www.lsbu.ac.uk/biology/enzyme/
- <http://www.aetlted.com/tech/applications.html>



SEMESTER - II

Course Code	Course Title	L	T	P	C
23217AEC21	MICROBIOLOGY	4	1	0	4

Learning Outcome:

To provide a comprehensive knowledge on taxonomy and microbial diversity, growth, their harmful effects and beneficial role of microorganisms in agriculture and environment

Course outcomes:

- CO-1 To understand the major discoveries of microbiology and describe microbial diversity, Microbial growth and metabolism.
- CO-2 To provide basic knowledge about microbial culture, identification of microbes, principle and working of microscopes and sterilization techniques
- CO-3 To enlighten the students on host microbe interaction and Epidemiology of microbial disease
- CO-4 To update the knowledge on epidemic and pandemic diseases.
- CO-5 To assess and appraise the role of novel microbes in environment and integrate them in specific innovative approaches.

UNIT-1

History and microbial taxonomy: Major discoveries related to the field of microbiology: Antony Von Leeuwenhoek, Louis Pasteur, Robert Koch and Edward Jenner. Microbial taxonomy: Bacteria, viruses, fungi, algae and protozoa, Microbial diversity: Biovars, Serovars and Prions, Microbial growth and metabolism: Microbial growth: Growth curve, factors affecting growth, Microbial metabolism- Methanogenesis, acetogenesis and auxotrophs.

UNIT-II

Microbial culture, identification, and control: Nutritional requirements for growth - Growth media and types, Pure culture techniques: Serial dilution and plating methods, Staining methods - Principles and types of staining (simple and differential), Identification of bacteria – Biochemical – IMViC, 16s rRNA sequencing. Microscopy: principles and applications of Bright field, florescent and Scanning electron microscopes, Microbial growth control: Physical Methods – Heat, Filtration, Low Temperatures, High Pressure, Desiccation, Osmotic Pressure, Radiation; Chemical Methods



UNIT-III

Host microbe interaction and Epidemiology: Human microbiome; Skin, Gastrointestinal tract, Oral cavity, Lung. Symbiotic relationship of microbes: Symbiosis, Mutualism, Parasitism, Commensalism and endophyte. Epidemiology of microbes: causes, types and transmission of epidemic, endemic and pandemic diseases

UNIT-IV

Microbial Diseases: Microbial diseases - General characteristics, pathogenesis, laboratory diagnosis and control measures of Pandemic and Epidemic diseases: Tuberculosis, Leprosy, Cholera, Typhoid, COVID-19, Yellow Fever, Flu, AIDS, Ebola, Zika Virus, Small Pox, Dengue, Chickungunya, Malaria, filariasis, Candidiasis, superficial mycosisg.

UNIT-V

Agricultural and Environmental Microbiology: Biological nitrogen fixation, free living, symbiotic nitrogen fixation, mechanism of Nitrogen, Biofertilizers- types and applications; Rhizosphere effect. Biogeochemical cycles-Carbon, Nitrogen, Sulphur and Phosphorous; Methanogenic bacteria Extremophiles- Thermophiles Acidophiles, Halophiles and alkalophiles; Biotechnological application of extremophiles

References

- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, (2017). Prescott's
- Microbiology, (10th edition), McGraw-Hill Education, ISBN: 978-1259281594.
- Maheshwari D K, Dubey R C 2013. A Textbook of Microbiology.4th Edn S Chand Publishing India.
- Ananthanarayan and Paniker's (2017) Textbook of Microbiology, (10th edition), The Orient Blackswan, ISBN: 978-9386235251.
- Benson HJ. (1999). Microbiological Applications: A Laboratory manual in General Microbiology, 7th Edition, McGraw Hill. 5
- Managing epidemics- Key facts about major deadly diseases, World Health Organization (WHO) 2018. 9. O'Flaherty, Vincent & Collins, Gavin & Mahony, Thérèse. (2010). Environmental Microbiology, Second Edition. 10.1002/9780470495117.ch11.
- Agriculture Microbiology, 2016. E-Course Developed By TNAU (ICAR)

Web Sources

- <https://www.who.int/emergencies/diseases/managing-epidemics-interactive.pdf> ISBN 978-92-4-156553-0. <https://doi.org/10.3389/fmicb.2020.631736>
- <https://www.agrimoon.com/wp-content/uploads/AGRICULTURAL-Microbiology.pdf>.



Course Code	Course Title	L	T	P	C
23217AEC22	PLANT AND ANIMAL BIOTECHNOLOGY	4	1	0	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of all the biotechnological application on plant and animals. The student will get to understand the core concepts of biotechnology.

Course outcomes:

- CO-1 To impart theoretical knowledge on various techniques of plant biotechnology like tissue culture, plant genetic transformation and their application in industries.
- CO-2 Importance of secondary metabolites and production in plants.
- CO-3 To develop concepts, principles and processes in animal biotechnology.
- CO-4 Concept and different types in Animal Cell Culture and animal cell lines.
- CO-5 Use of molecular biology techniques genetically engineer the animals to improve sustainability, productivity and suitability for pharmaceutical and industrial applications.

UNIT-I

Introduction of plant tissue culture, composition of media, Micropropagation, organogenesis, somatic embryogenesis, haploid and triploid production, protoplast isolation and fusion, hybrid and cybrid, synthetic seed production. Secondary metabolites in plants - Phytochemicals- Glycosides and Flavonoids; Anthocyanins and Coumarins - Lignans, Terpenes, Volatile oils and Saponins; Carotenoids and Alkaloids: biogenesis, therapeutic applications

UNIT-II

Plant Transformation Direct transformation by electroporation and particle gun bombardment. Agrobacterium, Ti plasmid vector. Theory and techniques for the development of new genetic traits, conferring resistance to biotic and abiotic. Plant engineering towards the development of enriched food products, plant growth regulators; Molecular Marker aided breeding: RFLP maps, Linkage analysis, RAPD markers, STS Micro satellite, SCAR, SSCP, QTL, Map based cloning and Molecular marker assisted selection

UNIT-III

Animal health disease diagnosis, hybridoma technique, monoclonal antibodies, application of probes for disease diagnosis of existing and emerging animal diseases. Prophylaxis - Vaccines,



Oral vaccines DNA Vaccines in animal disease. Cell culture: primary and established culture; organ culture; tissue culture

UNIT-IV

Disaggregation of tissue and primary culture; cell separation, Slide and coverslip cultures, flask culture, test tube culture techniques, cell synchronization, cryo preservation. Scaling up of animal cell culture, cell line and cloning micromanipulation and cloning, somatic cell cloning. Karyotyping; measuring parameters for growth, measurement of cell death, apoptosis and its determination, cytotoxicity assays

UNIT-V

Nuclear magnetic resonance methods of monitoring cell metabolism culturing animal cells in fluidised bed reactors. Application of animal cell culture for in vitro testing of drugs, in production of human and animal viral vaccines and pharmaceutical proteins. Culture Scale up and mass production of biologically important compounds. Harvesting of products, purification and assays. Transgenic animals: Production and application; transgenic animals in livestock improvement, transgenic animals as model for human diseases; Stem Cells- Properties, Types, Therapy, Prospects and Ethics in stem cell research.

Reference Books

- J.D.Watson, Gillman, J.Witknowski and M.Zoller, 2006. Recombinant DNA. 3rd ed.
- W.H.Freeman. 26 K. Dass. 2005, Text book of Biotechnology, Second Edition, Wiley Dreamtech, India (P) Ltd.
- H.Kreuzer & A.Massey. 2001. Recombinant DNA and Biotechnology: A guide for teachers Second Edition. ASM press, Washington.
- M.Sudhir. 2000. Applied Biotechnology & Plant Genetics. Dominant publishers & Distributors.
- Genetic Engineering of Animals by (Ed) A.Puhler, VCH Publishers, Weinheim, FRG, 1993.
- Animal Cell culture Practical approach. Ed. John R.W.Masters, Oxford.2004.
- Concepts in Biotechnology D. Balasubramaniam, Bryce, Dharmalingam, Green, Jayaraman Univ. Press, 1996.



Course Code	Course Title	L	T	P	C
23217AEC23	GENETIC ENGINEERING	4	1	0	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of all the biotechnological application on plant and animals. The student will get to understand the core concepts of biotechnology.

Course outcomes:

- CO-1 Understanding the basic steps of gene cloning and the role of enzymes and vectors responsible for gene manipulation, transformation and genetic engineering.
- CO-2 Getting detailed knowledge of gene transfer methods and identifying suitable hosts for cloning.
- CO-3 Acquiring theoretical knowledge in the techniques, tools, and application and safety measures of genetic engineering.
- CO-4 Describes the genome mapping and sequencing and methods for gene therapy.
- CO-5 Elucidate different techniques involved in genetic engineering

Unit I

Gene cloning. Genetic engineering tools. Nucleic acid manipulating enzymes. Promoters, Selectable markers and reporters used in rDNA technology. Restriction digestion, Ligation, Transformation, Selection of Recombinants. Construction of gene libraries

Unit II

E.Coli vectors - pBR322 and its derivatives; Cloning vectors for gram negative bacteria - ColE1, p15A, R1, IncPa, pSC101; Lambda bacteriophage vectors, filamentous phages, Cosmids, Phasmids, Phagemids. Cloning in gram-positive bacteria (*Bacillus subtilis*)

Unit III

Cloning in yeast *Saccharomyces cerevisiae*. Life cycle and types of vectors; Eukaryotic vectors. SV40 (molecular genetics and expression); Specialized cloning vector for cDNA; Synthesis of specific RNA in vitro; Vectors for cloning promoters and terminators; vectors with adjustable copy number



Unit IV

Nucleic acid hybridization techniques; Molecular probes (Types of probes and its construction); probe labeling. Nick translation, End labeling and Random primer labeling. Polymerase chain reaction and its variants; DNA fingerprinting; DNA sequencing first generation sequencing methods (Maxam and Gilbert sequencing, Sangers Dideoxy sequencing, Pyrosequencing, PCR based sequencing and hybridization sequencing).Second generation sequencing methods

Unit V

Site directed mutagenesis; DNA microarray; chromosome walking and jumping.Molecular techniques in prenatal diagnosis gene therapy, Transgenic animals (knockout mice) and plants (Flavr savr tomato), Pharmaceutical products (Vaccine, Humulin, etc), Crop improvement. Pesticide resistance, herbicide resistance, transgenic animals and GM foods; Modern Concepts in Genetic Analysis.

Reference Books:

- T.A. Brown, 2010. Gene cloning and DNA analysis: An introduction, 6th edition, Wiley-Blackwell.
- Sandy B.Primrose and Richard Twyman, 2006. Principles of Gene Manipulation and genomics, 7th edition, Wiley-Blackwell.
- Lewin, 2009. Genes X, 10th edition, Jones & Barlett Publishers
- Raymond Rodriguez and David T.Denhart 2003.Vectors, A survey of molecular cloning vectors and their uses
- Errst-L. Winnacker 1987.From genes to clones. Introduction to Gene Technology,
- Ed. David V. Geoddel 2002.Gene Expression technologies. Methods in enzymology (Vol.185)
- William Wu, Michael J.Welsh, Peter B.Kaufmar, Helen H.Zhang 2001. Methods in
- Gene Biotechnology



Course Code	Course Title	L	T	P	C
23217SEC24L	PLANT AND ANIMAL BIOTECHNOLOGY LAB	0	0	4	4

Learning Outcome:

The practical will establish a basic study skill on the subject and will improve the student's ability to have a hands on experience on the above core subjects.

Course outcomes:

- CO-1 To know about the media preparation and sterilization techniques
- CO-2 To understand the callus formation
- CO-3 (K4) Examine Plant and Animal cells and their functions
- CO-4 (K5) Assess extracted DNA, RNA and protein for rDNA technology
- CO-5 (K6) to study cloning tools

Experiments

Demonstration

16srRNA sequencing

Plant and Animal Biotechnology - Practical:

15 Hours

1. Plant tissue culture media preparation
2. Plant tissue culture sterilization techniques.
3. Generation of Callus from leaf
4. Generation of Callus from root
5. Generation of Callus from bud
6. Generation of Callus from shoot apex
7. Maintenance of callus culture.
8. Cell suspension culture
9. Anther culture



10. Pollen culture
11. Embryo culture.
12. Isolation of plant protoplast
13. Culture of plant protoplast.
14. Protoplast viability test.
15. Localization of nucleus using nuclear stain.
16. Agrobacterium culture maintenance and isolation of plasmid DNA.
17. Mass culture of Chlorella /Spirulina
18. Introduction to Animal Cell culture: Procedure for handling cells and medium.
19. Cleaning and sterilization of glassware and plastic tissue culture flasks
20. Preparation of tissue culture media
21. Preparation of sera for animal cell culture
22. Preparation of single cell suspension from chicken liver (Primary cell culture).
23. Trypsinization of established cell culture.
24. Cell counting and viability - staining of cells (a) Vital Staining (Trypan blue, Erythrosin (b) Giemsa staining.
25. MTT Assay



Course Code	Course Title	L	T	P	C
23217DSC25A	REGULATORY AFFAIRS AND INDUSTRIAL STANDARDS	4	1	0	3

Learning Outcome:

The subject imparts knowledge on the fundamentals of regulatory requirement in industries. The student will be provided with a basic knowledge and understanding about the regulatory affairs based on biotechnological industry requirements.

Course outcomes:

- CO-1 Elucidate the basic requirements of establish laboratory for testing samples as per the regulatory body's requirements
- CO-2 Describe the Scientific, technical knowledge about various food preservation techniques
- CO-3 Describe the basic concepts of packing of food materials, various parameters observed during packaging
- CO-4 Describe the testing of food materials and identifying of microbial food contaminant
- CO-5 Explain the basic of food safety management system, good manufacturing practice and good hygienic practices

UNIT-I

Planning, Organisation and setting of Food testing laboratory and laboratory safety

Understand the requirements for setting up a laboratory for the legal defensibility of analytical data. The ideal structure design, environment, layout for microbiological testing and Air handling etc., Introduction about accreditation, Different accreditation bodies (NABL, APLAC, ILAC), Requirements for ISO/IEC 17025:2017, documentation, pre-requisites for accreditation, management requirements, technical requirements, measurement of traceability, Laboratory safety: Personnel and laboratory hygiene, emergency planning, general hazards in a food



laboratory, safety equipment, storage of chemicals, acids, flammables etc, handling and biological spills and waste disposal

UNIT-II

Principles of Food Preservation technology

Heat: Principles of Heat transfer, Blanching, Pasteurization, Heat sterilization, thermal extrusion, cooking. Water Removal: Forms of Water in Foods, Sorption of water in foods, Water activity, drying and evaporation technology. Temperature reduction: Chilling, Freezing, Radiation: Ionizing Radiation, Microwave, Use of chemicals: Class-I & Class-II preservatives, smoke other chemical additives, New non-thermal methods: High hydrostatic pressure, modified atmosphere, high intensity pulsed electric fields, intense pulsed light, oscillating magnetic fields, hurdle technology, ultrasonic and ohmic heating etc.

UNIT-III

Principles of Food Packaging technology

Effect of environment on food stability: light, oxygen, water, temperature, sensitivity to mechanical damage and attack by biological agents, Different packaging materials used for food packaging and their properties including barrier properties, strength properties, optical properties: Glass, metals, paper, plastics .Biodegradable and edible films and coatings aseptic packaging and combinations, Selection of packaging material and design for various food commodities including fresh produce (Fruits and vegetables), milk and milk products (dairy), cereal, pulses, oil, meat, fish, poultry, water and processed foods, Evaluation of quality and safety of packaging materials- different testing procedures, Function of packaging: Protective packaging and active packaging smart and intelligent packaging, Newer packaging technologies- CAP/MAP packaging aseptic processing and packaging, irradiated packaging, retort pouch and microwaveable packaging.

UNIT-IV

Food Microbiology and testing

Introduction of Food microbiology: Classification and nomenclature of microorganisms. Morphology and structure of microorganisms in foods (yeast and Molds, Bacterial cells viruses), Important genera of mold, yeast, bacteria (Gram positive and Gram negative, facultative aerobic and anaerobic, endospore forming bacteria and non-sporulating bacteria), Bacterial groups (lactic acid, acetic acid, butyric acid etc.), thermophilic, proteolytic, saccharomytic etc, coliforms, faecal coliforms, enteric pathogens and emerging microbes, Sources of microorganisms in food chain (raw materials, water, air, equipment etc) and microbiological quality of foods, Microbial growth characteristics: Reproduction and growth (fission, generation time optimum growth, growth curve etc). Microbial growth in foods: intrinsic (pH, Moisture content, oxidation-



reduction potential, nutrient content, antimicrobial constituents and extrinsic parameters (temperature of storage, relative humidity of environment, presence and concentration of gases in the environment, Thermal destruction of microorganisms: Thermal death time, D Value, Z-Value, F-Value, thermal death time curve, 12 D Concept, Microbial food spoilage and food borne diseases, food pathogens, bacillus cereus and other bacillus species, campylobacter, clostridium species, Enterobacteriaceae, E. coli, listeria monocytogens, salmonella, shigella, staphylococcus aureus, vibrio species, yersinia enterocolitica, fungi, virus etc., Methods for the Microbiological examination of foods: Sampling activity and sampling plan, pure culture isolation: streaking, serial dilution and plating, cultivation, maintenance and preservation/stocking of pure culture, Observation of Indicator organisms: Direct examination, enumeration methods, plate count, MPN, biochemical test, Rapid methods detection of specific organisms.

UNIT-V

HACCP and Food safety management systems:

ISO 22000: Importance of implementing a HACCP system and how it can be applied to various products. Prerequisite programs, HACCP principles, some limitation of HACCP food safety objective (FSO). Food safety audits: Management review, audit certification and importance. Good manufacturing practices (GMP), Good hygienic practices (GHP), Food safety plan, food safety management risk analysis. Traceability food products recall and sanitation.

REFERENCE:

- ISO 9001, Quality management systems – Requirements
- ISO 17034 General requirements for the competence of reference material producers
- ISO/IEC 17043 Conformity assessment – General requirements for proficiency testing.
- Food safety standards authority regulation 2011.



Course Code	Course Title	L	T	P	C
23217SEC26	ENVIRONMENTALBIOTECHNOLOGY	3	0	0	2

Learning Outcome:

The subject imparts knowledge on the fundamentals of ecology and pollution. The student will be provided with a basic knowledge and understanding about the functions of ecosystem and reduction of pollution by biotechnological tools.

Course outcomes:

On successful completion of the course the students will be able to

- CO-1 Explain various waste management methods
- CO-2 Classify potential methods of biodegrading organic pollutants.
- CO-3 Examine the techniques involved in remediation of polluted environments
- CO-4 Assess types of pollution & its control
- CO-5 Compile biotechnological approaches to degrade xenobiotic compounds

Unit I –Research

Selection of problem-stages in the execution of research: choosing a topic to publication- preparation of manuscript-report writing- format of journals – proof reading – sources of information: Journals, reviews, books, monographs, etc, Bibilograpy. Journal ; standard of research journals – Impact factor.

Unit II: Statistical method

Measures of dispersion: Universe and population – delimiting population – sampling method – random sampling, stratified random sampling – types of variables: qualitative and quantitative variables – continuous and discontinuous variables – scaling method S- mean – standard deviation – standard error – coefficient of variation.

Unit III

Coparision of means, chisquard test, student test (ANOVA ‘’portioning of variation). F test – model sums on one way ANOVA with interpretation of data – introduction to MANIVA – Statistical and their use – significance test and fixing levels of significance – use of statisticalsoftware like COSTAT and STATISTICA. Breif introduction to pie and histograms. Use of LCD.



UNIT IV:

Chromatography – principle, operative technique and applications of paper, TLC, adsorption chromatography, GLC and HPLC. Ion-Exchange, molecular sieve, Electrophoretic techniques – principle and technique of gel, SDS, high voltage and discontinuous electrophoresis, Isoelectric focusing, pulsed field gel electrophoresis and capillary electrophoresis. Spectrometry – Centrifugation techniques.

UNIT V:

X-Rays – X-Ray diffraction, crystals and detectors, quantitative analysis and applications. Radio chemical methods – Basic concepts, counting methods and applications. Autoradiography, detection and measurement of radioactivity, applications of radioisotopes in biology.

References:-

- An introduction to practical biochemistry by David T. Plummer.
- Laboratory Manual in Biochemistry by Pattabiraman and Acharya
- Practical Biochemistry by J. Jayaraman.
- Analytical Biochemistry, D. J. Homie and Hazel Peck, Longman group, 3rd edition, 1998.
- Physical Biochemistry – Application of Biochemistry and Molecular Biology, David Friefelder, W.H Freeman and Co, 2nd Edition 1999.
- Experimental Biochemistry, Robert Switzer and Liamgarrity, W.H. Freeman and Co, 3rd 1999.
- Davis, G.B and C.A Parker, 1997. Writing the doctoral dissertation, Barrons Education series, 2nd edition, Pp 160, ISBN: 081208005
- Duneary, P. 2003. Authoring a Ph. D thesis: how to plan, draft, write and finish a doctoral dissertation. Plgrave Macmillan, Pp256. ISBN 1403905843



THIRD SEMESTER

Course Code	Course Title	L	T	P	C
23217AEC31	BIOINFORMATICS AND BIOSTATISTICS	5	1	0	4

Learning Outcome:

The paper imparts a thorough knowledge of the basics of bioinformatics tools and all the statistical concepts, in biology. The student will get to understand the core concepts of computation principles for the data analysis and In-Silico biological research.

Course outcomes:

- CO-1 To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
- CO-2 Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
- CO-3 Explain about the methods to characterize and manage the different types of Biological data.
- CO-4 To update the knowledge on Tests of significance for large and small samples.
- CO-5 To assess and appraise the role of novel microbes in environment and integrate them in specific innovative approaches.

Unit I

Database concepts, Introduction to internet and its application, Introduction to bioinformatics, Protein and nucleotide databases, Information retrieval from biological databases, Sequence alignment and database searching-similarity searches using BLAST and FASTA. Artificial Intelligence: Introduction to biological neural network, motivation for artificial neural network (ANN), Big data analysis - DNA/RNA/protein sequence or structure data, gene expression data, protein-protein interaction (PPI) data, pathway data and gene ontology (GO) data

Unit II

Sequence alignment basics, match, mismatch, similarity, scoring an alignment, gap penalty, protein vs DNA alignments, Dot-matrix alignment, pairwise alignment. Global and local alignment algorithms, multiple sequence alignment-progressive alignment and Iterative alignment algorithms, consensus sequence, patterns and profiles, Database searching: Pairwise alignment based rigorous algorithm (Smith and Waterman) and Heuristic algorithms (FASTA and Blast). Multiple sequence alignment based database searching. PSI- Blast, PAM and Blosum matrices



Unit III

Bioinformatics for genome sequencing, EST Clustering and analyses, Finding genes in prokaryotic and eukaryotic genomes, Regulatory sequence analysis, Bioinformatics for Genome maps and markers, Bioinformatics for understanding Genome variation, Protein structure-X-ray crystallography, The protein databank and the PDBSum-SCOP, CATH, DALI and HSSP ;Visualization of molecular structures-RasMol and Pymol; Protein secondary structure prediction, Fold Recognition; Transmembrane topology prediction

Unit IV

Correlation and regression – correlation table – coefficient of correlation – Z transformation – regression – relation between regression and correlation. Probability – Markov chains applications – Probability distributions – Binomial (Gaussian distribution) and negative binomial, compound and multinomial distributions – Poisson distribution

Unit V

Normal distribution – graphic representation.– frequency curve and its characteristics –measures of central value, dispersion, coefficient of variation and methods of computation – Basis of Statistical Inference – Sampling Distribution – Standard error – Testing of hypothesis – Null Hypothesis –Type I and Type II errors

Reference Books:

- Dassanayake S.Ranil, Y.I.N. Silva Gunawardene, 2011. Genomic and Proteomic Techniques, Narosa Publishing House Pvt. Ltd, New Delhi.
- Thiagarajan B, Rajalakshmi.P.A., 2009. Computational Biology, MJP publishers, Chennai.
- Bosu Orpita, Simminder Kaur Thukral, 2007. Bioinformatics Databases, Tools and Algorithms, Oxford University press, New Delhi.
- Rastogi.S.C, Mendiratta.N, Rastogi.P, 2004. Bioinformatics methods and applications, Prentice-Hall of India private limited, New Delhi.
- Lohar s. Prakash, 2009. Bioinformatics, MJP Publishers, Chennai.
- Stephen misener and Stephen A. Krawetz., 2000. Bioinformatics methods and protocols, Humana press Inc, New Jersey.
- Veer bala Rastogi. 2011. Fundamentals of Biostatistics. Ane books Pvt Ltd, Chennai.
- Rosner,B (2005), “Fundamentals of Biostatistics”, Duxbury Press.
- Warren,J; Gregory,E; Grant,R (2004), “Statistical Methods in Bioinformatics”,1st edition, Springer
- Durbin.R, S.Eddy, A.Krogh and G.Mitchison, 1998. Biological sequence analysis, Cambridge university press, Cambridge.



Course Code	Course Title	L	T	P	C
23217AEC32	IMMUNOLOGY	4	1	0	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of immunology. The student will get to understand the core concepts of immune systems and their non-specific and specific mechanisms, vaccine, etc.

Course outcomes:

At the end of the course the students will be able to

- CO-1 Illustrate various mechanisms that regulate immune responses and maintain tolerance
- CO-2 Describe key events and cellular players in antigen presentation, and how the nature of the antigen will shape resulting effector responses
- CO-3 Learn the concepts of cellular and molecular processes that represents the human immune system.
- CO-4 Elucidate the role of immunological regulation and tolerance at a cellular and molecular level
- CO-5 Compile concepts on immunological principles and diagnosis

Unit I

History and overview of the immune system. Types of immunity - innate, acquired, passive and active, self vs non-self-discrimination. Physiology of immune response: HI and CMI specificity and memory. Cells and organs of the immune system .Lymphoid tissue, origin and development. Hematopoiesis and differentiation of lymphocytes

Unit II

Lymphocyte-sub-populations of mouse and man. APC cells, lymphokines, Phagocytic cells, macrophage, dendritic cells, K and NK Cells. Nature and biology of antigens, epitopes, haptens, adjuvents. Immunoglobulins- structure, distribution and function. Immunoglobulin super family Isotypic, Allotypic and Idiotypic variants, generation of antibody diversity

Unit III

Monoclonal antibody production and its applications. Types of vaccine and vaccination schedule. Role of MHC antigens in immune responses, Structure and function of class I and class II MHC molecules. MHC antigens in transplantation and HLA tissue typing. Transplantation immunology- immunological basis of graft rejection, clinical transplantation and



Immunosuppressive therapy. Tumour Immunology - Tumour antigen, Immune response to tumours

Unit IV

Effector mechanisms in immunity - macrophage activation, cell mediated cytotoxicity, cytotoxicity assay. Hypersensitivity reactions and types. The complement system, mode of activation, classical and alternate pathway, biological functions of C proteins

Unit IV

Immunotechniques- Principle and Applications: Immuno diffusion, Immuno fluorescence, Insitu localization technique - FISH and GISH. RIA and ELISA, FACS, Western blot, ELISPOT assay. Agglutination tests. VDRL test. Purification of antibodies, Quantitation of immunoglobulin by RID, EID and nephelometry, CMI techniques and Immunotherapy.

Reference Books:

- Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt, 2011.
- Roitt's Essential Immunology, 12 edition, Wiley-Blackwell. USA.
- Kannan. I., 2010. Immunology. MJP Publishers, Chennai.
- Abbas, A.K., A.H.L. Lichtman and S. Pillai, 2010. Cellular and Molecular Immunology. 6th Edition. Saunders Elsevier Publications, Philadelphia.
- Seemi Garhat Bashir, 2009. Text Book of Immunology, PHI Learning Pvt. Ltd. New Delhi.
- Thomas J. Kindt, Barbara A. Osborne and Richard A. Goldsby, 2006. Kuby Immunology, 6th edition, W. H. Freeman & Company.
- Nandini Shetty, 1996, Immunology: introductory textbook - I. New Age International, New Delhi.



Course Code	Course Title	L	T	P	C
23217AEC33	BIOPROCESS TECHNOLOGY	4	1	0	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of bioprocess and industrial fermentation. The student will get to understand the core concepts of fermentation and its commercial application.

Course outcomes:

The student will learn about the:

- CO-1 (K2) Outline the basis of Bioprocess Engineering
- CO-2 (K3) Relate reactors in fermentation
- CO-3 (K4) Differentiate fermentation processes
- CO-4 (K5) Assess Scale up and Scale down
- CO-5 (K6) Compile the output of fermentation processes

Unit I

Introduction to fermentation. General requirements of fermentation. Microbial growth kinetics of batch and continuous culture. Solid substrate, slurry fermentation and its application. Microbial cell culture. Immobilization of cells and enzymes. Food Safety: Introduction to food safety aspects and food related hazards – HACCP and ISO.

Unit II

Types of bioreactors: Submerged reactors, surface reactors, mechanically agitated reactors, non-mechanically agitated reactors. Design of fermenters, body construction. Production of citric acid, penicillin and insulin. Isolation and improvement of Industrially important Micro-organisms, Media for Industrial fermentation and Sterilization.

Unit III

Introduction to bioproducts and bioseparation. Primary recovery process: Cell disruption methods. Cell lysis and Flocculation: Osmotic and mechanical methods of lysis. Flocculation by electrolysis; polymorphic flocculation. Precipitation methods. Filtration: Principles, Conventional, Crossflow filtration. Sedimentation: Principles, Sedimentation coefficients. Extraction Principles, Liquid liquid extraction, aqueous two phase extraction, supercritical fluid extraction.



Unit IV

Down Stream Processing: Chromatography Techniques, Membrane separation, ultrafiltration. Drying .Principles and operation of vacuum dryer, shelf dryer, rotary dryer, freezer and spray dryer. Crystallization and Whole broth processing.

Unit V

Aerobic and anaerobic fermentation processes and their application in the field of biotechnology industry. Production of commercially important primary and secondary metabolites, Effluent Treatment and Fermentation Economics.

Reference Books:

- Min-tzeLiong, 2011. Bioprocess Sciences and Technology. NovaScience Pub Inc.
- Michael L.Shuler, FikretKargi. 2003. Bioprocess Engineering. PHIpublishers.
- P.A.Belter, E.L.Cursler, and W.S.Hu. 1988.Bioseparation: Downstream processing for Biotechnology. John Wiley and sons.
- R.G. Harrison, P.Todd, SR.Rudge and D.P. Petrides. 2003.Bioseparation science and engineering. Oxford Press.



Course Code	Course Title	L	T	P	C
2317SEC34L	IMMUNOLOGY AND BIOPROCESS TECHNOLOGY	0	0	4	4

Learning Outcome:

The practical will establish a basic study skill on the subject and will improve the student's ability to calculate and improve their practical skill and knowledge.

Course outcomes:

CO-1 (K2) to learn the Bioinformatics tools for sequence retrieval and alignment

CO-2 (K3) to apply the learned tools for various applications

CO-3 (K4) to isolate, identify & enumerate immune cells

CO-4 (K5) to learn the technique of immunodiagnostics

CO-5 (K6) to study upstream & downstream techniques

Unit I: Immunology Practical

1. Identification of various immune cells from human peripheral blood.
2. Lymphocyte separation and identification
3. Determination of lymphocyte viability by trypan blue method
4. WBC counting
5. Preparation of serum and plasma
6. Electrophoretic profile of human serum in native PAGE
7. Preparation of cellular antigen – human RBC
8. Preparation of antigen-adjuvant mixture for production of polyclonal antibody
9. Isolation of IgG molecule from serum
10. Immunodiagnostics: CRP
11. Immunodiagnostics: ASO
12. Immunodiagnostics: Widal
13. Immunodiagnostics: RA
14. Immunodiagnostics: Blood grouping and typing
15. Immunodiagnostics: hCG
16. ELISA
17. Radial Immunodiffusion
18. Ouchterlony Immunodiffusion
19. Immunoelectrophoresis
20. Rocket electrophoresis
21. Counter current immunoelectrophoresis.
22. Bioassays for cytokines
23. Radioimmunoassays (Demonstration)



Unit II: Bioprocess Technology - Practical

1. Parts and design of fermenter
2. Solid state fermentation
3. Submerged fermentation
4. Foaming and antifoaming agents
5. Media preparation and sterilization
6. Isolation of industrially important microorganisms for microbial processes.
7. Conservation of Bacteria by Lyophilization.
8. Production and estimation of protease
9. Production and estimation of amylase.
10. Production of wine using grapes
11. Production of penicillin
12. Determination of penicillin activity
13. Citric acid production
14. Use of alginate for cell immobilization.
15. Media standardization (C:N ratio) for maximum biomass production of an industrially important microorganism.
16. Cell disruption (Sonication)
17. Aqueous Two Phase Extraction of enzymes



Course Code	Course Title	L	T	P	C
23217DSC35A	NANOBIOTECHNOLOGY	4	1	0	3

Learning Outcome:

The subject imparts knowledge on the fundamentals of nanoparticles. The student will be provided with a basic knowledge and understanding about the role of nanoparticles in biotechnology.

Course outcomes:

- CO-1 Understand the bases for Introduction to Nanotechnology
- CO-2 To impart understanding on Nanoparticle based Drug Delivery.
- CO-3 Fabrication of nanomaterials for bone tissue grafting
- CO-4 Methods of Nanofabrication
- CO-5 Understand the application of Nanotechnology

Unit I

Introduction to Nanotechnology- Scientific revolution, Feynman's vision, Classification of nanobiomaterials -Types of nanomaterials – nanoparticles, nanotubes, nanowires, Nanofibers, Size dependent variation in the properties of Nanomaterials, Nature's Nanophenomena.

Unit II

Preparation of Nanomaterials, Top down and bottom up approaches, Biosynthesis, Nanobiomaterials- Polymer, Ceramic, Metal based Nanobiomaterials, Carbon based Nanomaterials, DNA based Nanostructures, Protein based Nanostructures, Quantum dots, Magnetic Nanoparticles, Nanofibres, Hydrogels, Films and Scaffolds.

Unit III

Application of Nanomaterials in Bone substitutes and Dentistry, Food and Cosmetic applications, Bio-sensors and Lab-on-a-chip, Bio-devices and implantable devices, Bioremediation, Nanomaterials for anti-microbial coating – medical implants and paints, Application of Nanotechnology in textile industry.

Unit IV

Nanomaterials for diagnosis and therapy, Implications of drug delivery, Nano-carriers for application in medicine, polymeric nanoparticles as drug carriers, Drug release mechanism,



Targeted Drug Delivery using nanocarriers, Nanoparticle technologies for cancer therapy and diagnosis, Point of Care and Personalized medicine, Magnetic nanoparticles for imaging and Hyperthermia.

Unit V

Nanotoxicology, Portals of Entry of the nanoparticles into the Human Body, Bio-toxicity of Nanoparticles, Nanoparticles in Mammalian systems and Health threats, Biological response and cellular interaction of implant materials and scaffolds, Risk assessment and Safety Regulation of nanoparticles.

Reference Books:

- Nanotechnology, S.Shanmugam, Mjp publication. 2011.
- Advanced nanomaterials, kurt E. geckeler, Hiroyuki Nishide , Wiley VHC.2010.
- Nanotechnology and tissue engineering. T.Laurencin, Lakshmi S. Nair, CRC press. 2012.
- Handbook of carbon nanomaterials. Francis D souza, Karl M. Kadish.
- World scientific publishing co. pte. ltd. 2011.
- Oded Shoseyov (Editor), Ilan Levy, 2010. NanoBioTechnology: BioInspired Devices and Materials of the Future, Humana Press.
- Chad A. Mirkin and Christof M. Niemeyer, 2007. Nanobiotechnology II: More Concepts and Applications, Wiley-VCH.
- Challa S.S.R.Kumar (Ed). 2006. Biologicals and pharmaceutical nanomaterials, Wiley-VCH Verlag GmbH & Co, KgaA.
- K.K.K.Jain 2006. Nanobiotechnology in Molecular Diagnostics: Current Techniques and Applications Horizon Bioscience
- Niemeyer, C.M., Mirkin, C.A. (Eds). 2004. Nanobiotechnology Concepts, Applications and Perspectives, Wiley-VCH, Weinheim.
- Andrzej Miziolek, Shashi P.Karna, J malthew Mauro and Richard A.Vaia. 2005 Defense Applications of Nanomaterials :
- Springer Handbook of Nanotechnology- Ed. by B. Bhushan, Springer-Verlag (2004)
- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, C.N.R. Rao, A. Muller, A. K. Cheetham (Eds), Wiley-VCH Verlag (2004)
- Nanomaterials for medical diagnosis and therapy, Challa Kumar, Wiley-VCH, 2007.
- Nanotechnology for cancer therapy, Mansoor M. Amiji, CRC Press, 2007.
- K.K.Jain, Nano Biotechnology, Horizons Biosciences, 2006
- Nanomaterials: An introduction to synthesis, properties and application, Dieter Vollath, Wiley VCH, 2008
- Cato T. Laurencin and Lakshmi S. Nair, Nanotechnology and Tissue Engineering The Scaffold, CRC Press Taylor & Francis Group.



- Introduction to Nanoscience and Nanotechnology, Gabor .L et al, Fundamentals of Nanotechnology, Hornyak, G. Louis, Tibbals, H. F., Dutta, Joydeep, CRC Press, 2009.
- Assessing Nanoparticle Risks to Human Health, Gurumurthy Ramachandran, Elsevier, 2011.
- Nanotechnology: Environmental Health and safety, Risks, Regulation and Management, Matthew Hull and Diana Bowman, Elsevier, 2010.
- Nanotechnology: Health and Environmental Risks, Jo Anne Shatkin, CRC Press, 2013

Useful Websites:

<http://www.zyvex.com/nano> www.fda.gov/nanotechnology/ www.nature.com/nano/



Course Code	Course Title	L	T	P	C
23217SEC36	MOLECULAR BASIS OF DISEASE	4	1	0	3

Learning Outcome:

The course aims to integrate molecular aspects of chronic human disease into the context of histopathology and macroscopic specimens for each above disease topics outlined in the timetable and in Moodle. Furthermore, course aims mesh well with other disciplines including Anatomy, Biochemistry, Molecular Biology, Immunology, Microbiology, Pharmacology and Physiology.

Course outcomes:

- CO-1 Account for the basic terms, principles and mechanisms within general pathology
- CO-2 Explain about molecular and cellular pathophysiological mechanisms for common disorders
- CO-3 To know about molecular basis of human diseases
- CO-4 To identify the molecular basis of ischaemic diseases
- CO-5 Give an account of the molecular connections in organ system-related diseases

Unit I

Intro to Infectious Disease Diseases - Clinical Epidemiology - Pathology of Human Disease, genes, cell cycles, and chromosomes, Human disease pedigree and hemophilia

Unit II

Molecular basis of infectious diseases a Tuberculosis, Amoebiasis, Malaria. Genetic Neuropathies - Parkinson's Disease - Mitochondrial Disorders - lysosomal disorders, storage disorders

Unit III

Signaling pathways and their disruption in cellular adaptation mechanisms including hypertrophy, hyperplasia, atrophy and metaplasia, leading to manifestation of signs and symptoms in diseases such as cardiac failure, obesity, diabetes, cancer, etc

Unit IV

Molecular basis of ischaemic diseases a Myocardial ischaemia and infarction including new diagnostic parameters, Cerebral ischaemia and infarction , ischaemic limb disorders , renal failure a acute and chronic, ischaemic placental disorder and foetal mal developments , obesity , Rheumatoid Arthritis.

Unit V

Molecular basis of metabolic diseases. Organ Transplantation - Heart Failure

Reference Books:

- Principles of Gene Manipulation ,Sandy B. Primrose, Richard Twyman, Bob Old,Wiley, 08- Feb-2002



- From Genes to Genomes: Concepts and Applications of DNA Technology. Jeremy W Dale and Malcom von Schantz Copyright 2002 John Wiley & Sons, Ltd.
- Synthetic Biology: Tools and Applications. Edited by Huimin Zhao. Academic Press. Amsterdam (The Netherlands) and Boston (Massachusetts): Elsevier. ISBN: 978-0-12-394430-6. 2013.

URL

- Metabolic and Molecular Bases of Inherited Disease (MMBID) – 8th Edition – <http://ommbid.mhmedical.com>, on Pitt campus or through Pulse Secure VPN
- Online Mendelian Inheritance in Man, OMIM: <https://www.omim.org/>
- Genetics Home Reference: <https://ghr.nlm.nih.gov/>
- Gene Reviews: <https://www.ncbi.nlm.nih.gov/books/NBK1116/>
- Molecular Biology of the Cell (Alberts) 4th edition available from NCBI Bookshelf, <https://www.ncbi.nlm.nih.gov/books/NBK21054/>



SEMESTER IV

Course Code	Course Title	L	T	P	C
23217AEC41	PROTEOMICS	4	1	0	4

AIM:

To understand the proteins enclosed by the genes with respect to structure, function, protein – protein interactions, techniques for separation and analysis, database and applications.

COURSE OUTCOME:

- Gain knowledge on phylogenetic profiles
- Describe the features of Yeast two-hybrid system.

UNIT I INTRODUCTION: Proteomics introduction – Protein sequencing – Protein Digestion Techniques – Mass Spectrometers for Protein and Peptide Analysis – Protein Identification by Peptide Mass Fingerprinting – Software Tools for Peptide Mass Fingerprinting: Finding the Matches – Peptide Sequence Analysis and Protein Identification with Tandem Mass Spectrometry

UNIT II PROTEOME DATABASES: Proteome databases – Comparative proteomics methods – 2D gel databases – Protein interaction data bases – Metabolic pathway databases – resources for interaction prediction – network and pathway visualization tools – Protein network analysis

UNIT III PROTEOMICS TOOLS: 2D gel electrophoresis and Mass spectra – Protein identification from 2D gel, mass spectra and sequence data – Protein property prediction – bulk, active sites, modification sites, interactive sites, location, localization, stability, shape, domains properties, secondary and tertiary structures – Protein identification programs – Muscot – PeptIdent – Protein prospector – GFS

UNIT IV FUNCTIONAL PROTEOMICS: Functional proteomics – protein phenotypes – Protein-Protein Interaction Mapping: Experimental – Yeast two-hybrid system – phage display – protein fragment complementation assays – Computational approach

UNIT V APPLICATION OF PROTEOMICS: Applications of Proteomics – Protein Expression Profiling – Identifying Protein – Protein Interactions and Protein Complexes – Mapping Protein Modifications – Protein Arrays and Protein Chips – Application of proteomics to medicine, toxicology and pharmaceuticals

REFERENCES

- Baxevanis D and Ouellette BFF, Bioinformatics: A practical guide to the analysis of genes and proteins (3rd Edn.), John Wiley & Sons, Inc. 2005.
- . Baxevanis D and Ouellette BFF, Bioinformatics: A practical guide to the analysis of genes and proteins (2nd Edn.), John Wiley & Sons, Inc. 2002.
- Brown TA, Genomes (2nd Edn.), BIOS Scientific Publishers, Oxford, UK, 2002.
- Sensen CW, Essentials of Genomics and Bioinformatics, Wiley–VCH. 2002.
- Sensen CW, Hand book of Genome Research, Wiley–VCH Verlag GmBh & Co,



Course Code	Course Title	L	T	P	C
23217AEC42	GENOMICS	4	1	0	4

AIM:

To study prokaryotic and eukaryotic genomes, general methods of genome sequencing techniques, genome analysis and annotations, genome mapping techniques and applications of genomics.

OUTCOME:

- Acquire the aspects of Gene Contig and Shotgun method.
- Know the features of the Genome Mapping databases.

UNIT -I INTRODUCTION: Genome structure and anatomy of prokaryotic and eukaryotic genome – Nuclear genomes – Organelle genomes – Repetitive DNA sequence – Transposable elements– Pseudo genes – Genome databases – organisms-specific databases.

UNIT -II GENOME SEQUENCING DNA: sequencing techniques: Maxam Gilbert method – Sanger's method – Pyrosequencing – Whole genome sequencing – Gene Contig and Shotgun method – Human genome project.

UNIT -III GENOME ANALYSIS AND ANNOTATION: Searching and locating Genes – Programs and databases – Determining function of genes – Gene Prediction – Methods of gene prediction – Softwares and tools.

UNIT -IV GENOME MAPPING: Mapping databases – Types of mapping – Genetic mapping: DNA markers – RFLP, SSLP, RH maps, SNP – Linkage analysis – Physical mapping: Restriction mapping – FISH – STS mapping

UNIT -V APPLICATIONS OF GENOMICS DNA: microarray and its applications – Medical applications: Development of Antibiotics – Vaccines – Drug discovery – Human genetics diseases: Identification – Gene Diagnosis and Gene therapy– Genomics in Plant Biology.

REFERENCES:

- Brown T.A., Genomes 3 (3rd Edn.), Garland Science Publishing, New York, 2007.
- Brown T.A., Gene Cloning and DNA Analysis – An Introduction (6th Edn.), A John Wiley & Sons, Ltd., Publications, UK, 2010.
- Jeremy W. Dale and Malcolm von Schantz, From Genes to Genomes – Concepts and Applications of DNA Technology, John Wiley & Sons, Ltd., Publications, UK, 2002.
- Richard J. Reece, Analysis of Genes and Genomes, John Wiley & Sons, Ltd., Publications, UK, 2004.



DISSERTATION

Course Code	Course Title	L	T	P	C
23217PRW43	PROJECT VIVA	0	0	10	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of academic research. The student will get to understand the core concepts of pursuing research.



Course Code	Course Title	L	T	P	C
23217DSC44_A	DISCIPLINE SPECIFIC ELECTIVE COURSE-IV STEM CELL BIOLOGY	4	1	0	3

Learning Outcome:

The subject imparts knowledge on the fundamentals of stem cells. The student will be provided with a basic knowledge and understanding about the application of stem cell biology.

Course Outcomes:

At the end of the Course, the Student will be able to:

- CO1 To understand the major discoveries of stem cell biology
- CO2 To provide basic knowledge about stem cell niche and functions
- CO3 To enlighten the students on Stem cell isolation and culture techniques
- CO4 To update the knowledge on Stem cell cycle
- CO5 To assess and appraise Applications of Embryonic stem cells.

Unit- I

Stem cells - Definition, Characterization, Pluripotency, Self-renewal and differentiation. Types of stem cells- Embryonic stem cells, Adult stem cells and mesenchymal stem Cells, Adipose stem cells

Unit-II

Stem cell niche, Niche specification - Drosophila germ line stem cells. Receptors, genes and markers of stem cells

Unit-III

Stem cell isolation and culture techniques. Characterization of stem cells

Unit-IV

Stem cell cycle. Chromatin modification and transcriptional regulation, chromatin modifying factors, Chromosomal inactivation. JAK -STAT pathway, Ras\Raf pathway, PI3K cell signaling, p53 check points, Role of LIF pathway in cell cycle control



Unit-V

Applications of Embryonic stem cells, Bone marrow stem cells, Adipose derived stem cells and Hematopoietic stem cells. Ethics in human stem cell research

Reference Books:

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, Alexander Battler, Jonathan Leo, Springer, STEM CELL TECHNOLOGY Syllabus - Semester First References:
- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2, Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan



Course Code	Course Title	L	T	P	C
23217DSC45_A	DISCIPLINE SPECIFIC ELECTIVE COURSE-V BIOETHICS, BIOSAFETY, CLINICAL TRIALS, IPR & ENTREPRENEURSHIP	4	1	0	3

Learning Outcome:

This course provides the guidelines and regulations governing research; evaluate ethical conduct and social responsibilities; to adhere to safe working practices; to appreciate the need for protection of human subjects; to recognize the potential harms in research and show sensitivity to cultural and ethical issues; to create a general awareness about IPR.

Course outcomes:

CO-1	Understand the basics of biosafety and bioethics and its impact on biological sciences and the importance of human life.
CO-2	Apply the knowledge to recognize the importance of biosafety guidelines and good clinical practices.
CO-3	Acquire adequate knowledge in the use of genetically modified organisms and its effect on human health.
CO-4	Evaluate the benefits of GM technology and importance of IPR
CO-5	Analyse the importance of protection of new knowledge and innovations and its role in business and entrepreneurship

Unit I

Introduction to Bioethics Need for bioethics in social and cultural issues. Bioethics & GMO's Issues and concerns pertaining to Genetically modified foods & food crops, Organisms and their possible health implications and mixing up with the gene-pool. Bioethics in Medicine Protocols of ethical concerns related to prenatal diagnosis, gene therapy, Organ transplantation, Xenotransplantation, Containment facilities for genetic engineering experiments, regulations on field experiments and release of GMO's labeling of GM foods.

Unit II

Clinical trials –Regulations. Bioethics & Cloning Permissions and Procedures in Animal Cloning, Human cloning, Risks and hopes. Bioethics in Research Stem cell research, Human Genome Project, Use of animals in research, human volunteers for Clinical research, Studies on Ethnic races. Ethics in patient care, Informed consent.



Unit III

Biosafety – Biological risk assessment. Biological agents and Hazard groups. Criteria in biological risk assessment. Guidelines for categorization of genetically modified plants for field test. Regulation, national and international guidelines of Biosafety, rDNA guidelines, Regulatory requirements for drugs and Biologics GLP. Biosafety levels. Safety equipments and Biological Safety cabinets.

Unit IV

IPR: Introduction to Intellectual Property rights, Patenting – Factors for patentability – Novelty, Non-obviousness, Marketability. Procedures for registration of Patents. Copyright works, ownership, transfer and duration of Copyright. Renewal and Termination of Copyright. Industrial Designs - Need for Protection of Industrial Designs. Procedure for obtaining Design Protection. Infringement, Right of Goodwill, Passing Off. Trademarks - Introduction to Trademarks. Need for Protection of Trademarks. Classification of Trademarks. Indian Trademarks Law. Procedural Requirements of Protection of Trademarks

Unit V

Geographical Indications - Indication of Source and Geographical Indication. Procedure for Registration, Duration of Protection and Renewal. Infringement, Penalties and Remedies. Layout- Designs of Integrated Circuits: Conditions and Procedure for Registration. Duration and Effect of Registration Protection of Plant variety and Plant breeders' rights in India. Protection of traditional knowledge, Bioprospecting and biopiracy. India's new IP Policy (2016), Govt of India's steps to promote IPR. Career opportunities in IP. Entrepreneurship: Definition and importance, Characteristics and functions of an entrepreneur.

Reference Books:

- “Bioethics & Biosafety” by Sateesh MK, IK International publications, 2008
- USPTO Web Patent Databases at: www.uspto.gov/patft
- Government of India's Patents Website: patinfo.nic.in
- Intellectual property India: www.ipindia.nic.in
- “Indian Patent Law : Legal and Business Implications” by Ajit Parulekar, Sarita D'Souza Macmillan India publication, 2006
- “Agriculture and Intellectual Property Rights”, edited by: Santaniello, V., Evenson, R.E., Zilberman, D. and Carlson, G.A. University Press publication, 2003
- Research papers and Reports provided from time to time
- Ganguli P, (2001), Intellectual Property Rights, Tata Mcgraw Hill.
- Ramesh Chandra, (2004), Issues Of Intellectual Property Rights, Isha Books.
- Erbisch F.h., Maredia K.M, (2000), Intellectual Property Rights In Agricultural Biotechnology, Universities Press.
- Shiv Sahai Singh, (2004), Law Of Intellectual Property Rights, Deep & Deep Publications (p) Ltd.





**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

B.Sc. BIOTECHNOLOGY CURRICULUM

REGULATION 2023



B.sc., Graduate Attributes

- Research, inquiry and analytical thinking abilities.
- Capability and motivation for intellectual development.
- Ethical, social and professional understanding.
- Communication in intra and inter disciplinary
- Teamwork, collaborative and management skills in scientific research
- Information literacy in respective discipline

B.sc., Program Educational Objectives PEO

- **PEO 1:** Graduates will learn and apply knowledge of Biotechnology, Science and Engineering concepts to solve problems related to field of Biotechnology.
- **PEO 2:** Demonstrate professional and ethical attitude with awareness of current issues and think about the social entailment of their work, especially its impact on safety, health and environment for sustainable development.
- **PEO 3:** To empower the students with analytical and research skills, enable them to critically analyze existing literature in an area of specialization and to nurture entrepreneurial endeavors.
- **PEO 4:** Graduates will be able to design and innovate solution to Biotechnological problems by applying appropriate tools while keeping in mind safety and ethical factor for environmental & society.
- **PEO 5:** Graduates will be able to undertake any responsibility as an individual and as a team in a multidisciplinary environment.



B.Sc., Programme Specific Outcome (PSO)

- **PSO1-** Graduates will exhibit contemporary knowledge in Biotechnology and students will be eligible for doing jobs in pharmaceutical and biotechnological Industry.
- **PSO2-**An expert in biotechnology and allied fields (medical, microbial, agricultural, environmental, plant and animal) for utilizing the practical skill to address biotechnological challenges.
- **PSO3-** Graduates will be able to work individually as well as in team to survive in multidisciplinary environment.
- **PSO4-** If students will engage themselves in the process of effective learning, it will give opportunities to utilize acquired knowledge for the catering the needs of science and technology as well as for the betterment of human mankind.
- **PSO5-**Graduates will be able to understand the potentials, and impact of biotechnological innovations on environment and their implementation for finding sustainable solution to issues pertaining to environment, health sector, agriculture, etc.

B.Sc., Program Outcome PO

- **PO1-**Understand the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life
- **PO2-**Understanding and better knowledge of the causes, types and control methods for environmental pollution by the students.
- **PO3-**The student will be able to discuss the mechanisms associated with gene expression system in prokaryotes and eukaryotes.
- **PO4-**Developed various communication skills such as reading, listening, speaking etc.,
- **PO5-**Acquired the skills in handling scientific instruments, planning and performing in laboratory experiments
- **PO6-**Ethics: Convey and practice social, environmental and biological ethics.
- **PO7-**To get knowledge about research tools and learn to do review literature. Ability to carryout independent literature survey corresponding to the specific publications type and asses basic research tool



SCHOOL OF ARTS AND SCIENCE

B.Sc., BIOTECHNOLOGY - REGULATION 2023

COURSE STRUCTURE

SEMESTER – I					
Course Code	Course Title	L	T	P	C
THEORY					
23110AEC11/ 23111AEC11/ 23132AEC11/ 23135AEC11	Tami – I/Advanced English-I/Hindi-I/ French - I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23117AEC13	Cell and Molecular Developmental Biology	4	1	0	3
23115GEC14	Biological Chemistry	4	1	0	3
PRACTICAL					
23117SEC15L	Cell and Molecular Developmental Biology	0	0	3	3
23115SEC16L	Biological Chemistry	0	0	3	3
Skill Enhancement Course					
23117SEC17	Food and Nutrition (Non Major Elective)	2	0	0	2
23117SEC18	Foundation Course	2	0	0	2
Ability Enhancement Compulsory course					
231AECCINC	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	-	-	-	1
Total		20	4	6	25
SEMESTER – II					
Course Code	Course Title	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Tami – II/Advanced English-II/Hindi-II/ French - II	3	1	0	3
23111AEC22	English-II	3	1	0	3
23117AEC23	Genetics	4	1	0	3
23116GEC24	Fundamentals of Microbiology	4	1	0	3
PRACTICAL					
23117SEC25L	Genetics	0	0	3	3
23116SEC26L	Fundamentals of Microbiology	0	0	3	3
Skill Enhancement Course					
23117SEC27	Public health and Hygiene(Non Major Elective)	2	0	0	2
23117SEC28	Food and Bioprocess technology	2	0	0	2
Ability Enhancement Compulsory course					
231AECCCMS	Communication Skills	2	0	0	2



AUDIT COURSE					
231SSCBE	Basic Behavioural Etiquette	-	-	-	1
Total		20	4	6	25
SECOND YEAR					
SEMESTER – III					
23110AEC31/ 23132AEC31/ 23111AEC31/ 23135AEC31	Tamil – III/Hindi-III/Advanced English-III/ French – III	3	1	0	3
23111AEC32	English-III	3	1	0	3
23117AEC33	Immunology and Immunotechnology	4	1	0	3
23115GEC34	Bioinstrumentation	4	1	0	3
PRACTICAL					
23117SEC35L	Immunology and Immunotechnology	0	0	3	3
23115SEC36L	Bioinstrumentation	0	0	3	3
Skill Enhancement Course					
23117SEC37	Environment Management In Industries	2	0	0	1
23117SEC38	Good Laboratory Practices	2	0	0	2
Ability Enhancement Compulsory course					
23115RMC39	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	-	-	-	1
Total		20	4	6	24
SEMESTER – IV					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV	3	0	0	3
23111AEC42	English-IV	3	0	0	3
23117AEC43	Genetic Engineering and rDNA technology	4	1	0	3
23117GEC44	Bioinformatics and Biostatistics	4	1	0	3
PRACTICAL					
23117 SEC45L	Genetic Engineering and rDNA technology	0	0	3	3
23117SEC46L	Bioinformatics and Biostatistics	0	0	3	3
Skill Enhancement Course					
23117SEC47	Organic Farming and Health Management	2	0	0	2
23117SEC48	Biotechnology for Society	2	0	0	2
Ability Enhancement Compulsory course					
23115BRC49	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	0	0	2
AUDIT COURSE					
231LSCLS	Leadership and Management Skills	0	0	0	1
Total		22	2	6	27
SEMESTER – V					
23117AEC51	Plant Biotechnology	5	1	0	4
23117AEC52	Animal Biotechnology	5	1	0	4



23117AEC53	Environmental and Industrial Biotechnology	5	1	0	4
23117DSC54__	Discipline Specific Elective –I	4	0	0	3
Skill Enhancement Course					
23117SEC55L	Plant Biotechnology and Animal Biotechnology Lab	0	0	3	3
23117SEC56L	Environmental and Industrial Biotechnology Lab	0	0	3	3
23117SEC57	Internship/Industrial Visit/Field Visit	0	0	0	2
AUDIT COURSE					
231ACLSPSL	Professional Skills	-	-	-	1
231AECCVED	Value Education	2	0	0	2
	Total	21	3	6	26
Third year					
SEMESTER – VI					
22117AEC61	Bioentrepreneurship	5	0	0	4
22117AEC62	Pharmaceutical Biotechnology	5	0	0	4
23117DSC63	Discipline specific Elective II	5	0	0	3
23117PRW64	Project	0	0	13	4
23117SEC65	General awareness for competitive examination	2	0	0	2
231EXACT	Extension activity	-	-	-	1
AUDIT COURSE					
231ACSIKWS	Indian Knowledge System	-	-	-	2
	Total	17	0	13	20
Total Credits -Programme					140
Total Credits - Audit Courses					07
Total Credits					147

Semester	Discipline specific Elective courses -I
I	23117DSE54A -Nano technology 23117DSE54B -Enzymology 23117DSE54C -Bioethics and Biosafety 23117DSE54D -Cancer biology 23117DSE54E - Biochemical Pharmacology 23117DSE54 - Disaster Management
	Discipline specific Elective courses -II
II	23117DSC63 A-Marine Biotechnology 23117DSC63 B -Food Technology

இக்கால இலக்கியம்
23110AEC 11

முதல் பருவம்

பாடநோக்கங்கள்

1. இக்கால தமிழ் இலக்கிய வகைகளின் மாதிரிகளை கற்பித்தல்.
2. தமிழின் இனிமையை உணரச் செய்தல்
3. தமிழின் ஈடுபாட்டையும் சுவைக்கும் திறனையும் ஏற்படுத்துதல்.
4. கவிதை எழுதும் திறனை உருவாக்குதல்
5. படைப்பாளர்களாக உருவாக்கும் திறனை ஏற்படுத்துதல்.

பயன்கள்

- மொழி ஆளுமைத் திறன் பெறுதல்.
- சமூக சிந்தனையை வளர்த்துக் கொள்ளுதல்.
- படைப்பாளர்களாக உருவாகும் திறனைப் பெறுதல்.
- இலக்கியங்களின் அறிவை மேம்படுத்துதல்.
- கவிதை எழுதும் முறையை புரிந்துக்கொள்ளுதல்

அலகு -1 மரபுக்கவிதை

1. பாரதியார்--விடுதலை, வந்தே மாதரம் ,காற்று
- 2.பாரதிதாசன் - அழகின் சிரிப்பு ,தமிழனுக்கு வீழ்ச்சி இல்லை
- 3.கவிமணி தேசியவிநாயகம் பிள்ளை-- தொழிலாளியின் முறையீடு
- 4.நாமக்கல் கவிஞர்-- தருணம் இதுவே ,
- 5.கண்ணதாசன்-- அனுபவம்

அலகு -2 புதுக்கவிதைகள்

- 1.அப்துல் ரகுமான் -வெற்றி
- 2.அறிவுமதி-நட்புக் காலம்
- 3.வைரமுத்து- ருசி, சிற்பி- ஓடு ஓடு சங்கிலி
- 4.மு.மேத்தா- வெளிச்சம் வெளியே இல்லை

அலகு -3 நாட்டுப்புறவியல்

1.பழமொழிகள்

2. விடுகதைகள்

3. தொழில் பாடல்

அலகு - 4 சிறுகதை

1. தடயம்- மா. ஜெயபிரகாசம்

2. எதார்த்தம் - சு. தமிழ்ச்செல்வி

3.நீதி-- பூமணி

அலகு - 5 இலக்கியவரலாறு

1. கவிதை

2. சிறுகதை

3. நாட்டுப்புறவியல்

பொதுக்கட்டுரை – மனித நேயம், வாழ்வியல் அறங்கள்

மனப்பாடப் பகுதி : பாரதியார் கவிதை- வேண்டும்,பாரதிதாசன் கவிதை-செந்தாமரை

பார்வை நூல்கள் :

1. பாரதியார் கவிதைகள் - மணிவாசகர் பதிப்பகம் சென்னை

2.பாரதிதாசன் கவிதைகள் - பாடி நிலையம், சென்னை

3. தமிழ் இலக்கிய வரலாறு - மு வரதராஜன் சாகித்திய அகாடெமி,சென்னை

4. நாட்டுப்புறவியல் - முனைவர். ஆறு. ராமநாதன் ,மணிவாசகர் பதிப்பகம், சென்னை

5. தமிழ் சிறுகதையும் தோற்றம் வளர்ச்சி - தமிழ் புத்தக நிலையம், சென்னை

இணையதளம் -www.tamilvu.org

www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3



SEMESTER I

Course Code	Course Title	L	T	P	C
23111AEC11	Advanced English-I	3	1	0	3

Aim:

To improve the knowledge of English

Course Objective:

CO1: To familiarize the students with the glossary terms, figures of speech

CO2: To enhance vocabulary

CO3: To learn how to edit and proofread

CO4: To know the comparison and contrast and cause and effect forms

CO5: To understand the impact of the speeches of famous people

Course Outcome:

CO1: Development of vocabulary

CO2: Learning to edit and do proof reading

CO3: Reading and comprehending literature

CO4: Comparison and contrast and cause and effect forms

CO5: The impact of the speeches of famous people

UNIT-I:

The Origin of Language - Development of Gesture, Sign, Words, Sounds, Speech and Writing Language History and the Process of Language Change Core Features of Human Language, Animals and Human Language

UNIT-II:

Nature of Language Pure Vowels, Diphthongs and Consonants Language Varieties: Dialects, Idiolect, Pidgin and Creole Language and Gender, Language and Disadvantage

UNIT-III:

Linguistic Form Morphology, Grammar, Syntax Saussurean Dichotomies: Synchronic and Diachronic Linguistics Semantics, Pragmatics



UNIT-IV:

Branches of Linguistics Structural Linguistics, Sociolinguistics, Psycholinguistics, Neurolinguistics, Applied Linguistics

UNIT-V:

Stylistics and Discourse Analysis: Relationship between Language and Literature, Style and Function, Poetic Discourse, Narrative Discourse and Dramatic Discourse

Author	Title of the book	Edition/Year	Publisher
Wren and Martin	English Grammar	2009	S.Chand & Company Ltd
Meenakshi Raman & Sangeetha Sharma	Technical Communication	Second Edition/2011	Oxford University Press
Sudhir Kumar Sharma	The World's Great Speeches	-	Galaxy Publishers



Course Code	Course Title	L	T	P	C
23111AEC12	English-I	3	1	0	3

Course Objectives

CO1: To enable learners to acquire the linguistic competence necessarily required in various life situations.

CO2: To help them understand the written text and able to use skimming, scanning skills

CO3: To assist them in creative thinking abilities

CO4: To enable them become better readers and writers

CO5: To assist them in developing correct reading habits, silently, extensively and intensively

Course Content:

UNIT I: Poetry

1.1 A Patch of Land - Subramania Bharati

1.3 A Nation's Strength - Ralph Waldo Emerson

1.4 Love Cycle - Chinua Achebe

UNIT II: Prose

2.1 JRD - Harish Bhat



2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim

UNIT III: Short Stories

3.1 The Faltering Pendulum - Bhabani Bhattacharya

3.2 How I Taught my Grandmother to Read - Sudha Murthy

3.3 The Gold Frame- R.K. Laxman

UNIT IV: Language Competency

4.1 Vocabulary : Synonyms, Antonyms, Word Formation

4.2 Appropriate use of Articles and Parts of Speech

4.3 Error correction

UNIT V: English for Workplace

5.1 Self - introduction, Greetings

5.2 Introducing others

5.3 Listening for General and Specific Information

5.1 Listening to and Giving Instructions / Directions

Course Outcomes

Course Outcomes	On completion of this course students will;	Programme Outcomes
CO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	PO1
CO2	Understand the total content and underlying meaning in the context.	PO1, PO2
CO3	Form the habit of reading for pleasure and for information	PO4,PO6
CO4	Comprehend material other than the prescribed text	PO4, PO5, PO6
CO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	PO3, PO8



Text books (Latest Editions)	
1.	Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi:Sahitya Akademi, 1967
2.	How I taught my Grandmother to Read and other Stories, Murthy, Sudha,Penguin Books, India, 2004

Reference Books (Latest Editions, and the style given must be strictly adhered to)	
1.	English in use - A textbook for College Students (English ,Paper back, -T.Vijay Kumar, K Durga Bhavani, YL Srinivas
2.	Practical English Usage - 4th Edition By Michael Swan
3.	The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace -Margaret Shepherd,Penny Carter, (Illustrator), Sharon Hogan, 2005.

Web Resources	
1.	A patch of land by Subramania Bharati translated by Usha Rajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=v#v=onepage&q=subramania%20bharati%20poems&f=false
2.	The Sparrow by Paul Laurence Dunbar https://poets.org/poem/sparrow-0
3.	A Nation's Strength by Emerson https://poets.org/poem/nations-strength
4.	Love cycle by Chinua Achebe : https://www.best-poems.net/chinua-achebe/love-cycle.html
5.	JRD by Harish Bhat https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories
6.	Us and Them by David Sedaris From Dress Your Family in Corduroy and Denim https://legacy.npr.org/programs/morning/features/2004/jun/sedaris/usandthem.html
7.	Uncle Podger Hangs a Picture: http://rosyhunt.blogspot.com/2013/01/uncle-podger-hangs-picture.html
8.	The Gold Frame: https://fybaenglish.blogspot.com/2018/12/the-gold-frame-r-k-laxman.html



Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO/PO	PSO 1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15

Weighted percentage of Course Contribution to POS	3.0	3.0	3.0	3.0	3.0
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3 – Strong, 2 – Medium, 1 - Low



Course Code	Course Title	L	T	P	C
23117AEC13	CELL AND MOLECULAR DEVELOPMENTAL BIOLOGY	4	1	0	3

Aim: To understand the various techniques in biotechnology and their applications.

Course Objectives:

- Have an insight of the cell as the fundamental unit of life and to compare the structure of the Eukaryotic cell with the primitive prokaryotic cell
- Analyze the structure and obtain a strong foundation about the functional aspects of cell organelles and cell membrane.
- Study the structure and functions of Nucleic acid and discuss the molecular mechanism of Replication, Transcription and Translation and post translational modifications of proteins.
- Predict the response of cells to the intra and extracellular environment by studying about the intracellular signaling pathways.
- Understand the principles and molecular mechanisms involved in cellular differentiation, morphogenesis, growth and Potency of the cell.

Course Outcomes:

- The students do understand the importance of plant and animal diversity and their conservation through *in-vitro* propagation and maintenance.
- Exploited techniques in molecular biology like isolation of animal and plant genomic DNA, their separation by gel electrophoresis, and amplification of separated DNA by polymerase chain reaction.
- To gain knowledge in Concept of Biology, Bio-molecules, Genetics, DNA Technology, Bioinformatics, Nanotechnology, Genetic Manipulations etc.,
- To understand the principles of the mechanism of some biotechnologically derived diagnostic aids/tests



UNIT-I

Discovery and diversity of cells - Cell theory - Structure of prokaryotic (bacteria) and eukaryotic cells (plant and animal cells).

UNIT-II

Bio-macromolecules and Bio-micromolecules (Primary functions in the cell). Structure and Functions of Cell Organelles: Cell wall - Cell membrane - Cytoplasm - Nucleus - chromosomes - Endoplasmic reticulum - Ribosomes - Golgi bodies - Plastids - Vacuoles - Lysosomes - Mitochondria - Microbodies - Flagella - Cilia - Centrosome and Centrioles - Cytoskeleton.

UNIT-III

Structure and functions of DNA and RNA - Central Dogma of the cell. DNA-Replication in prokaryotes - Transcription in Prokaryotes and Eukaryotes - RNA Processing - Genetic code- Translation - Similarities and differences in prokaryotic and eukaryotic translation - Post Translational Modifications - Protein Sorting - Protein degradation.

UNIT-IV

Cell cycle - Cell cycle checkpoints - Cell division - Mitosis and Meiosis - Cellular differentiation - Cell junctions - Cell Adhesion - ExtraCellular Matrix - Cell to cell communications - Signal transduction - G - Protein Coupled Receptors Signal transduction pathways

UNIT-V

Gametogenesis - Spermatogenesis and Oogenesis in mammals. Fertilization- Types of cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals- Organogenesis.

TEXTBOOKS:

1. T. Devasena (2012), Cell Biology, Oxford University Press.
2. Gupta, Renu & Makhija, Seema & Toteja, Ravi. (2018). Cell Biology: Practical Manual.
3. Gilbert, S.F. 2016. Developmental Biology, 11th edition. Sinauer Associates Inc. Publishers, MA. USA.
4. Bruce Alberts, 6th Edition (2014). Molecular Biology of the cell, W. W. Norton & Company.
5. James D. Watson (2001), The Double Helix: A personal account of the Discovery of the Structure of DNA, Touchstone Publishers.



REFERENCE BOOKS:

1. Karp's Cell and Molecular Biology: Concepts and Experiments. 8th Edition(2015). Wiley Publications.
2. James D. Watson, 7th Edition (2014), Molecular Biology of the Gene, Pearson Publications.
3. Geoffrey M. Cooper, 7th Edition (2015). The Cell: A Molecular Approach, Sinauer Associates, Oxford University Press.
4. Lodish Harwey, 6th Edition (2016), Molecular Cell Biology, W. H. Freeman Publications
5. Wolpert L, Tickle C, 2015. Principles of Development, 5th edition, Oxford University Press.

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	2	1	3	-	3	3	2	3
CLO2	3	3	3	3	-	3	3	2	3
CLO3	3	3	3	2	-	3	3	2	2
CLO4	3	2	3	2	-	3	3	2	3
CLO5	3	3	2	2	-	3	3	2	3
TOTAL	15	14	12	12	0	15	15	10	15
AVERAGE	3	2.8	2.4	2.4	0	3	3	2	3



ALLIED COURSE OFFERED BY BIOCHEMISTRY

BIOCHEMISTRY I

Course Code	Course Name	L	T	P	S
23115GEC14A	BIOLOGICAL CHEMISTRY	4	1	0	3

Course objectives

The objectives of this course are to

- Introduce the structure and classification of carbohydrates
- Comprehend the metabolism of carbohydrates
- Study the classification and properties of amino acids
- Elucidate the various levels of organization of Proteins
- Study functions and deficiency diseases of vitamins

Unit I:

Definition and classification of carbohydrates, linear and cyclic forms (Haworth projection) for glucose, fructose and mannose and disaccharides (maltose, lactose, sucrose). General properties of monosaccharide's and disaccharides. Occurrence and significance of polysaccharides.

Unit II: Metabolism- Catabolism and Anabolism. Carbohydrate metabolism- Glycolysis, TCA cycle, HMP shunt and glycogen metabolism and energetic

Unit III: Amino acids -Classifications, physical properties -amphoteric nature, isoelectric point and chemical reactions of carboxyl amino and both groups. Amino acid metabolism - transamination, deamination and decarboxylation.

Unit IV :Proteins- classification - biological functions ,physical properties- ampholytes, iso electric point, salting in and salting out, denaturation, nature of peptide bond. Secondary structure, α -helix and β -pleated sheet, tertiary structure, various forces involved- quaternary structure.

Unit V: Vitamins- Fat (A, D, E and K) and water soluble vitamins(B complex and C)- sources, RDA, biological functions and deficiency diseases



Course Outcome

CO	On completion of this course, students will be able to	Programme Outcome
CO1	Classify the structure of carbohydrates and its properties	PO1
CO2	Explain the metabolism of carbohydrates and its significance	PO1
CO3	Classify amino acids and its properties	PO1
CO4	Explain the classification and elucidate the different levels of structural organization of proteins	PO1
CO5	Identify the disease caused by the deficiency of vitamins	PO1

Text Books

- Satyanarayan,U (2014) Biochemistry (4th ed), Arunabha Sen Books & Allied (P) Ltd, Kolkata.
- Jain J.L.(2007) Fundamentals of Biochemistry,S.Chand publishers 311

Reference books

- David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6th ed) W.H. Freeman.



Course Code	Course Title	L	T	P	C
23117SEC15L	CELL AND MOLECULAR DEVELOPMENTAL BIOLOGY	0	0	3	3

Course objectives

CO1: Demonstrate the operation of Light Microscope

CO2: Identify blood cells and its components

CO3: Isolate and identify plant, and animal cells.

CO4: Summarizes the concept of gametes

CO5: Develop skill to perform cell fractionations.

EXPERIMENTS

1. Components of a Compound / Light Microscope.
2. Blood smear preparation and Identification of Blood cells
3. Buccal smear preparation and Identification of squamous epithelial cells.
4. Isolation and Identification of plant cells.
5. Observation of sperm & Egg
6. Mounting of chick Embryo - 24 hrs, 48 hrs, 72 hrs, 96 hrs.
7. Types of placenta in mammals.
8. Cell fractionation and Identification of cell organelles (Demo)

REFERENCE:

- K.V. Chaitanya, (2013), *Cell and molecular biology: Lab manual*, PHI publishers, ISBN 978-81-203-800-4

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMMESPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	2	3	3	2	2
CLO2	3	3	3	3	3	3	3	2	2
CLO3	3	3	3	3	3	3	3	3	3
CLO4	3	2	3	3	3	3	3	3	3
CLO5	3	3	2	3	2	2	2	3	3
TOTAL	15	14	14	15	13	14	14	13	13
AVERAGE	3	2.8	2.8	3	2.6	2.8	2.8	2.6	2.6



Course Code	Course Title	L	T	P	C
23115SEC16L	BIOLOGICAL CHEMISTRY	0	0	3	3

Learning objectives

- Identify carbohydrates by qualitative test
- Estimate biomolecules volumetrically
- Estimate protein quantitatively

I Qualitative analysis of carbohydrates

- a) Monosaccharides-Glucose, Fructose
- b) Disaccharides- Lactose, Maltose, Sucrose
- c) Polysaccharides-Starch

II Volumetric analysis

- a) Estimation of ascorbic acid using 2,6-dichlorophenolindophenol as link solution
- b) Estimation of Glucose by Benedict's method
- c) Estimation of Glycine by Sorenson Formal titration

III Quantitative analysis (Demonstration Experimentt)

- a) Colorimetric estimation of protein by Biuret method

Course Outcome

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Qualitatively analyze and report the type of carbohydrate based on specific tests	PO1, PO2, PO3
CO2	Quantitatively estimate the carbohydrates, amino acids and ascorbic acid	PO1, PO2, PO3
CO3	Estimate protein by colorimetric method	PO1, PO2, PO3



Text books

1. Laboratory manual in Biochemistry, J. Jayaraman, 2nd edition, New Age International Publishers, 2011.
2. An Introduction to Practical Biochemistry, David T. Plummer, 3rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.
3. Biochemical Methods, Sadasivam S and Manickam A, 4th edition, New Age International Publishers, 2016

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3	3				3	3	3	3
CO 2	2	3	3				3	3	3	3
CO 3	2	3	3				3	3	3	3

S - Strong (3) M – Medium (2) L -Low(1)



Non Major Elective Semester-I

Course Code	Course Title	L	T	P	C
23117SEC17	FOOD AND NUTRITION	2	0	0	2

Course Objectives

CO1: The student can determine the relationship between food, health and immunity

CO2: Able to explain the classification of foods and their deficiency

CO3: Can analyse the importance of BMR

CO4: Can outline the basic food groups and their adulteration

CO5: Apply the concepts of food to prepare different food plans

Unit I:

Definition of food, Nutrition, Nutrient, Nutritional status, Dietetics, Balance diet, Malnutrition, Energy (Unit of energy-Joule, Kilocalorie). Health, Immunity by food and function of food.

Unit II:

Carbohydrate, Protein, Fat, Vitamin and Minerals (Calcium, Phosphorous, Sodium, Potassium, Iron, Iodine, Fluorine) -Sources, Classification, Function, Deficiencies of these nutrients. Function of water and dietary fiber.

Unit III:

BMR: Definition, factors affecting BMR and total energy requirements (Calculation of energy of individuals)

Unit IV:

Basic five food groups, nutritional significance of cereals, pulses, milk, meat, fish, vegetables, egg, nuts, oils and sugars. Food toxins, Food additives, Food quality, Safe food handling, Food adulteration, Preservatives and Packaging

Unit V:

Principles and Objectives of meal planning. Diet for an infant, preschool child, School child, normal male and female of different occupations.



Text Books

1. Vidya & D.B. Rao, 2010. A textbook of nutrition by, Discovery Publishinghouse,
2. Handbook of Nutrition & Food, third edition, CRC Press (Taylor and Francis group) by Carolyn D.Berdanier
3. Food science and Nutrition, Oxford publication by Sunetra Roday
4. Janet D Ward & Larry T Ward, Principles of food science by, Goodheart-Wilcox publishing.
5. Dr. M. Swaminathan, 2018. Hand Book of Food & Nutrition, Second edition Bangalore press.

Reference Books

1. Joshi, V.K. and Singh, R.S., A. (2013), *Food Biotechnology- Principles and practices*, I.K.International Publishing House Pvt. Ltd., New Delhi,.
2. RavishankarRai, V,(2015), *Advances in Food Biotechnology*, (First edition),John Wiley & Sons, Inc, ISBN 9781118864555
3. Foster, G.N., (2020), *Food Biotechnology*, (First edition), CBS Publishers & Distributors Pvt Ltd, ISBN 9789389396348
4. Anthony Pometto, Kalidas Shetty, Gopinadhan Paliyath, Robert E. Levin (2005), *Food Biotechnology*, (2nd edition), *CRC Press*, ISBN 9780824753290
5. Perry Johnson-Green (2018), *Introduction to Food Biotechnology*, Special Indian Edition, *CRC Press*, ISBN 9781315275703

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	2	1	1	3	2	3	3	3
CLO2	3	2	1	1	3	3	3	3	3
CLO3	3	2	1	1	3	3	3	3	3
CLO4	3	2	1	1	3	3	3	3	3
CLO5	3	2	1	1	3	3	3	3	3
TOTAL	15	10	5	5	15	14	15	15	15
Average	3	2	1	1	3	2.8	3	3	3



Course Code	Course Title	L	T	P	C
23117SEC18	FOUNDATION COURSE	2	0	0	2

Unit 1:

Biotechnological Advances in Plant Seed Development and Germination Cellular and Molecular Biology of embryogenesis in dicotyledonous plants, hormonal regulation of seed development; control of seed maturation and germination, biotechnological approaches for altering seed composition.

Unit II:

DNA replication, Repair and Recombination: Replication initiation, elongation and termination in prokaryotes & eukaryotes, enzymes and accessory proteins involved in DNA replication, Fidelity; DNA repair- photoreactivation, nucleotide and base excision repair, mismatch repair, SOS response, gene amplification, mobile genetic elements.

Unit III:

Cellular therapy; Stem cells: definition, properties and potency of stem cells; Sources: embryonic and adult stem cells; Concept of tissue engineering; Histotypic and Organotypic culture for tissue engineering; Immunotherapy: Cancer immunotherapy; Role of cytokine therapy in cancers; Genetically engineered stem cells in cancer treatment

Unit IV:

Introduction to Fermentation processes, Types of fermentation processes, batch fermentation processes and its kinetics, plug flow fermentation process and its kinetics, continuous fermentation processes and its kinetics, Fed batch fermentation processes and its kinetics, factors affecting fermentation processes.

Unit V:

Molecular pharming (farming): edible vaccines, therapeutic proteins, Nutritional quality: golden rice, protein, vitamins. T-DNA & transposon tagging, promoter trapping, activation tagging. Chloroplast transformation: advantages, vectors, success with tobacco and potato.



Course Code	Course Title	L	T	P	C
231AECCINC	INDIAN CONSTITUTION	2	0	0	2

Objectives:

- To make the students understand about the democratic rule and parliamentary administration
- To appreciate the salient features of the Indian constitution 3.To know the fundamental rights and constitutional remedies
- To make familiar with powers and positions of the union executive ,union parliament and the supreme court
- To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Learning Out comes:

- Democratic values and citizenship training are gained
- Awareness on fundamental rights are established
- The function of union government and state government are learnt
- The power and functions of the judiciary are learnt thoroughly
- Appreciation of democratic parliamentary rule is learnt

Unit I: The making of Indian constitution

The constitution assembly organization –character -work salient features of the constitution- written and detailed constitution -socialism –secularism-democracy and republic.

Unit II: Fundamental rights and fundamental duties of the citizens.

Right of equality - right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies -fundamental duties .

Unit III: Directive principles of state policy.

Socialistic principles-Gandhi an principles-liberal and general principles -differences between fundamental rights and directive principles

Unit IV: The union executive, union parliament and Supreme Court.

Powers and positions of the president -qualification _method of election of president and vice president -prime minister -Rajya Sabah -Lok Sabah .the supreme court -high court -functions and position of supreme court and high court

Unit V: State council -election system and parliamentary democracy in India.

State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.

References:

- 1) Palekar.s.a. Indian constitution government and politics, ABD publications, India
- 2) Aiyer, alladi krishnaswami, Constitution and fundamental rights 1955.
- 3) Markandan. k.c.directive Principles in the Indian constitution 1966.
- 4) Kashyap. Subash c, Our parliament ,National book trust , New Delhi 1989



Course Code	Course Title	L	T	P	C
231LSCUV	UNIVERSAL HUMAN VALUES	0	0	0	1

Aim:

This course aims at making learners conscious about universal human values in an integral manner, without ignoring other aspects that are needed for learner's personality development.

Course Objectives:

The present course deals with meaning, purpose and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realise one's potentials.

Course Outcomes:

By the end of the course the learners will be able to:

- Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.
- Learn from case studies of lives of great and successful people who followed and practised human values and achieved self-actualisation.
- Become conscious practitioners of human values.
- Realise their potential as human beings and conduct themselves properly in the ways of the world.

Unit I

- Introduction: What is love? Forms of love – for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living
- Love and compassion and inter-relatedness
- Love, compassion, empathy, sympathy and non-violence
- Individuals who are remembered in history for practicing compassion



and love.

- Narratives and anecdotes from history, literature including local folklore
- Practicing love and compassion: What will learners learn gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?
- Sharing learner's individual and/or group experience(s)
- Simulated Situations
- Case studies

Unit II

- Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others)
- Individuals who are remembered in history for practicing this value
- Narratives and anecdotes from history, literature including local folklore
- Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?
- Learners' individual and/or group experience(s)
- Simulated situations
- Case studies

Unit III

- Introduction: What is non-violence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non-violence
- Ahimsa as non-violence and non-killing
- Individuals and organisations that are known for their commitment to non-violence
- Narratives and anecdotes about non-violence from history, and literature including local folklore
- Practicing non-violence: What will learners learn/gain if they practice non-violence? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about non-violence



- Simulated situations
- Case studies

Unit IV

- Introduction: What is righteousness?
- Righteousness and dharma, Righteousness and Propriety
- Individuals who are remembered in history for practicing righteousness
- Narratives and anecdotes from history, literature including local folklore
- Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Case studies

Unit V

- Introduction: What is peace? Its need, relation with harmony and balance
- Individuals and organisations that are known for their commitment to peace
- Narratives and Anecdotes about peace from history, and literature including local
local
- folklore
- Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about peace
- Simulated situations
- Case studies

Unit VI

- Introduction: What is service? Forms of service for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.



- Individuals who are remembered in history for practicing this value.
- Narratives and anecdotes dealing with instances of service from history, literature
- including local folklore
- Practicing service: What will learners learn/gain if they practice service? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s) regarding service
- Simulated situations
- Case studies

Unit VII

- Introduction: What is renunciation? Renunciation and sacrifice. Self-restrain and Ways of overcoming greed. Renunciation with action as true renunciation
- Individuals who are remembered in history for practicing this value.
- Narratives and anecdotes from history and literature including local folklore about individuals who are remembered for their sacrifice and renunciation.
- Practicing renunciation and sacrifice: What will learners learn/gain if they practice Renunciation and sacrifice? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Case studies

பக்தி இலக்கியம் - 23110AEC21
இரண்டாம் பருவம்

பாடநோக்கங்கள்

- காலந்தோறும் பக்தி இலக்கியம் வளர்ந்துள்ள தன்மையைக் கற்பித்தல்.
- நாயன்மார்கள், ஆழ்வார்களின் பக்திச் சிறப்பை அறிய செய்தல்.
- ஆழ்வார்களின் பக்தி உணர்வை உண்டாக்கும்
- பாடல்களில் இசை இன்பம், ஓசை நயம் ஆகியவற்றை உணரச்செய்தல்
- குழந்தைப் பருவத்தின் தன்மையை உணர்த்துதல்

பயன்கள்

- நாயன்மார்கள் பக்திச் சிறப்பை அறிதல்.
- ஆழ்வார்களின் பக்தி நெறியை உணர்தல்.
- பக்தி இலக்கியம் காலம் தோறும் வளர்ந்ததை அறிதல்.
- பாடல்களில் இசை இன்பம், ஓசை நயம் அறிதல்.
- குழந்தைப் பருவத்தின் தன்மையை உணர்தல்.

அலகு- 1 பன்னிரு திருமுறைகள்

1. திருஞானசம்பந்தர்- திருத்தில்லைப் பதிகம்
2. திருநாவுக்கரசர் - திருநீற்றுப் பதிகம்
3. சுந்தரர் - திருவெண்ணைநல்லூர்
4. திருமூலர்- திருமந்திரம்(இளமை நிலையாமை)

அலகு- 2 பன்னிரு ஆழ்வார்கள்

1. ஆண்டாள் - திருப்பாவை
2. பெரியாழ்வார்- மூன்றாம் திருமுறை(பத்து பாடல்கள்)
3. மதுரகவியாழ்வார் - கண்ணின் நுண் சிறு தாம்பு

அலகு- 3 சிற்றிலக்கியங்கள்

1. மீனாட்சியம்மைப் பிள்ளைத்தமிழ்- செங்கீரை பருவம், அம்புலி பருவம்
2. நந்திக்கலம்பகம்
3. குற்றால குறவஞ்சி- குறத்தி நகர்வளம் கூறுதல்
4. காளமேகப்பூவர்பாடல்கள்

அலகு- 4 புதினம்

1. நா .பார்த்தசாரதியின்- குறிஞ்சி மலர்

அலகு-5 தமிழ் இலக்கிய வரலாறு

1. பக்தி இலக்கியங்கள்
2. சைவமும் தமிழும்
3. வைணவ சமயம் போற்றி வளர்த்த தமிழ்
4. சிற்றிலக்கியங்கள்
5. நாவல் இலக்கியம்

பார்வை நூல்கள் :

1. தேவாரம் - மணிவாசகர் பதிப்பகம் சென்னை
2. நாலாயிர திவ்ய பிரபந்தம் - வர்த்தமான பதிப்பகம் சென்னை
3. தமிழ் இலக்கிய வரலாறு - முனைவர் ச சுபாஷ் சந்திர போஸ், இயல் வெளியீடு ,தஞ்சாவூர்
4. தமிழ் நாவல் இலக்கியம் -கா கைலாசபதி- தமிழ் புத்தக,நிலையம், சென்னை

இணையதளம் -www.tamilvu.org , www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3



Course Code	Course Title	L	T	P	C
23111AEC21	Advanced English-II	3	1	0	3

Aim:

To improve communication skills in English

Course Objective:

- To understand the format of e-mail, fax and memos
- To write itinerary, checklist, invitation, circular, instruction, recommendations
- To understand the impact of the biographies of famous people

Course Content:

Unit I

Introduction Test of vocabulary range; test of verbal speed; test of verbal responsiveness; affixation-prefix, suffix; synonyms.

Unit II

Homonyms and homographs Words of foreign origin; antonyms; redundant words; phrases; acronyms; words commonly confused; slang and new words.

Unit III

Technical terms Personality types; relationships; medicines; science; business, education, law, technology, and the humanities.

Unit IV

Vocabulary for professional exams TOEFL; IELTS; SAT; GRE; CAT; MAT; TANCET; BEC; GMAT

Unit V

Vocabulary games synonyms; antonyms; compound word; homophone; idioms; literature; oxymoron; parts of speech; prefix; suffix; root word; spelling; word play.

Outcome:

- Developing technological skill
- Able to write in a variety of formats
- Read biographies and develop personality

Author	Title of the book	Edition / Year Publisher	Edition / Year Publisher
Meenakshi Raman & amp; Sangeetha Sharma	Technical Communication	2011	Oxford University Press
Rajendra Pal & amp; J.S.Korlahalli	Business Communication	2015	Sultan



Course Code	Course Title	L	T	P	C
23111AEC22	Paper II - General English	3	1	0	3

Course Objectives

CO1: To introduce learners to the essential skills of communication in English

CO2: To enable them use these skills effectively in academic and non-academic contexts

CO3: To enable them use these skills effectively in academic and non-academic contexts

CO4: To enable them use various business communication strategies and to use advanced vocabulary

CO5: To familiarize them in writing descriptive essays and respond to arguments orally and in writing

Course Content

UNIT I :Poetry

1.1 Very Indian Poem in Indian English - Nissim Ezekiel

1.2 Still I Rise - Maya Angelou

1.3 On Killing a Tree - Gieve Patel

UNIT II :Prose

2.1 If You Are Wrong Admit it- Dale Carnegie

2.2 Kindly Adjust Please - Shashi Tharoor

2.3 The Spoon-fed Age- W.R. Inge

UNIT III:Fiction

Alchemist - Paulo Coelho

UNIT IV:Language Competency

4.1 Homonyms, Homophones, HomographsPortmanteau words

4.2 Subject Verb Agreement



UNIT V: English in the Workplace

- 5.1 Reading for General and Specific information [Charts, tables, schedules, graphs etc]
- 5.2 Reading news and weather reports
- 5.3 Writing paragraphs
- 5.4 Taking and making notes

Course Outcomes	On completion of this course, students will;	POS
CO1	Learn to introduce themselves and talk about everyday activities confidently	PO1
CO2	Be able to write short paragraphs on people, places and events	PO1, PO2
CO3	Identify the purpose of using various tenses and effectively employ them in speaking and writing	PO4, PO6
CO4	Gain knowledge to write subjective and objective descriptions	PO4, PO5, PO6
CO5	Identify and use their skills effectively in formal contexts.	PO3, PO8

Text Books (Latest Editions)	
1.	The Alchemist - Paulo Coelho Harper – 2005

References Books (Latest editions and the style as given below must be strictly adhered to)	
1.	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2.	Descriptive English. <u>SP Bakshi</u> , <u>Richa Sharma</u> · 2019, Arihant Publications (India) Ltd.
3.	The Reading Book: A Complete Guide to Teaching Reading. <u>Sheena Cameron</u> , <u>Louise Dempsey</u> , S & L. Publishing, 2019.
4.	Skimming and Scanning Techniques, <u>Barbara Sherman</u> , Liberty University Press, 2014
5.	Brilliant Speed Reading: Whatever you need to read, however ... <u>Phil Chambers</u> , Pearson, 2013.
6.	The Archer, <u>Paulo Coelho</u> . Penguin Viking, 2020.



Web Resources	
1.	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40_%20_2020103001102714.pdf
2.	Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise
3.	The Flower by Tennyson: https://www.poemhunter.com/poem/the-flower-2/
4.	On Killing a tree by Gieve Patel: https://www.poemhunter.com/poem/on-killing-a-tree/
5.	If you are wrong, admit it: https://www.tbr.fun/if-youre-wrong-admit-it/
6.	Kindly Adjust please - Shashi Tharoor https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3lhtdXqvuV4ySECn9S7SA6HmCEYISyd1OHd3BlwKgiNKKwdkeSg3qWp-U/
7.	The Spoon Fed Age: https://www.nrkacademy.com/2016/04/spoon-feeding-by-wringe.html
8.	The Alchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PS O2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POS	3.0	3.0	3.0	3.0	3.0



Course Code	Course Title	L	T	P	C
23117AEC23	GENETICS	4	1	0	3

Aim:

- Students will understand the cellular components underlying mitotic cell division.

Objectives:

- Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
- Students will understand how these cellular components are used to generate and utilize energy in cells

Outcomes:

- This paper will enable the students to learn the basics and lay strong foundation in understanding the composition of cells, how cells works is fundamental to living systems.s

UNIT I

Genetics- History, Genetics in Society and Biology, Fundamental Concepts of Genetics- Mendelian genetics: Monohybrid cross, Dihybrid cross, Test Cross, Back cross, Sex determination and Sex-Linked Chromosomes, genetic vs environmental effect-multiple alleles. Deviations from Mendelian Genetic Principles.

UNIT II

Prokaryotic and Eukaryotic Chromosomes – organization and structure-Transposable elements, Cellular Reproduction in Prokaryotic and Eukaryotic cells - mitosis and meiosis- significance- cell cycle-Linkage, mechanism of crossing over-genetic variability,



UNIT III

Gene concept: modern concept of gene- DNA as a genetic material- Watson and Crick model of DNA- DNA replication- repair- Telomeres-Linkage-Recombination-Gene Mapping- DNA Senescence.

UNIT IV

Prokaryotic and Eukaryotic Transcription and Translation-RNA and its types-Genetic code. Control of Gene Expression:– Operon concept- Lac and Trp operon

UNIT V

Gene Mutation and Chromosome variations-Genetic disorders- in borne errors of metabolism, Banding techniques, chromosomal aberrations.

Cell Junctions and the Extracellular Matrix- Cell–Cell junctions-the Extracellular Matrix Cancer and oncogenes.

REFERENCES

- Genetics-A Conceptual Approach by Benjamin A. Pierce, 4th Edn, 2012 W. H. Freeman and Company.
- Molecular Biology of the Cell by Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter, 6th Edn, 2015, Garland Science
- iGenetics: A Molecular Approach by Peter J. Russell. 3rd Edn, 2010, Pearson Education, Inc.,
- Genetics by Verma and Agarwal. Chand publications.
- Genetics by Gardner, Simmons and Snustad. 2004. John Wiley & sons.



Course Code	Course Title	L	T	P	C
23116AEC34	FUNDAMENTALS OF MICROBIOLOGY	4	1	0	3

Aim:

Students should have knowledge about the history and development of Microbiology

Objectives:

The contents of this course will help students understand history, biology of microorganisms, growth and control of microbes. Thus the beginners are rightly exposed to foundation of Microbiology which would lead them towards progressive advancement of the subject

Unit I History of microbiology

Historical development of Microbiology- Theories of spontaneous generation – The scope of Microbiology - prokaryotic and eukaryotic microorganisms. General principles and nomenclature – Haeckel’s three kingdom concept, Whittaker’s five kingdom concept- Carl Woese three domain classification.

Unit II Microscopy

Microscopy: Principles and applications of bright field, dark field, phase contrast, fluorescent SEM and TEM. Principles and types of staining– Simple, differential (Gram, Spore, AFB) Capsule staining (Negative), Sterilization: Principles and methods – physical moist heat, dry heat, filtration (Membrane and HEPA).

Unit III General Characteristics of microbes

General characteristics and nature of Archaeobacteria, Cyanobacteria, Mycoplasma, Rickettsiae, Chlamydia, Spirochaetes, Actinobacteria, Protozoa, Algae, Fungi and Viruses. Basic understanding of classification of viruses, algae, fungi and protozoa.



Unit IV Classification of bacteria

Outline classification for bacteria as per the Bergey's Manual of Systematic Bacteriology -Structural organization of bacteria – Size, shape and arrangement of bacterial cells -Ultrastructure of a bacterial cell - cell wall, cell membrane, ribosomes, nucleoid, slime, capsule, flagella, fimbriae, spores, cysts, plasmid, mesosomes and cytoplasmic inclusions.

Unit V Cultivation of microbes

Cultivation of microbes- Types of culture media with specific examples for each type. Aerobic and Anaerobic culture techniques-Pure culture techniques (Tube dilution, Pour plate, Spread plate and Streak plate).

Outcomes:

On the successful completion of the course, student will be able to:

1. Understand the history of microbiology
2. Analyze the types of microscope
3. Understand the general characteristics of microbes
4. Evaluate the success of understanding the characterization and cultivation of microbes.

REFERENCES

1. Alcamo IE. Fundamentals of Microbiology, sixth edition, Addison wesley Longman, Inc. California. 2001.
2. Alexopoulos CJ, Mims CW and Blackwell M. Introductory Mycology. Fifth edition John Wiley and Sons. Chichester. 2000.
3. Atlas RA and Bartha R. Microbial Ecology. Fundamentals and Application, Benjamin Cummings, New York. 2000.
4. Black JG. Microbiology-principles and explorations, 6th edition. John Wiley and Sons, Inc. New York. 2005.
5. Cappuccino and Sherman. Microbiology – A Laboratory Manual. 7th edition, Dorling Kindersley (India) Pvt. Ltd., New Delhi. 2012.
6. Dubey RC and Maheswari DK. A Text Book of Microbiology. S Chand, New Delhi. 2010
7. Johri RM, Snehlatha, Sandhya Shrama. A Textbook of Algae. Wisdom Press, New Delhi. 2010.



7. Kanika Sharma. Textbook of Microbiology – Tools and Techniques. 1st edition, Ane Books Pvt. Ltd., New Delhi. 2011.
8. Madigan MT, Martinko JM, and Parker J. Biology of Microorganisms, 12th Edition, MacMillan Press, England. 2009.
9. Moselio Schaechter and Joshua Leaderberg. The Desk encyclopedia of Microbiology. Elsevier Academic press, California. 2004.
10. Pelczar MJ, Chan ECS and Kreig NR. Microbiology, fifth edition. McGrawHill. Book Co. Singapore. 2009.
11. Prescott LM, Harley JP, and Klein DA. Microbiology (7th edition) McGraw Hill, Newyork. 2008.
12. Schlegel HG. General Microbiology, Cambridge University Press, U.K. 2008.
13. Tortora GJ, Funke BR and Case CL. Microbiology: An Introduction. 9th Edition, Pearson Education, Singapore. 2009.
14. Rajan S and Selvi Christy R. Essentials of Microbiology, Anjanaa Book House, Chennai, 2015.



Course Code	Course Title	L	T	P	C
23117SEC25L	GENETICS LAB	0	0	3	3

Course Objectives:

- Demonstrate the basic principles of important techniques in Molecular biology and Genetics.
- Analyze the Polytene chromosome of the organisms
- Identify Barr bodies from Buccal smear
- Demonstrate the Preparations and maintenance of culture medium
- Demonstrate Human karyotyping

Outcomes:

- It will provide an understanding of the unique features of plant cells and animal cell.
- Gain understanding on the interaction between cells and the environment

Experiments:

1. Mitotic stages of onion (*Allium cepa*) root tip
2. Meiotic stages of cockroach testes/ Flower bud
3. Giant chromosomes from *Chironomus* larvae/ *Drosophila* salivary glands
4. Identification of Barr bodies from Buccal smear
5. Preparations of culture medium and culture of *Drosophila* – methods of maintenance
6. Identifications of mutants of *Drosophila*
7. Human karyotyping (Demo)

REFERENCE:

1. Practical Manual on "Fundamentals of Genetics" (PBG-121). 2019, Edition: First
Publisher: Odisha University of Agriculture & Technology. Editor: Kaushik Kumar Panigrahi



**MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME
SPECIFIC OUTCOME**

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	3	3	3	3	3
CLO2	3	3	3	3	3	3	3	3	3
CLO3	3	3	3	3	2	3	3	3	3
CLO4	3	3	3	2	3	2	3	3	2
CLO5	3	3	2	3	3	3	3	2	3
TOTAL	15	15	14	14	14	14	15	14	14
AVERAGE	3	3	2.8	2.8	2.8	2.8	3	2.8	2.8



Course Code	Course Title	L	T	P	C
23116SEC26L	MICROBIOLOGY LAB	0	0	3	3

Course objectives

1. Describe the general Laboratory safety & Sterilization Techniques
2. Develop Skills in Media Preparation, Isolation & Serial Dilution Techniques and Pure Culture Techniques
3. Microscopically analyze the morphological features of Bacteria and fungi and define various Staining Techniques.
4. Perform the Motility of organisms.
5. Able to characterize and identify bacteria using Biochemical tests.

Experiments:

1. Safety practices in Microbiological laboratory
2. Microscope and its operation
3. Principles and operations – Autoclave, Hot Air Oven, Filtration, Laminar Air Flow, Incubators, colony counter, Centrifuge, pH meter, Colorimeter and Spectrophotometer
4. Preparation of culture media, cleaning of glassware and sterilization methods
5. Demonstration of ubiquitous nature of microorganisms.
6. Measurement of size of microbes – micrometry.
7. Observation of permanent slides to study the structural characteristics of algae (Anabena, Nostoc, Spirulina, Oscillatoria), fungi (Pythium, Rhizopus, Saccharomyces, Penicillium, Aspergillus, Agaricus) and protozoa (Entamoeba histolytica and Plasmodium spp.).
8. Enumeration of bacterial numbers by Viable count (Plate count) and Total count (Haemocytometer count)
9. Pure culture techniques - Streak plate, Pour plate and Spread plate.
10. Test for motility of bacteria – Hanging drop method.
11. Staining techniques – Simple staining, Gram's staining, Spore-staining, Capsular staining.
12. Isolation of bacteria, actinobacteria, fungi and cyanobacteria.



Course Code	Course Title	L	T	P	C
23117SEC27	PUBLIC HEALTH AND HYGIENE	2	0	0	2

Course objectives

1. Can explain the importance of health and hygiene
2. Can analyze the importance of food and malnutrition
3. Can understand the cause of diseases
4. Will get know about lifestyle diseases
5. Will get awareness about various Health Services Organizations

Unit I

Scope health and hygiene – Concept of health and disease - Pollution and health hazards; water and airborne diseases. Radiation hazards: Mobile Cell tower and electronic. Role of health education in environment improvement and prevention of diseases. Personal hygiene, oral hygiene and sex hygiene.

Unit II

Classification of food into micro and macro nutrients. Balanced diet, Importance of dietary fibres. Significance of breast feeding. Malnutrition anomalies – Anaemia, Kwashiorkor, Marasmus, Rickets, Goiter (cause, symptoms, precaution and cure).

Unit III

Communicable viral diseases- measles, chicken pox, poliomyelitis, swine flu, dengue, chikungunya, rabies, leprosy and hepatitis. Communicable bacterial diseases- tuberculosis, typhoid, cholera, tetanus, plague, whooping cough, diphtheria, leprosy. Sexually transmitted diseases- AIDS, syphilis and gonorrhoea. Health education and preventive measures for communicable diseases.

Unit IV

Non-communicable diseases such as hypertension, stroke, coronary heart disease, myocardial infarction. Osteoporosis, osteoarthritis and rheumatoid arthritis-cause, symptom, precautions. Diabetes- types and their effect on human health. Gastrointestinal disorders- acidity, peptic ulcer, constipation, piles. (cause, symptoms, precaution and remedy) Obesity (Definition and consequences). Mental illness (depression and anxiety). Oral and lung cancer and their preventive measures.



Unit V

Health Services Organizations: World Health Organization (WHO), United Nations

International Children's Emergency Fund (UNICEF) and Indian RedCross (IRC).

Text Books

1. Mary Jane Schneider (2011) Introduction to Public Health.
2. Muthu, V.K. (2014) A Short Book of Public Health.
3. Detels, R. (2017) Oxford Textbook of Public Health (6th edition).
4. Gibney, M.J. (2013) Public Health Nutrition.
5. Wong, K.V. (2017) Nutrition, Health and Disease.

Reference Books

1. S. Lal, (2018), Vikas. *Public Health Management Principles And Practice*, 2nd Edition, CBS Publishers and Distributors Pvt Ltd, ISBN: 978-93-87742-93-2.
2. Mary-Jane Schneider (2016), *Introduction to Public Health*, (5th Edition), Jones & Bartlett Learning,. ISBN-13: 978-1284197594
3. Carolyn D. Berdanier, Johanna T. Dwyer, David Heber (2013), *Handbook of Nutrition and Food*, (3rd Edition), CRC Press,. ISBN 9781466505711
4. Sue Reed, Dino Pisaniello, Geza Benke, Kerrie Burton. (2013), *Principles of*
5. *Occupational Health and Hygiene: An Introduction*, (2nd Revised ed. Edition), Allen & Unwin,
6. V. Kumaresan, R. Sorna Raj, (2012) *Public Health and Hygiene*, (1st Edition), Saras Publication

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	-	2	3	3	3	3	3
CLO2	3	3	-	2	3	3	3	3	3
CLO3	3	3	1	2	3	3	3	3	3
CLO4	3	3	1	2	3	3	3	3	3
CLO5	2	3	2	3	3	3	2	2	3
TOTAL	14	15	4	11	15	15	14	14	15
Average	2.8	3	0.8	2.2	3	3	2.8	2.8	3



Course Code	Course Title	L	T	P	C
23117SEC28	FOOD AND BIOPROCESS TECHNOLOGY	2	0	0	2

Course Outcome

Students will be able to assess nutritional status and apply the knowledge in understanding the metabolism and nutrient functions.

UNIT I

Introduction to Bioprocess Technology: History and Scope- Bioreactor: Design, parts and accessories, functions- Modes of Operation of fermenter – Batch & continuous - Types of reactors - Bubble column, Fluidized bed reactor, plug flow reactor.

UNIT II

Fermentation media design, sterilization and media requirement for industrial fermentation, Main parameters to be monitored and controlled in fermentation processes, aerobic and anaerobic fermentation processes. Development and scale up of bioreactors for production of biological products. Immobilization – Types of immobilization, various methods - Applications of immobilized enzyme technology.

UNIT III

Downstream processing: Cell disruption methods for intracellular products, removal of insolubles, biomass (and particulate debris) separation techniques, flocculation and sedimentation, centrifugation and filtration methods. Enrichment operations: Membrane – based separations. Product finishing: precipitation/crystallization, mixing, dialysis, distillation and drying



UNIT IV

Production of microbial enzymes (Amylase, Protease and Pectinase) applications, production of organic solvents (Ethanol, Methanol) – production of organic acids (Citric acid, Acetic acid) - Single cell protein production – Spirulina, Yeast, Actinomycetes protein. Beverages production – Beer and Wine.

UNIT V

Processing of Milk – Pasteurization and homogenization - Modifying milk composition – Production of milk products – Curd, cheese, yogurt, and flavoured milk. Bakery products – Bread making. Probiotics and Role of Food technology in bio-defense programs.

References:

1. Shuler, M.L. and Kargi, F. 2008. Bioprocess engineering – Basic concepts. Pearson Education.
2. M.L. Srivastava., 2010. Fermentation Technology, Narosa Publications.
3. Pauline M. Doran., 2009. Bioprocess Engineering Principles. Academic Press Inc.,
4. El-Mansi & Bryce C.F.A., 2007. Fermentation Microbiology and Biotechnology., 2nd edition, Taylor and Francis Publishing



Course Code	Course Title	L	T	P	C
231AECCCMS	COMMUNICATION SKILLS	2	0	0	2

Course Objectives:

This course has been developed with the following objectives:

1. Identify common communication problems that may be holding learners back
2. Identify what their non-verbal messages are communicating to others
3. Understand role of communication in teaching-learning process
4. Learning to communicate through the digital media
5. Understand the importance of empathetic listening
6. Explore communication beyond language.

Course Outcome:

By the end of this program participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.

Unit I

- Techniques of effective listening
- Listening and comprehension
- Probing questions
- Barriers to listening

Unit II

- Pronunciation
- Enunciation
- Vocabulary
- Fluency
- Common Errors



Unit III

- Techniques of effective reading
- Gathering ideas and information from a given text
- Identify the main claim of the text
- Identify the purpose of the text
- Identify the context of the text
- Identify the concepts mentioned
- Evaluating these ideas and information
- Identify the arguments employed in the text
- Identify the theories employed or assumed in the text Interpret the text
- To understand what a text says
 - i. To understand what a text does
 - ii. To understand what a text means

Unit IV

- Clearly state the claims
- Avoid ambiguity, vagueness, unwanted generalisations and oversimplification of issues
- Provide background information
- Effectively argue the claim
- Provide evidence for the claims
- Use examples to explain concepts
- Follow convention
- Be properly sequenced
- Use proper sign posting techniques
- Be well structured
 - i. Well-knit logical sequence
 - ii. Narrative sequence
 - iii. Category groupings
- Different modes of Writing -
 - i. E-mails
 - ii. Proposal writing for Higher Studies
 - iii. Recording the proceedings of meetings
 - iv. Any other mode of writing relevant for learners



Unit V

- Role of Digital literacy in professional life
- Trends and opportunities in using digital technology in workplace
- Internet Basics
- Introduction to MS Office tools
 - i. Paint
 - ii. Office
 - iii. Excel
 - iv. Powerpoint

- Introduction to social media websites
- Advantages of social media
- Ethics and etiquettes of social media
- How to use Google search better
- Effective ways of using Social Media
- Introduction to Digital Marketing

Unit VI

- Meaning of non-verbal communication
- Introduction to modes of non-verbal communication
- Breaking the misbeliefs
- Open and Closed Body language
- Eye Contact and Facial Expression
- Hand Gestures
- Do's and Don'ts
- Learning from experts
- Activities-Based Learning

Reference:

1. SenMadhucchanda (2010), *An Introduction to Critical Thinking*, Pearson, Delhi
2. Silvia P. J. (2007), *How to Read a Lot*, American Psychological Association, Washington DC

காப்பிய இலக்கியம் - 23110AEC31
மூன்றாம் பருவம்

பாடநோக்கங்கள்

- ◆ தமிழ்க் காப்பியங்களை அறிமுகப்படுத்துதல்.
- ◆ காப்பியங்கள் கூறும் வாழ்வியல் அறங்களை உணர்த்துதல்.
- ◆ காப்பிய இலக்கியங்களில் இலக்கியச் சுவையை பயிற்றுவித்தல்.
- ◆ நாடக இலக்கியத்தின் தனித்துவத்தைக் கற்பித்தல்.
- ◆ புராணச் செய்திகளை மேம்படுத்திக் கொள்ளச் செய்நல்

பயன்கள்

- ◆ இலக்கியங்களின் சிறப்புகளை அறிவர்
- ◆ காப்பியக் கதைகள் வழி அறச் சிந்தனை பெறுவர்
- ◆ பல்வேறு காப்பிய வடிவங்களை பற்றிய அறிவு பெறுவர்.
- ◆ நாடக படைப்பாக்கத்திற்கான தூண்டுதலைப் பெறுவர்
- ◆ புராணச் செய்திகள் வழி தமிழ் கலாச்சாரத்தை அறிவர்.

அலகு-1 காப்பியங்கள்

1. சிலப்பதிகாரம் - மதுரை காண்டம் (வழக்குரை காதை)]
2. மணிமேகலை - விழாவறை காதை
3. சீவக சிந்தாமணி - குணமாலையார் இலம்பகம்

அலகு-2 காவியங்கள்

1. கம்பராமாயணம்- மந்தரை சூழ்ச்சி படலம்
2. மகாபாரதம் - ஆரண்ய பருவம்

அலகு-3 புராணங்கள்

1. பெரியபுராணம்- இளையான்குடி மாற நாயனார் புராணம்
2. சீறாப்புராணம் - ஈத்தங்குழை வரவழைத்தப் படலம்
3. தேம்பாவணி- பிரிந்த மகனை காண்படலம்

அலகு-4 நாடகம் - சாபம்? விமோசனம்

அலகு-5 இலக்கிய வரலாறு

1. காப்பியங்கள்
2. இரட்டைக் காப்பியங்கள்
3. நாடக இலக்கியம்

பார்வை நூல்கள் :

1. காப்பியத்திறன்- மணிவாசகர் நூலகம், சிதம்பரம்.
2. தமிழ் காப்பியங்கள் - கி. வா .ஜெகன் ஜெகநாதன் , அமுத நிலையம், சென்னை .
3. நவீன நாடக உருவாக்கம் - கோ பழனி , தமிழ் பல்கலைக்கழகம், தஞ்சாவூர்.

4. இணையதளம் -www.tamilvu.org , www.noolulagam.com

5. சாபம்? விமோசனம்

மு.இராமசுவாமி,

செண்பகம் இராமசுவாமி,

பாவை பதிப்பகம், ஜானிஜான் சாலை,

சென்னை - 14

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3



Course Code	Course Title	L	T	P	C
23111AEC31	Advanced English-III	3	1	0	3

Course Objective:

- To familiarize with the organs of speech and the description and classification of speech sounds
- To understand consonant cluster, syllable, word accent and intonation. To know how to interpret graphics
- To write slogans and advertisements

Course Content:

UNIT-I

The Origins of Language - The natural sound source - The social interaction source
The physical adaptation source: teeth and lips, mouth and tongue, larynx and pharynx

UNIT-II

The Sounds of Language – Phonetics Voiced and voiceless sounds Place of articulation Manner of articulation - Consonants, Vowels, Diphthongs

UNIT-III

The Sound Patterns of Language Phonology Phonemes: Natural classes Syllables: Consonant clusters Coarticulation effects: Assimilation, Nasalization, Elision , Normal

UNIT-IV

Word formation - Coinage, Acronyms, Derivation, Prefixes and suffixes, Infixes, Multiple

UNIT-V

Syntax



Course Outcome:

- ❖ Understand phonetics
- ❖ Develop writing skill
- ❖ Able to develop creative writing

Author	Title of the book	Edition / Year	Publisher
T.B. Balasubramaniyan	A textbook of phonetics for Indian Students	Reprint 2208	Macmillian
Meenakshi Sharma & Sangeetha Sharma	Technical Communication	2011	Oxford University Press



Course Code	Course Title	L	T	P	C
23111AEC32	English-III - (GENERAL ENGLISH)	3	1	0	3

Course Objectives:

CO1: To enhance the level of literary and aesthetic experience of students and to help them respond creatively.

CO2: To sensitize them to the major issues in the society and the world.

CO3: To sensitize them to the major issues in the society and the world.

CO4: To equip them to utilize the digital knowledge resources effectively for their chosen fields of study.

CO5: To help them think and write imaginatively and critically.

Course Content:

UNIT I:

Poetry:

- 1.1 The Voice of the Mountains - Mamang Dai
- 1.2 A Song of Hope - Oodgeroo Noonuccal
- 1.3 In an Artist's Studio - Christina Rossetti

UNIT II:

Scenes From Shakespeare:

- 2.1 Romeo & Juliet - The Balcony Scene
- 2.2 Macbeth - Banquet Scene



2.3 Julius Caesar - Murder Scene

UNIT III:

Speeches of Famous personalities

3.1 Yes, We Can -Barack Obama

3.2 You've Got to Find What You Love -Steve Jobs

UNIT IV:

Language Competency

4.1 Writing letters and emails

4.2 Writing and messaging in social media

platforms[blogs, twitter, instagram.facebook]

4.3 Learning netiquette, email etiquette

UNIT V:

English for Workplace

5.1 Data Interpretation and Reporting

5.2 Data Presentation and analysis

5.3 Meeting Etiquettes - language, dress code, voice modulation.

Online Meetings - Terms and expressions used

5.4 Conducting and participating in a meeting



Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	PO1
CO2	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society	PO1,PO2
CO3	Produce grammatically and idiomatically correct language.	PO4,PO6
CO4	Gain knowledge in writing techniques to meet academic and professional needs.	PO4,PO5,P O6
CO5	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	PO3,PO8

Text Books (Latest Editions)	
1.	Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011)
References Books:(Latest Editions,and the style as given below must be strictly adhered to)	
2.	Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
3.	Famous Speeches by Mahatma Gandhi, Createspace Independent Publishing Platform, 2016
4.	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish , Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5.	Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse , Michigan Teacher Training, 2016.
6.	Role Play-Theory and Practice. Krysia M Yardley-Matwiejczuk , SAGE publications ltd, 1997

Web Resources	
1.	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-B y-Mamang-Dai-Adivasi-Resurgence
2.	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3.	In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4.	Sita by Toru Dutt: https://www.poetrynook.com/poem/s/%E2%94%9C%C2%ABta



5.	Tryst with Destiny: https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html#:~:text=Jawaharlal%20Nehru%2C%20delivering%20his%20Tryst%20with%20Destiny%20speech.&text=%22Long%20years%20ago%20we%20made,awake%20to%20life%20and%20freedom.
6.	Yes, We Can: https://www.englishspeecheschannel.com/english-speeches/barack-obama-speech/
7.	You've got to find what you love: https://www.businessbusinessbusiness.com.au/steve-jobs-youve-got-to-find-what-you-love/#:~:text=Steve%20Jobs%2C%20in%20his%20commencement,emphasizes%20on%20believing%20in%20oneself.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium, 1 – Low Mapping with

Programme Specific Outcomes:

CO /PO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POS	3.0	3.0	3.0	3.0	3.0



Course Code	Course Title	L	T	P	C
23117AEC33	Immunology and Immunotechnology	4	1	0	3

Aim:

- To learn the immune system and reaction

Objectives:

- Explain the role of immune cells and their mechanism in body defense mechanism.
- Demonstrate the antigen –antibody reactions in various immune techniques.
- Gain new insights into Antigen -Antibody interactions and to demonstrate immunological techniques.
- Gain knowledge of production of vaccines.
- Apply the knowledge of immune associated disease, hypersensitivity reactions.

Outcomes:

- The students may understand the immune system, its components and various techniques used in bio manipulation.

Unit I

Introduction to Immunology. Cells involved in immune response. Primary and Secondary lymphoid organs – Thymus, Bone marrow, Lymph nodes and Spleen. Hematopoiesis – development of B and T lymphocytes. Types of immunity – Innate and acquired.



Unit II

Antigen: Characteristics and types. Antibody – Structure, Types, Properties and their Biological Function. Production of antibodies- Hybridoma technology: Applications of Monoclonal antibodies in biomedical research

Unit III

Antigen – Antibody interactions, Immunodiffusion and Immuno electrophoresis. Principle and application of ELISA and RIA and Fluorescent antibody technique and Western Blotting. Purification of antibodies.

Unit IV

The complement system and activation and regulation. Types – Classical, alternative and Lectin pathway. Biological function of C' proteins. Cytokines- Structure and Function. Vaccines – Types, Production and application

Unit V

Hypersensitivity Reactions and Types. Major Histocompatibility Complex – MHC genes, MHC in immune responsiveness, Structure and function of Class I and Class II MHC molecules. HLA tissue typing.

Text Books

Thomas J. Kindt, Barbara A. Osborne and Richard A Goldsby, 2006.

Kuby Immunology. 6th edition, W. H . Freeman and Company.

Kannan, I., 2010. Immunology. MJP Publishers, Chennai

Abbas, A.K., A.H.L., Lichtman and S. Pillai, 2010. Cellular and Molecular Immunology, 6th Edition. Saunders Elsevier Publications, Philadelphia

Nandini Shetty, 1996, Immunology : introductory textbook – I. New Age International, New Delhi.

Fahim Halim K., 2009. The Elements of Immunology. Pearson Education.



REFERENCES:

- Immunology by I.J. Kubey .1991 Freseman and company.
- Essential immunology Ivan Roitt , 1994. Blackwell Scientific publisher, Oxford.
- Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt, 2011. Roitt.s Essential Immunology, 12th edition, Wiley- Blackwell. USA.
- Janeway Travers. (1997). Immunobiology- the immune system in health and disease. Current Biology Ltd. London, New York. 3rd Edition.
- Frank C. Hay, Olwyn M. R. Westwood. (2002). Practical Immunology, 4thEdition., Wiley-Blackwell.
- Noel R. Rose, Herman Friedman, John L. Fahey. (1986). Manual of Clinical Laboratory Immunology. ASM.3rd Edition

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	3	3	3	3	3
CLO2	3	3	3	3	3	3	3	3	3
CLO3	3	3	3	3	2	3	3	3	3
CLO4	3	3	3	2	3	2	3	3	2
CLO5	3	3	2	3	3	3	3	2	3
TOTAL	15	15	14	14	14	14	15	14	14
AVERA GE	3	3	2.8	2.8	2.8	2.8	3	2.8	2.8



Course Code	Course Title	L	T	P	C
23115GEC34	BIOINSTRUMENTATION	4	1	0	3

Course Objectives

1. Practice, experiment with and apply the basic instruments in the laboratory.
2. Predict the functionality of Beer – Lambert’s law in identifying and quantifying a biomolecule.
3. Employ the separation techniques for separating biomolecules based on chromatography and electrophoretic techniques
4. Understand the clinical important isotopes and detection of isotopes.
5. Employ the separation techniques for separating biomolecules based on centrifugal force by centrifugation

Unit I

pH – Definition – pH meter. Measurement of pH and calibration of pH meter - Buffers – Preparation of Buffers. Microscopy: Principle and applications of Compound, Bright field, Phase contrast and Fluorescence Microscope.

Unit II

Spectra – Absorption and Emission Spectra – Beer Lambert’s law – Colorimeter, UV-Visible Spectrophotometer. Mass spectroscopy - Atomic absorption spectrometer (AAS) - Nuclear magnetic resonance spectrometer (NMR).

Unit III

Chromatography - Principles – Paper Chromatography, TLC, Gel filtration, Ion-Exchange, Affinity Chromatography Gas Liquid Chromatography and HPLC. Electrophoresis: Principle, Paper Electrophoresis – Cellulose Acetate Electrophoresis - Agarose Gel Electrophoresis – SDS- PAGE and Iso-electric focusing



Unit IV

Radioactivity – Isotopes – Clinically important isotopes – Measurement of Radioactivity – GM Counters, Scintillation Counters – Autoradiography – Applications. SOPs for Radioactive materials.

Unit V

Centrifugation – Principles - RCF, Sedimentation concept - - Different types of centrifuge – Types of rotors – Centrifugation types: Differential and Density gradient centrifugation – Ultra Centrifuge.

Text Books

1. Upadhyay and UpadhyayNath. (2009). “Biophysical Chemistry”, Principles and Techniques. Himalaya Publishing House.
2. Upadhyay and UpadhyayNath. (2009). “Biophysical Chemistry”, Principles and Techniques. Himalaya Publishing House.
3. SkoogD.A.F.James Holler and Stanky,R.Crouch, (2007) “Instrumental Methods of Analysis” Cengage Learning
4. Palanivelu P, 2000. Analytical Biochemistry & Separation Techniques, 4th edition, Twenty first century publications.
5. Prakash M, 2009. Understanding Bioinstrumentation, 1st edition, Discovery Publishing House Pvt Ltd

Reference Books

1. Keith Wilson,John Walker,(2010).Principles and techniques of Biochemistry and Molecular Biology”(7th edition).Cambridge University Press.
2. David L.Nelson, Michael M Cox.Lehninger(2008).”Principles of Biochemistry”,Fifth edition W.H.Freeman,Newyork.
3. Khandpur R S, 2014. Handbook of Biomedical Instrumentation, 3rd edition, McGraw Hill Education (India).
4. L.A Geddes and L.E.Baker (2008) “Principles of Applied Biomedical Instrumentation”WileyIndia Third Edition.
5. Sharma B K, 2005. Instrumental Methods of Chemical Analysis, 24th Edition, GOEL Publishing House.



Course Code	Course Title	L	T	P	C
23117SEC35L	IMMUNOLOGY AND IMMUNOTECHNOLOGY	0	0	3	3

Course Objective

- Perform blood grouping and determine blood type.
- Able to count WBC and RBC.
- Conduct serological diagnostic tests such as ASO, CRP, RA and Widal test.
- Acquire technical skills required for immunodiffusion and know the principle behind the techniques.
- Able to Demonstrate ELISA, Handling of Laboratory animals.

Experiments:

- Separation of Serum and Plasma.
- Blood grouping and Rh typing.
- WBC counting
- RBC counting
- Differential blood count
- WIDAL Slide test
- ASO test
- Double Immunodiffusion
- Single Radial Immunodifusion
-

Text Books

- Talwar. (2006). Hand Book of Practical and Clinical Immunology, Vol. I, 2nd edition, CBS.
- Asim Kumar Roy. (2019). Immunology Theory and Practical, Kalyani Publications.

Reference Books

1. Frank C. Hay, Olwyn M. R. Westwood. (2008). Practical Immunology, 4th Edition, Wiley-Blackwell.
1. Rose. (1992). Manual of Clinical Lab Immunology, ASM.
2. Wilmore Webley. (2016). Immunology Lab Manual, LAD Custom Publishing.
3. Janeway Travers. (1997). Immunobiology- the immune system in health and disease. Current Biology Ltd. London, New York. 3rd Edition.
4. Peter J. Delves, Seamus Martin, Dennis R. Burton, Ivan M. Roitt. (2006). Roitt's
5. Essential Immunology, 11th Edition., Wiley-Blackwell.



Course Code	Course Title	L	T	P	C
23115AEC36L	BIOINSTRUMENTATION	0	0	3	3

Course Objective

- Practice, experiment with and apply the basic instruments in the laboratory such as weighing balance, pH meter, shaker, incubator etc. in various research processes.
- Predict the functionality of Beer – Lambert's law in identifying and quantifying biomolecules.
- Employ the separation techniques for separating biomolecules based on paper chromatography
- Employ the separation techniques for separating biomolecules based on paper chromatography
- Employ the separation techniques for separating biomolecules based on centrifugal force by centrifugation.

Experiments:

1. Preparation of Buffer (Phosphate Buffer)
2. Determination of pH of biological samples using pH meter
3. UV spectra of Nucleic acids and proteins.
4. Chromatography analysis of sugar, amino acids, lipids by paper chromatography.
5. Chromatography analysis of sugar, amino acids, lipids by Thin layer chromatography.
6. Fractionation of biological material into its various components by Centrifuge.

Text Books

1. Sharda University Abstract Laboratory Manual for Bio-instrumentation, Biochemistry, Microbiology, Cell Biology and Enzyme Technology
2. Bhomwik (2011), *Analytical techniques in Biotechnology – A complete laboratory manual*, MGH Publisher, ISBN-13 : 978-007070013

Reference Books

1. P. Palanivelu (2017), *Analytical Biochemistry and Separation techniques – A laboratory manual*, (5th Edition), Twentyfirst century publishers, ISBN: 978-81-908489-0-9



MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	3	3	3	3	3
CLO2	3	3	3	3	3	3	3	3	3
CLO3	3	3	3	3	2	3	3	3	3
CLO4	3	3	3	2	3	2	3	3	2
CLO5	3	3	3	3	3	3	3	2	3
TOTAL	15	15	15	15	14	14	15	14	14
AVERAGE	3	3	3	3	2.8	2.8	3	2.8	2.8



Course Code	Course Title	L	T	P	C
23117SEC37	ENVIRONMENT MANAGEMENT IN INDUSTRIES	2	0	0	1

Course Objective

1. The student understands the need of Instruments for Medical field
2. Can examine the setup of Dairy Industry
3. learn the Management skills for Agri Industry
4. Understanding of hazards in Workplace
5. Gains knowledge about Industrial hazards and its prevention

Unit I

Introduction to life science, computer in life science-Medical imaging, Genomics and phylogenetics, Drug design and discovering, Assistive robotics, Brain-computer interfaces, Simulation of biological systems and Medical treatment optimization.

Unit II

Introduction to Dairy industries, The Structure of Dairying in Developing Countries, Application of Computer in Dairy Industry, Milk Procurement & Billing, Plant Automation, Computerized Accounting System, Applications of Management Information System (MIS), Packaging, Supply Chain Integration and Traceability.

Unit III

Agribusiness - Application of marketing and decision making in contemporary agribusiness firms. Marketing strategies, marketing research and information, segmentation and targeting, Professional selling skills and knowledge – Rural Development – NABARD.



Unit IV

Hazards in the workplace: Pressure, Biological, Chemical, Electricity, Fire, Heat & Cold, Indoor Air Quality, Lighting, Noise, ergonomics, Radiation (ionizing & non ionizing), Vibrations, hours of work, violence in work place, Understanding of Material Safety Data Sheets, Accidents and Safety Management: Accident Prevention methods, Safety Management and audit, Personal Protection Approaches

Unit V

Occupational Health & Industrial Hygiene: Scientific and engineering basis for occupational health, biological monitoring (e.g. BEI), Occupational Hygiene, Concept of First Aid, Preventive Measures, and Occupational Health & Safety Management System: OHSAS – 18000.

Text Books

1. Multi-Criteria Decision Analysis for Risk Assessment and Management, Editors Jingzheng Ren, Series Title Industrial Ecology and Environmental Management Publisher Springer Cham,
DOI <https://doi.org/10.1007/978-3-030-78152-1>
2. Environmental Management, Butterworth-Heinemann, Editor(s): Iyyanki V. Muralikrishna, Valli Manickam, 2017, Page iv, ISBN 9780128119891,
<https://doi.org/10.1016/B978-0-12-811989-1.12001-9>.
(<https://www.sciencedirect.com/science/article/pii/B9780128119891120019>)
3. Life Cycle Sustainability Assessment for Decision-Making Methodologies and Case Studies Book • 2020 Editors Jingzheng Ren & Sara Toniolo

Reference Books

1. Lalat Chander, 2010. Text book of Dairy Plant Layout and Design, ICAR, New Delhi.
2. Larry R. Collins, 2001. Physical Hazards of the Workplace, CRC Press, Taylor & Francis group.
3. Andrew Barkley, 2013, Principles of Agricultural Economics, Taylor & Francis group.



4. Mishra R.K., 2015. Occupational health management, Aitbs
Publishers and Distributors- Delhi.

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	3	2	3	3	3
CLO2	3	3	3	3	3	2	3	3	3
CLO3	3	3	3	3	3	3	3	3	3
CLO4	3	3	3	3	3	3	3	3	3
CLO5	3	3	3	3	3	3	3	3	3
TOTAL	15	15	15	15	15	13	15	15	15
Average	3	3	3	3	3	2.6	3	3	3



Course Code	Course Title	L	T	P	C
23117SEC38	GOOD LABORATORY PRACTICES	2	0	0	2

Course Objective

1. The student obtains adequate information to setup Biotechnology Laboratory
2. Learn to prepare solutions and maintenance of lab
3. Can demonstrate the working of lab equipment's
4. Learns about Biotechnology lab standards
5. Gains knowledge about Safety measures

Unit I

15 Hours

Biotechnology lab organization - Types of labs associated with Biotechnology (General lab, microbial culture lab, plant tissue culture lab, Fermentation lab, computational stimulation lab), Types of Chemical (Analytical grade, molecular grade) and its various arrangement (Arrangement of basic chemicals, solvent, acid and base, fine chemicals like dyes, protein and enzyme storage units), Physical chemical characteristics: hygroscopic, corrosive, volatile properties; Fire and explosion hazard data, Health hazards (how to use UV-illuminator), Fumigation technique.

Unit II

15 Hours

Lab ethics - Regulatory affairs: Methods and types of documentation (pre-lab writes, result recording and post lab report: interpretation of result), Dilution factor calculation, Molarity, percentage, dilution of concentrated solution, metric units (kg to gms and vice-versa).

Unit III

15 Hours

Instrument calibration and importance - Principles, use and maintenance of laboratory instruments like Autoclave, hot air oven, Incubators, Water bath,



Refrigerator, Centrifuge, Calorimeter, pH meter, Haemocytometer, Microtome, Electronic balances, Bio safety cabinets. SOP preparation for instrumentation.

Unit IV

15 Hours

GLP & Biotechnology Industry standards - Good Laboratory guidelines, Elements of GLP, Standard Operating Procedures and its importance, Quality Assurance & Quality control, Internal audit basics, ISO, BIS and HACCP standards.

Unit V

15 Hours

Types of wastes and safe disposal methods - Definition of waste, types of waste: Biological and chemical waste, methods of Safe Disposal of biological and chemical waste: treatment methods of Ethidium Bromide solutions, Electrophoresis Gels, Contaminated Gloves, debris, Wastes containing sodium azide, Silver staining solutions, Perchloric acid, Nanoparticle wastes, Spill management, Awareness and training for personnel.

Text Books

1. Milton A. Anderson GLP Essentials: A Concise Guide to Good Laboratory Practice, Second Edition 2nd Edition, Published by CRC press.
2. 2nd Edition GLP Essentials A Concise Guide to Good Laboratory Practice, Second Edition By Milton A. Anderson Copyright Year 2002
3. Principles of Good Laboratory Practice Paperback – 1 January 2020 by Pradeep Deshmukh (Author)

Reference Books

1. Good Laboratory Practice: Nonclinical Laboratory Studies Concise Reference Paperback – Import, 18 October 2010 by Mindy J Allport-Settle (Author)



2. Good Laboratory Practice Standards: Applications for Field and Laboratory Studies (ACS Professional Reference Book) 1st Edition by Willa Y. Garner (Editor), Maureen S. Barge (Editor), James P. Ussary (Editor)

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	1	3	2	3	3	3
CLO2	3	3	3	2	3	1	3	3	3
CLO3	3	3	3	2	3	1	3	3	3
CLO4	3	3	2	2	2	3	3	3	3
CLO5	3	3	2	2	2	3	3	3	3
TOTAL	15	15	13	9	13	10	15	15	15
Average	3	3	2.6	1.8	2.6	2	3	3	3



Course Code	Course Title	L	T	P	C
23117RMC39	Research Methodology	2	0	0	2

AIM:

To create a basic appreciation towards research process and awareness of various research publication

OBJECTIVES:

- To understand the steps in research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-bases
- To give exposure to MATLAB platform for effective computational and graphic works required for quality research

OUTCOME:

Ability to carry out independent literature survey corresponding to the specific publication type and assess basic computational frameworks used in mathematical researches.

PREREQUISITES:

Basic computer literacy & skills for working in window-environment

UNIT I: Introduction to Research Methodology

Meaning of research – Objectives of research – Types of research – Significance of research – Research approaches

UNIT II: Research Methods

Research methods versus methodology – Research and scientific method – Criteria of good research – Problems encountered by researchers in India.

UNIT III: Literature Survey



Articles – Thesis – Journals – Patents – Primary sources of journals
and patents – Secondary sources – Listing of titles – Abstracts – Reviews –
General treatises – Monographs.

UNIT IV: Database Surve

Database search – NIST – MSDS – PubMed – Scopus – Science citation index
– Information about a specific search.

UNIT V:

Basic Principles of Laboratory Safety and Waste management

Introduction - Access to Laboratory and Emergency Exits - Personal Protective
Clothing and Equipment - Good Working Practices-Maintenance of Laboratory
Equipment - Working with Hazardous Substances - Storage of Chemicals -
Working with Flammable Solvents - Gas Cylinders-Fire Precautions -
Emergency Procedures - First Aid - Accident Follow-Up - Safety Manual -
Safety Training - Management of Laboratory Safety and Responsibilities -
Waste Management.



Course Code	Course Title	L	T	P	C
231ACLSOAN	OFFICE AUTOMATION	-	-	-	1

Aim:

Course Objectives :

To provide an in-depth training in use of office automation, internet and internet tools. The course also helps the candidates to get acquainted.

Course Outcomes:

After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with internet.

UNIT I

Knowing the basics of Computers

UNIT II

Word Processing (MS word)

UNIT III

Spread Sheet (MS XL)

UNIT IV

Presentation (MS Power Point)

UNIT V

Communicating with Internet

Reference:

1. Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
2. Microsoft Office 2007 Bible - John Walkenbach, Herb Tyson, Faith Wempen, Cary N. Prague, Michael R. Groh, Peter G. Aitken, and Lisa A. Bucki - Wiley India pvt.ltd.



3. Introduction to Information Technology - Alexis Leon, Mathews Leon,
and LeenaLeon, Vijay Nicole Imprints Pvt. Ltd., 2013.
4. Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
5. <https://en.wikipedia.org>
6. <https://wiki.openoffice.org/wiki/Documentation>
7. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

சங்க இலக்கியம் - 23110AEC41

நான்காம் பருவம்

பாடநோக்கங்கள்

- ◆ இலக்கியங்கள் வாயிலாக சமுதாயக் கருத்தக்களை
- ◆ பழந்தமிழ் இலக்கிய வளத்தை உணர்த்துதல்.
- ◆ சங்க அக, புற பாடல் மரபுகளைப் பயிற்றுவித்தல்
- ◆ வாழ்வியல் அறங்கள் மற்றும் வரலாற்றுச் செய்திகளை . பயிற்றுவித்தல்
- ◆ புற இலக்கியங்கள் காட்டும் வாழ்வியல் அறங்களை எடுத்துக் கூறுதல்

பயன்கள்

- ◆ பழந்தமிழ் இலக்கிய மரபை அறிவர்.
- ◆ சங்க இலக்கியங்களில் உள்ள அழகியல் கூறுகளை உணர்வர்.
- ◆ வாழ்வியல் அறங்கள் மற்றும் வரலாற்றுச் செய்திகளை அறிவர்.
- ◆ சங்க அக, புற பாடல் மரபுகளை புரிந்துக்கொள்வர்.
- ◆ புற இலக்கியங்கள் காட்டும் வாழ்வியல் அறங்களை உணர்வர்.

அலகு-1

1. குறுந்தொகை- பாடல் எண்: 28,38
2. நற்றிணை- பாடல் எண்: 1,27,28,167,168
- 3.ஐங்குறுநூறு- பாடல் எண்: இளவேனில் பத்து

அலகு-2

- 1.கலித்தொகை- பாடல் எண்: 3,7
- 2.அகநானூறு- பாடல் எண்:5,42,100
3. புறநானூறு- பாடல் எண்: 182,204,41,121

அலகு-3

- 1 சிறுபாணாற்றுப்படை முழுவதும்

அலகு-4

1. திருக்குறள்- செய்நன்றி அறிதல், கூடா நட்பு ,நலம்புனைந்துரைத்தல்
2. நாலடியார் - பாடல் எண்: 1,172,215,253

அலகு-5

இலக்கிய வரலாறு

- 1.சங்க இலக்கியம்
- 2.எட்டுத்தொகை, பத்துப்பாட்டு
- 3.பதினெண் கீழ்க்கணக்கு நூல்கள்

பார்வை நூல்கள்

- 1.குறுந்தொகை - கழக வெளியீடு ,சென்னை
- 2.நற்றிணை - கழக வெளியீடு ,சென்னை
- 3.ஐங்குறுநூறு - கழக வெளியீடு ,சென்னை
- 4.கலித்தொகை - கழக வெளியீடு ,சென்னை
- 5.அகநானூறு - கழக வெளியீடு ,சென்னை
- 6.புறநானூறு - கழக வெளியீடு ,சென்னை
- 7.திருக்குறள் - பரிமேலழகர் உரை ,கழக வெளியீடு ,சென்னை
8. இணையதளம் -www.tamilvu.org , www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3



Course Code	Course Title	L	T	P	C
23111AEC41	Advanced English-IV	3	0	0	3

Aim:

To improve the knowledge of English

Objective:

- To familiarize with the objectives and types of interview To know the types of questions and answering techniques To prepare reviews and proposals
- To learn the grammatical forms
- To understand the meaning of a poem and write the content To write for and against a topic
- To draw a flowchart To write definitions Course Content:

UNIT 1

Parts of speech –Noun –Pronoun-Adjective-Verb-Adverb-Conjunction- PrepositionInterjection-
Definition-Types-Examples

UNIT 2

Types Of Sentences-Statement-Interrogative-Exclamatory-Imperative

UNIT 3

Sentence Pattern-Types-SV-SVO-SVC-SVA-SVOO-SVOC-SVOA

UNIT 4

Tenses- Subject -Verb-Concord

UNIT5

Phrases And Clauses-Definition And Types Outcome: Develop writing skill

Comprehend and describe poems

Learn interviewing skills



ReferencesBooks

Author	Title of the book	Edition / Year	Publisher
Rajendra Pal & J.S Korlahalli	Essentials of Business Communication	2015	Sultan Chand & Sons



Course Code	Course Title	L	T	P	C
23111AEC42	English-IV	3	1	0	3

Course Objectives:

CO1: To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.

CO2: To enable them use receptive skills through reading and listening to acquire good exposure to language and literature

CO3: To help them develop style in speech and writing and manipulate the tools of language for effective communication.

CO4: To provide exposure to plays, autobiographies and expose them to value based ideas.

CO5: To enhance their language skills especially in the areas of grammar and pronunciation.

Course Content:

UNIT I:

Life Writing

1.1 I am Malala-Malala Yousafzai - Chapter 1

1.2 My Inventions - Nikola Tesla - Chapter 2

UNIT II:

One Act Plays

2.1 The Zoo Story- Edward Albee



2.2 The Proposal- Anton Chekhov

UNIT III:

Interviews

3.1 Nelson Mandela's Interview with Larry King.

3.2 Rakesh Sharma's Interview with Indira Gandhi from Space

3.3 Lionel Messi with Sid Lowe (Print)

UNIT IV:

Language Competency

4.1 Refuting, Arguing & Debating

4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help
4.3 Interviews (face to face, telephone and video conferencing)

UNIT V:

English for Workplace

5.1 Job Applications: Covering letters, CV and Resume

5.2 Creating a digital profile - LinkedIn

5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card

5.4 Body Language - Practical Skills for Interviews



Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Learn to communicate effectively and appropriately in real life situation.	PO1
CO2	Use English effectively for study purpose across the curriculum	PO1,PO2
CO3	Develop interest in and appreciation of Literature	PO4,PO6
CO4	Develop and integrate the use of the four language skills	PO4,PO5,PO6
CO5	Enhance their language skills especially in the areas of grammar and pronunciation.	PO3,PO8

TextBooks(LatestEditions)	
1	I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by <u>Malala Yousafzai</u> , <u>Christina Lamb</u> , Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition
ReferencesBooks	
(Latest editions,and the style as given below must be strictly adhered to)	



1	<u>Writing Your Life: A Guide to Writing Autobiographies</u> , Marv Borg, Taylor & Francis, 2021
2	<u>One-act Plays for Acting Students: An Anthology of Short</u> <u>Norman A. Bert</u> · 1987 ·
3	<u>The One-Act Play Companion: A Guide to plays, playwrights ...</u> <u>Colin Dolley</u> , <u>Rex Walford</u> · 2015
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Role Play-Theory and Practice. Krysia M Yardley-Matwiejczuk, SAGE publications ltd, 1997

Web Resources

	or Readers' Theatre: <u>https://www.youtube.com/watch?v=JaLOJt8orSw&t=469s</u> (the link to the performance; refer scripts by Aaron Sheperd)
	<u>http://BBC</u> learn English.com
	<u>http://onestopenglish.com</u>
	<u>http://hearn-english-today.com</u>
	<u>http://talkenglish.com</u>



	<p>he Zoo Story: http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pf</p>
	<p>he Proposal: https://www.one-act-plays.com/comedies/proposal.html</p>
	<p>elson Mandela with Larry King nterviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lkl.00.html</p>
	<p>akesh Sharma with Indira Gandhi nterview : https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-tol-indira-gandhi-about-india-from-space-2204839</p>

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3



CO/PO	PSO 1	PS O2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weight age	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0



Course Code	Course Title	L	T	P	C
23117AEC43	GENETIC ENGINEERING AND R DNA TECHNOLOGY	4	1	0	3

Aim:

- To be able to read, interpret and discuss scientific journal articles in physiology.

Objectives:

- To provide advanced undergraduate and introductory graduate students with a comprehensive overview of animal physiology from molecular, cellular and whole animal systems approaches.
- To critically evaluate clinical and research case problems relating to endocrinology and cell biology.

Outcomes:

- Understand the physiological processes that regulate body functions and the regulation of an organ system from the molecular all the way to the whole animal level
- Understand how changes in one system may impact a different system

UNIT I

Respiration: Availability of oxygen- respiratory organs in animals- properties and functions of respiratory pigments- regulation of respiration

UNIT II

Circulation: types of hearts- composition and functions of blood- cardiac rhythm- cardiac output- ECG- blood pressure- electrical activity and properties of heart- regulation of cardiovascular function.



UNIT III

Coordination (neuromuscular and neuroendocrine): Nerveimpulse
conduction-ultrastructure of muscle – theories of muscle
contraction

UNIT IV

Excretion: structure and functions of different excretory organs in animals-
mechanismof urine formation in man

UNIT V

Homeostasis: Significance- mechanism of osmo-ion regulation in fresh
water,estuarine and marine fishes.

REFERENCES:

- Human Physiology, Stuart Fox, 11th ed., McGraw Hill
- Linda Costanzo's "Physiology- Board Review Series (5th ed.)" Lippincott
Williams & Wilkins.



Course Code	Course Title	L	T	P	C
23117GEC44	BIOINFORMATICS AND BIOSTATISTICS	4	1	0	3

Course Objective

- Acquire knowledge about the Developments and Applications of Bioinformatics.
- Gain knowledge about the importance of the bioinformatics, databases, tools and software of bioinformatics and explain different types of Biological Databases.
- Understand the basics of sequence alignment, sequence analysis and Protein structure prediction method.
- Demonstrate the basic methods of data collection, graph construction and sampling techniques and Calculate measures of central tendency
- Correlate and analyze biological data through various statistical methods and interpret biological data via various probabilistic distribution methods.

Outcomes:

- To Understand the regulation of protein and nucleic acids function
- To know the structure-function relationships and macromolecular interactions.
- To find out newer methods to implement rDNA Technology for various organisms.
- To understand several modern molecular methods to elucidate molecular and genetic questions.

UNIT I:

Introduction to Bioinformatics – Genome, Transcriptome and Proteome, Gene prediction rules and software. Nucleic acid Databases – Primary and Secondary Databases – Structure Database – CATH, SCOP – Data base Searching – BLAST and FASTA, BLOSSUM



UNIT II:

Sequence analysis (Proteins and Nucleic acids), Protein Database: Comparison of Protein sequences and Database searching – methods for protein structure prediction - Homology modeling of proteins, visualization tools (RASMOL).

UNIT III:

Multiple Sequences alignment – method of multiple sequences alignment- Evolutionary analysis, clustering methods Phylogenetic trees - Methods to generate phylogenetic tree- Tools for multiple sequences alignment and phylogenetic analysis - History of Drug Discovery, Steps in Drug design - Chemical libraries – Role of molecular docking in drug design.

UNIT IV:

Statistics – collection, classification, tabulations of Statistical Data – Diagrammatic representation – Graphs – Sampling method and standard error. Measures of central tendency – measures of dispersion.

UNIT V:

Correlations and regression. Probability distribution-Binomial, Negative binomial, multinomial distribution, Poisson distribution. Tests of significance – t tests – F tests – Chi square test. Analysis of variance – Statistical Soft wares.

Text Books

1. Pennington, S.R. and Punn, M.J. 2002. Proteomics: from protein sequence to function. Viva books Pvt. Ltd.
2. Shuba G., 2010. Bioinformatics., Tata McGraw Hill publishing. India.
3. Rastogi, S.C, Mendiratta, N, Rastogi, P., 2004. Bioinformatics methods and application. Prentice-Hall of India private limited, New Delhi.
4. N.Gurumani (2011) "An Introduction to Biostatistics" MJP Publishers
5. Verbala Rastogi .(2011). "Fundamentals of Biostatistics", Ane books Pvt Ltd Publishers, Chennai.



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

TOTAL	15	15	15	14	14	15	15	14	14
AVERAGE	3	3	3	2.8	2.8	3	3	2.8	2.8



Course Code	Course Title	L	T	P	C
23117SEC45L	GENETIC ENGINEERING AND RDNA TECHNOLOGY	0	0	3	3

Course Objective

- Isolate the Plasmid DNA and Genomic DNA. and predict the molecular weight of DNA by agarose gel electrophoresis.
- Demonstrate working principles of PCR, RFLP and other important Genetic Engineering techniques.
- Prepare the competent cells and perform bacterial transformation.
- Determine the restriction digestion of DNA
- Determine the restriction fragment length polymorphism.

Experiments

1. Isolation of genomic DNA Isolation of plasmid DNA Isolation of RNA
2. Production of competent cells for transformation Bacterial transformation
3. Restriction Digestion of DNA
4. Restriction Fragment Length Polymorphism(DEMO) PCR(Demonstration)

Text Books

Laboratory Manual for GENETIC ENGINEERING 1st Edition, Kindle
Edition by S.JOHN VENNISON (Author) 2009.



MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	3	3	3	3	3
CLO2	3	3	3	3	3	3	3	3	3
CLO3	3	3	3	3	2	3	3	3	3
CLO4	3	3	3	2	3	2	3	3	2
CLO5	3	3	3	3	3	3	3	2	3
TOTAL	15	15	15	14	14	14	15	14	14
AVERAGE	3	3	3	2.8	2.8	2.8	3	2.8	2.8



Course Code	Course Title	L	T	P	C
23117SEC46L	BIOINFORMATICS AND BIOSTATISTICS	0	0	3	3

Course Objective

1. Analyse the Biological databases
2. Able to perform BLAST and FASTA
3. Represent data in to graphical form
4. Test the level of significance of biological data and interpret the results.
5. Determine averages of the biological data

Experiments

1. Biological databases (NCBI, Swissprot and PDB)
2. BLAST FASTA
3. Identification of functional domains in nucleotide binding proteins using adomain analysis server like SMART
4. Preparation of bar diagram, line diagram and pie diagram using MS EXCEL.
5. Calculation of Central tendency- mean, geometric mean, median using MSEXCEL
6. Calculation of dispersion – Mean deviation, quartile deviation and standarddeviation using MS EXCEL
7. Calculation of student's t test using MS EXCEL

Text Books

1. Pennington, S.R. and Punn, M.J. 2002. Proteomics: from protein sequence to function. Viva books Pri. Ltd.
2. Maleolm and Goosfship. J. 2001. Genotype to phenotype, 2nd edition. BiosScientific Publishers Ltd



- Misener, S. and Krawetz. S.A. 2000. Bioinformatics: Methods and Protocols. Humana press.
- Attwood, T.K. and Parry-Smith, D.J. 1999. Introduction to Bioinformatics. Pearson Education Asia.
- Primrose, S.B. 1998. Principle of genome analysis. 2nd edition. Blackwell Science.

Reference Books

- Durbin, R., Eddy, S., Krogh, A. and Mitchison, G. 1998. Biological sequence analysis. Cambridge University Press.
- Friedman, C.P. and Wyatt. J.C. 1997. Computers and Machine: Evaluation methods in medicinal information. Springer-verlag, New York.

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	3	3	3	3	3
CLO2	3	3	3	3	3	3	3	3	3
CLO3	3	3	3	3	2	3	3	3	3
CLO4	3	3	3	2	3	2	3	3	2
CLO5	3	3	3	3	3	3	3	2	3
TOTAL	15	15	15	14	14	14	15	14	14
AVERAGE	3	3	3	3	2.8	2.8	3	2.8	2.8



Course Code	Course Title	L	T	P	C
23117SEC47	ORGANIC FARMING AND HEALTH MANAGEMENT	2	0	0	2

Course Objective

- The student will value the concepts of ecology and environment
- To know the techniques of Vermicomposting and enjoying the cultivation of common Medicinal Herbs
- To gain the knowledge about Principles and Policies in Organic forming and Certification agencies
- To realize the Concept of Health and importance of well being
- To appreciate the Role of exercise and nutrition in Health related fitness

Unit I

Ecology and Environment – Principles of ecology – Ecosystem - Biotic and abiotic components and interaction – Energy flow –Nutrient cycle – Biodiversity – Endemic – Exotic - Interrelationships.

Unit II

Composting – Microbial Compost – Vermicompost – Setup for vermicompost unit - Nutrition garden – Ring garden – Double digging – Cultivating vegetables – Common medicinal herbs – Identification and Cultivation.

Unit III

Organic farming – Principles and Policies – Certification agencies – AGMARK, fssai, Halal certification – Participatory grading system (PGS) – Storage – Packing – Transportation – Marketing. Micro-enterprises – Self Help Groups – Economics of cultivations – Sustainability



Unit IV

Health: Concept of Health, changing concepts definitions of health, dimensions of health, concept of well being, spectrum of health, determinants of health, ecology of health, right to health, responsibility for health, indicators of health

Unit V

Exercise and Health related fitness: Health related fitness, health promotion, physical activity for health benefits. Sports related fitness: Role of nutrition in sports, nutrition to athletic performance

Text Books

1. G.K. Veeresh, 2006. Organic farming , First edition, New Delhi, India
FoundationBooks in association with Centre for Environment Education.
2. Mangala rai, 2012.Hand Book of Agriculture, Sixth Edition, ICAR New Delhi.
3. B.B. Sharma , 2007. A Guide to Home Gardening, Second Edition, MIB
India, NewDelhi.
4. Adrienne E. Hardman, 2009. Physical Activity and Health – The evidence
explained,Second edition, Taylor and Francis Group.

Reference Books

1. Farmers of Forty Centuries: Permanent Organic Farming in China, Korea,
andJapan Hardcover – 10 June 2011by F. H. King (Author)
2. Organic Farming: Components And Management Edition: 1
Author/s:GehlotD , Publisher: M/s AGROBIOS (INDIA) ISBN:
9788177544008



Course Code	Course Title	L	T	P	C
23117SEC48	BIOTECHNOLOGY FOR SOCIETY	2	0	0	2

Course Objective

1. Will understand the role of Biotechnology in Sericulture, Apiculture and Mushroom Cultivation
2. Will gain knowledge about the production of Bio fertilizer and advantages of Biopesticides
3. Will understand the significance of microorganisms in Biodegradation
4. Will get know about History of Antibiotics
5. L Will able to comprehend about Transgenic Plants

Unit I

15 Hours

Introduction to Biotechnology- Role of Biotechnology in sericulture- Rearing of silkworms- Importance and applications- Role of Biotechnology in apiculture- Bee hive hierarchy- Bee keeping process- Products obtained- Mushroom farming stages- Cultivation of paddy straw mushroom- Importance of mushroom cultivation.

Unit II

15 Hours

Biofertilizer- Definition- Mass production of *Rhizobium*-Advantages and disadvantages- Biopesticides- Definition- Microbial biopesticides- *Bacillus thuringiensis*- Single cell protein- Introduction- history- production of *Spirulina* SCP- Applications- Advantages & disadvantages

Unit III

15 Hours

Biodegradation- Definition- Process-role of microorganisms in biodegradation - biodegradable plastics-advantages- Bio weapons- introduction- history- potential agents- delivery methods- harmful effects.



Unit III

15 Hours

Biodegradation- Definition- Process-role of microorganisms in biodegradation - biodegradable plastics-advantages- Bio weapons-introduction- history- potential agents- delivery methods- harmful effects.

Unit IV

15 Hours

Antibiotics- Definition- Introduction and history of antibiotics- sources-classification- spectrum- production of penicillin- definition of antibiotic resistance.

Unit V

15 Hours

Transgenic plants – Definition of transgene and transgenesis - BT Cotton, Flavr-Savr tomato and Golden rice- history – importance, applications, advantages and disadvantages.

Text Books

1. Sathyanarayana, U., Chakrapani, U., (2008). Biotechnology, First edition, Books and allied (P) Ltd, Kolkata.
2. A.K. Chatterji, (2011). Introduction to Environmental Biotechnology, Third edition, PHI Learning Pvt Ltd. New Delhi. ISBN-978-81-203-4298-9
3. R.C. Dubey, (2014). A text book of Biotechnology, S.Chand & Company, New Delhi. ISBN 9788121926089
4. H. Patel, (2011). Industrial Microbiology, (2nd edition), MacMillan Publishers
5. Thakur, I.S., (2019). Environmental Biotechnology- Basic principles and applications- (2nd edition)- Dreamtech Press, ISBN 978-93-89307-55-9

Reference Books

1. Basics of Biotechnology Paperback – 1 January 2004 by A.J. Nair (Author) Publisher Laxmi Publications
2. Basic Biotechnology Paperback – 2 February 2008 by Ratledge Colin (Author) Publisher Cambridge University Press



Course Code	Course Title	L	T	P	C
231AECCEVS	Environmental Studies	2	0	0	2

Aim:

- To motivate for participation in environment protection and improvement.

Objectives:

- Creating the awareness about environmental problems among people.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating public to participate in environment protection and environmentimprovement.
- Acquiring skills to help the concerned individuals in identifying and solvingenvironmental problems.
- Striving to attain harmony with Nature.

Outcomes:

- Students will gain about environmental pollutions, preventive measures.
- Student will gain information related to societal issues in concern withenvironment.
- Students should have out line knowledge on natural resources and effectivemanagement of resources.
- Understand the principles of ecology and environmental issues that apply to air,land, and water issues on a global scale;
- Develop critical thinking and/or observation skills, and apply them to theanalysis of a problem or question related to the environment;
- Demonstrate ecology knowledge of a complex relationship between predators,prey, and the plant community;Apply their ecological knowledge to illustrate



and graph a problem and describe the realities that managers face when dealing with complex issues; and Understand how politics and management have ecological consequences.

1. Nature of Environmental Studies

Definition, scope and importance.

Multidisciplinary nature of
environmental studies
Need for public
awareness.

2. Natural Resources and Associated Problems.

- a) Forest resources: Use and over — exploitation, deforestation, dams and their effects on forests and tribal people.
- b) Water resources: Use and over — utilization Of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources.
- d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer — pesticide problems.
- e) Energy resources: Growing energy needs, renewable and non — renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.
- f) Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification,

Role of an individuals in conservation of natural resources.

3. Ecosystems

Concept of an ecosystem.

Structure and function of an
ecosystem. Producers,
consumers and decomposers.

Energy flow in the ecosystem.



Ecological succession.

Food chains, food webs and ecological pyramids.

Introduction, types, characteristics features, structure and function of the following ecosystem:

- a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

4. Biodiversity and its conservation

Introduction — Definition: genetic, species and ecosystem diversity. Bio — geographical classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

India as a mega — diversity nation. Western Ghat as a biodiversity region. Hot — spot of biodiversity.

Threats to biodiversity habitat loss, poaching of wildlife, man — wildlife conflicts.

Endangered and endemic species of India.

Conservation of biodiversity: In — situ and Ex — situ conservation of biodiversity.

5. Environmental Pollution

Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of a individual in prevention of pollution.

6. Social Issues and the Environment

Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible



Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

Wasteland reclamation.

Consumerism and waste products.

7. Environmental Protection

From Unsustainable to Sustainable development. Environmental Protection Act.

Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act.

Forest Conservation Act.

Population Growth and Human Health, Human Rights.

8. Field Work

Visit to a local area to document environmental assets — River / Forest / Grassland / Hill / Mountain. Or Visit to a local polluted site — Urban / Rural Industrial / Agricultural. Study of common plants, insects, birds. Or Study of simple ecosystems — ponds, river, hill slopes, etc.

References:

1. Agarwal, K.C., 2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt, Ltd., Ahmedabad 380013, India, Email: rn4pin@icenet.net (R)
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clank R.S., Marine Pollution, Clarendon Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E. & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Western Ltd.



7. Down to Earth, Centre for Science and Environment, New Delhi. (R)]
8. Gleick, H., 1993, Water in crisis, Pacific Institute for studies in Dev., Environment & Security. Stockholm Env Institute. Oxford Univ. Press 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bompay (R)
10. Heywood, V.K. & Watson, R.T.1995, Global Biodiversity Assessment, Crnbridge Univ. Press 1140 p.
11. Jadhav, H. and Bhosale, VJvI. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.
12. Mickinney, M.L. and School. R.M. 1196, Environmental Science Systems and Solutions, Web enhanced edition, 639p.
13. Miller T.G. Jr. Environmental Science. Wadsworth Publications Co. (TB).
14. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA,574zp.
15. Rao M.N. and Dana, A.K. 1987, Waste Water Treatment, Wxford & IBH Publ. Co. Pvt. Ltd., 345p
16. Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse, Meerut
17. Survey of the Environment, The Hindu (M)
18. Townsend C., Harper, J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
19. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. 1 and II, Environmental Media (R)
20. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno— Science Publications (TB)
21. Wagner K.D., 1998, Environmental management, W.B. Saunders Co. Philadelphia, USA 499p,
22. Paryavaran shastra — Gholap T.N,
23. Paryavaran Sahastra — Gharapure
24. (M) Magazine
25. (R) Reference (TB) Textbook



SEMESTER V

Course Code	Course Title	L	T	P	C
23117AEC51	PLANT BIOTECHNOLOGY	5	1	0	4

Course Objective:

- Explore the history of Biotechnology and state the importance of organization of plant genome
- Be acquainted with the molecular basis of action of plant hormones and gene expression
- Illustrate about various culture medium preparations, haploid, triploid plant production and its applications
- Exploit symbiotic organisms as a vector for gene transfer to produce transgenic plants
- Develop molecular technique skills for crop improvement.

Unit I

15 Marks

History of plant biotechnology, Conservation of Plant using Biotechnology. Plant genome organization: structural features of a representative plant gene, gene families in plants. Organization of chloroplast genome and mitochondrial genome

Unit II

15 Marks

Auxins, cytokinins and gibberlins – molecular basis of action – phytochrome – role in photomorphogenesis – abscisic acid – and stress – induced promoter switches in the control of gene expression – Ethylene and fruit ripening.

Unit III

15 Marks

Media composition (MS media) - Micropropagation techniques - direct and indirect organogenesis - somoclonal variation - somatic embryogenesis - haploid and triploid -



Protoplast isolation, fusion and culture - hybrid and cybrid production, Synthetic seedproduction. Secondary metabolite production.

Unit IV

15 Marks

Agroacterium and crown gall tumors – Mechanism of T-DNA transfer to plants, Ti and Ri Plasmid vectors and their utility – Plant viral vectors. Symbiotic nitrogenfixation in Rhizobia, nif gene.

Unit V

15 Marks

Crop improvement, herbicide resistance, insect resistance, virus resistance, plants as bioreactors. Transgenic plants- plant vaccines, genetically modified food - future perspectives & ecological impact of transgenic plants

Text Books

1. Sudhir, M. 2000. Applied Biotechnology and plant Genetics. Dominantpublishers and distributors.
2. Trivedi, P.C.2000. Applied Biotechnology: Recent Advances. PANIMAPublishing corporation.
3. Ignacimuthu. 1996. Applied Plant Biotechnology. Tata McGraw – Hill.
4. Narayanaswamy S. 1994. Plant cell and tissue culture. Tata McGraw HillPublishing Company limited, New Delhi.
5. Chawla, H.S., “Introduction to Plant Biotechnology”, 3rd Edition, SciencePublishers, 2009.

Reference Books

1. Kojima, Lee, H. and Kun, Y. 2001. Photosynthetic microorganisms inEnvironmental Biotechnology. Springer – Verlag.
2. Stewart Jr., C.N., “Plant Biotechnology and Genetics: Principles, Techniquesand Applications” Wiley-Interscience, 2008.
3. Heldt HW. Plant Biochemistry & Molecular Biology, Oxford University Press.1997.



4. Trigiano, R.N. and Gray, D.J. 1996. Plant tissue culture concepts and laboratory exercise. CRC Press. Boca Raton, New York.
5. Street, H.E. 1977. Plant tissue culture. Blackwell Scientific Publications, Oxford, London.



Course Code	Course Title	L	T	P	C
23117AEC52	ANIMAL BIOTECHNOLOGY	5	1	0	4

Course Objective

1. Understand the basic concepts of Animal cell culture and cell laboratory
2. Describe the media preparation, preservation, trypsinization, counting, maintenance and application of cell lines.
3. Discuss the strategies for gene transfer and gene expressions with their applications.
4. Be acquainted with genetic modification and stem cell technology in production of transgenic animals.
5. Learn the Assisted reproductive technology and its applications.

Unit I

15Hours

Animal cell culture – History and development, Pluripotency, Media, balanced salt solutions, Physical, chemical and metabolic functions of constituents of culture media, Role of carbon dioxide, Serum, growth factors and amino acids in media. Serum containing and serum free media. Constitution of a media for cell line. Essential equipments required for animal cell culture.

Unit II

15Hours

Types of cell culture- Primary, Secondary, Organ culture and cell lines. Role of feeder layers in cell culture, Cell separation techniques, cell synchronization, Cell counting



methods, cryopreservation, Cell banking procedures. Biology of cultured cells-Apoptosis and cell death.

Unit III

15Hours

Transfection of cells in culture- Animal viral vectors for transfection, Physical methods of transfection, HAT selection, selectable markers. Micro manipulation of cells, Gene targeting, gene silencing and Gene knockout and their applications.

Unit IV

15Hours

Protein production by genetically engineered mammalian cell lines, Stem cells and their applications-; Cell culture as a source of valuable products -Transgenic Animals.

Unit V

15Hours

Collection and preservation of embryos, Semen banking, AI, IVF and ICSI. CaseStudy-any two relevant studies.

Text Books

1. Ramasamy.P. 2002.Trends in Biotechnology, University of Madras ofPublications, Pearl Press
2. Ignacimuthu. 1996. Basic Biotechnology. Tata McGraw-Hill.
3. K. Srivastava et al., 2009, Animal Biotechnology, Oxford & IBH PublishingCo. Pvt. Ltd.
4. B.C. Currell et al., 1994, In vitro Cultivation of Animal Cells (Biotol),Butterworth-Heinemann Ltd.
5. Jenkins, N. (ed). 1999 Animal cell Biotechnology: Methods and protocols.Humana press, New Jersey.



Reference Books

**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

1. R. Ian Freshney, Culture of Animal cells – A Manual of Basic Technique
Fourth Edition, WILEY LISS & Publications.
2. Glick, B.R. and Pasternak. 2002. Molecular Biotechnology:
Principle and applications of recombinant DNA.
3. Kreuzer, H. and Massey, A. 2001. Recombinant DNA and Biotechnology:
A guide for teachers, 2nd edition. ASM Press Washington.
4. Traven. 2001. Biotechnology. Tata McGraw – Hill.
5. Walker, J.M. and Gingold, E.B. 1999. Molecular biology and
Biotechnology, 3rd edition. Panima Publishing Corporation.



Course Code	Course Title	L	T	P	C
23117AEC53	ENVIRONMENTAL AND INDUSTRIAL BIOTECHNOLOGY	5	1	0	4

Course objectives

1. Know about the environment, its issues and management of the environment.
2. Explain the process of waste water treatment, drinking water treatment and solid waste management in various industries.
3. Illustrate the significance of bioreactors in bioprocess engineering and culture methods.
4. Explain Downstream processing, Fermented Products production and advanced methods
5. Speculate the role and importance of microorganisms behind the ore leaching, production of food products and Biofertilizers.

Unit I

15 Hours

Environmental Pollution – Sources and types - Water, Air, Thermal, Industrial and Radiation - Global environmental changes. Global warming, Greenhouse effect, acid rain, ozone depletion, and photochemical smog. Environmental issues, management strategies and safety, Biotechnological approaches for management.

Unit II

15 Hours

Waste water treatment: Aerobic and anaerobic methods (Primary, Secondary and Tertiary) – Use of aquatic plants in waste water treatment. Solid waste management. Bioenergy and SCP from waste. Drinking water treatment.
Biotechnological approach to industrial effluent (Paper, Tannery, Textile) Pesticide waste disposal.



Unit III 15 Hours

Bioprocess Engineering-Steps in bioprocess development. Design of bioreactors - Basic objective of fermenter design, aseptic operation & containment, body construction, agitator and sparger design, baffles, stirrer glands and bearings. Bioreactor configurations and types: Bubble column, airlift reactor, packed bed, fluidized bed, trickle bed, Membrane reactor, Photobioreactor, Animal and plant cell bioreactors. Factors affecting broth viscosity, Mixing in Fermenters. Fermentation systems Batch culture, Continuous culture, Fed-batch culture.

Unit IV 15 Hours

Downstream processing Filtration, Centrifugation, Cell disruption, Liquid-liquid extraction, Chromatography, membrane processes, Drying, Crystallization, Whole broth processing. Different types of fermented foods produced from microorganisms- Idli, Sauerkraut - Dairy products- Cheese and Yoghurt. Microbial biomass, Microbial enzymes– Amylase & protease, Immobilization of enzymes: Methods, Properties, Applications, Advantages and Disadvantages of Immobilization, Biosensors and Biochips -Types and applications. Microbial Polysaccharide production: Xanthan, Dextran.

Unit V 15 Hours

Ore leaching (methods and examples), MEOR, Production of antibiotics – Penicillin - streptomycin. Alcoholic beverages: Wine, Beer –Biofertilizers- Rhizobium & Azotobacter. Biopesticides – Bacillus thuringiensis and microbial toxin production and their applications - Biosurfactants, Vitamins- Folic acid & Vitamin B12, Organic acids

Text Books

1. Chatterji, A.K., 2002. Introduction to Environmental Biotechnology, Prentice-Hall of India, New Delhi.
2. Anil Kumar De., 2000. Environmental Chemistry, 4th Edition. New Age International, New Delhi.



3. Murugesan, A G., Rajakumari, C., 2005. Environmental Science and Biotechnology Theory and Techniques., MJP publishers, Chennai.
4. T.Satyanarayana, Bhavdish Narain Johri, Anil Prakash (2012), Microorganisms in Sustainable Agriculture and Biotechnology.
5. Madigan, Michael and Martinko, John, Brock biology of microorganism, 11th edition, (2005).

Reference Books

1. Alan Scragg, 1999. Environmental Biotechnology, Pearson Education Limited, England,
2. Peter F. Stanbury, Allan Whitaker, Stephen J. Hall (2013). Principles of Fermentation Technology Second Edition, Elsevier Science Ltd
3. Michael J. Waites, Neil L. Morgan, John S. Rockey Gary Higton (2001.), Industrial Microbiology: An Introduction. . Blackwell Science Ltd
4. Nduka Okafor, Modern Industrial Biotechnology & Microbiology (2017), Science Publishers, Edenbridge Ltd.
5. Waites, Morgan, Rockey and Higton, Industrial Microbiology: An Introduction, Blackwell Science (2001).



Course Code	Course Title	L	T	P	C
23117SEC55L	PLANT BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY LAB	0	0	3	3

Course Objectives

1. Explain plant tissue culture and Illustrate Callus development.
2. Develop technical skills in Protoplast isolation and Nucleus localization.
3. Make use of the techniques used in preparing tissue culture medium and membrane filtration in culturing animal cells and prepare single cell suspension and evaluate cell counting and viability.
4. Develop technical skills in isolation of DNA and RNA from plants and microorganisms.
5. Examine the importance of trypsinization in monolayer and subculture and cryopreservation.

Experiments

1. Plant tissue culture media preparation & sterilization techniques.
2. Callus induction
3. Isolation of plant protoplast & viability test.
4. Localization of nucleus using nuclear stain.
5. Preparation of Animal Tissue culture medium and membrane filtration
6. Preparation of Single Cell Suspension & Cell counting
7. Cell viability Test
8. Isolation of plant DNA and plant RNA(Demo)
9. Isolation of Agrobacterium plasmid DNA (Demo)
10. Trypsinization of monolayer and subculturing (Demo)
11. Measurement of phagocytic activity (Demo)
12. MTT Assay (Demo)
13. Cryopreservation and thawing (Demo)



MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	2	-	2	3	3	3
CLO2	3	2	2	2	-	2	3	3	3
CLO3	3	3	2	2	-	2	3	3	3
CLO4	3	2	3	2	-	2	3	3	3
CLO5	3	3	2	1		2	3	3	3
TOTAL	15	13	12	9	-	10	15	15	15
AVERAGE	3	2.6	2.5	1.9	-	2	3	3	3



Course Code	Course Title	L	T	P	C
23117SEC56L	ENVIRONMENTAL AND INDUSTRIAL BIOTECHNOLOGY	0	0	3	3

Course objectives

1. Students can able to isolate the microorganisms and determine their growthcurve, generation time.
2. To analyze the water samples, perform immobilization and production of Wine,Biogas and compost.
3. Develop skills in bio fertilizer production and microbial identification.
4. Gain basic skills to analyze raw milk and determine the pasteurization efficacy.
5. Develop skills to perform efficiency tests of biofertilizers and biopesticides,microbial polysaccharide production.

Experiments:

1. Isolation of Air borne Pathogens
2. Study of Growth Curve and Generation time of Bacteria/ Yeast usingturbidometry.
3. Water analysis – MPN and BOD.
4. Immobilization of whole yeast cells/ enzyme by Alginate beads.
5. Production of wine
6. Production of Biogas – In vitro & Compost Making.
7. Biofertilizer production/Spirulina production - field visit. (Report should beincluded in the record)
8. Isolation and identification of starter organisms from Idli batter/ curd
9. Grading of raw milk (Dye reduction test).
10. Determination of efficiency of Pasteurization by quantitative phosphatase test.
11. Preparation and Efficiency testing of Biofertilizer/ Biopesticide. (Demo)
12. Production of microbial Polysaccharide. (Demo)



Text Books

1. Aneja K R, Laboratory Manual of Microbiology and Biotechnology, MEDTECH, 2014. ISBN-13 : 978-9381714553
2. Vijaya Ramesh, (2007), Food Microbiology, MJP Publishers, Chennai, ISBN-13 : 978-8180940194

Reference Books

1. Raghuramulu, N., Madhavan Nair, K., and Kalyanasundaram, S. Ed., (1983), A Manual of Laboratory Techniques, National Institute of Nutrition, ICMR, Hyderabad.

	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	PS O1	PS O2	PS O3
CLO1	3	2	3	2	2	2	3	3	3
CLO2	3	2	3	2	2	2	3	3	3
CLO3	3	2	3	2	2	2	3	3	3
CLO4	3	2	3	1	2	2	3	3	3
CLO5	3	2	3	1	2	2	3	3	3
TOTAL	15	10	15	8	10	10	15	15	15
Average	3	2	3	16	2	2	3	3	3



Course Code	Course Title	L	T	P	C
23117AEC61	BIOENTREPRENEURSHIP	5	0	0	4

Course objectives

1. Students will be able to identify the challenges of being a Bioentrepreneur
2. Will understand the Business proposal for starting a company
3. Will learn about Vermicomposting and Sericulture
4. Will aspire to set up Mushroom Cultivation
5. Will learn the technique of Single cell protein Cultivation

Unit I

15 Hours

Basics of Bio entrepreneurship -Biotechnology in a Global scale; types of Bio-industries – Biopharma, Bioagri and Bioservice innovations – Successful Entrepreneur – Creativity, Leadership, Managerial skills, Team building, Decision making; Public and private funding agencies (MSME, DBT, BIRAC, Startup & Makein India)

Unit II

15 Hours

Business plan preparation; business feasibility analysis by SWOT, business plan proposal for virtual startup company; statutory and legal requirements for starting a company/venture; basics in accounting practices. Market Conditions, Identifying the need of the customers.

Unit III

15 Hours

Vermicomposting–Earthworms-Ecological types-Vermiculture-Compost pit-Vermibed-a pplications. Sericulture-Mulberry cultivation-Silkworm Rearing-Economics of silkworm Production-Chawki Rearing-Sericulture in India.

Unit IV

15 Hours

Phases of Mushroom Cultivation; Selection of an acceptable mushroom species/strains, Management of mushroom development, Mushroom harvesting;



Mushroom diseases, Medicinal and Nutritional properties of mushroom.
Aquaponics- Systems-Fish and Vegetables-Nutrients and Biofilters-
Advantages and Disadvantages.

Unit V1

5 Hours

Single Cell Protein Production: Source: Algae, Bacteria, Yeast – Cultivation
of Single Cell protein: SPIRULINA Cultivation – Production site,
Microorganism, Experimental design; harvesting and Drying.

Text Books

1. Shimasaki, C. D. (2014). Biotechnology entrepreneurship: Starting, managing, and leading biotech companies. Amsterdam: Elsevier. Academic Press is an imprint of Elsevier.
2. Onetti, A., & Zucchella, A. (n.d.). Business modeling for life science and biotech companies: Creating value and competitive advantage with the milestone bridge. Routledge.
3. The Earthworm book, Ismail, S.A., other India Press, Goa
4. An Introduction to sericulture by G. Ganga, J. Sulochana Chetty.
5. Silk: Processing, Properties and Applications Book by K. Murugesha Babu

Reference Books

1. Adams, D. J., & Sparrow, J. C. Enterprise for life scientists: Developing innovation and entrepreneurship in the biosciences. Bloxham: Scion.
2. Jordan, J. F. (2014). Innovation, Commercialization, and Start-Ups in Life Sciences. London: CRC Press.
3. Desai, V. The Dynamics of Entrepreneurial Development and Management. New Delhi: Himalaya Pub. House.
4. The Essential Guide to Cultivating Mushrooms: Simple and Advanced Techniques for Growing Shiitake, Oyster, Lion's Mane, and Maitake Mushrooms at Home by Stephen Russell
5. Nutraceutical spirulina: Commercial cultivation using rural technology in India by Pushpa Srivastava



MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	2	3	2	2	3	3	3
CLO2	3	2	2	3	2	2	3	3	3
CLO3	3	2	2	2	2	3	3	3	3
CLO4	3	2	2	2	2	3	3	3	3
CLO5	3	2	2	2	2	3	3	3	3
TOTAL	15	13	10	14	10	13	15	15	15
Average	3	2.6	2	2.8	2	2.6	3	3	3



Course Code	Course Title	L	T	P	C
23117AEC62	PHARMACEUTICAL BIOTECHNOLOGY	5	0	0	4

Course Objective

1. Students will understand the series of processes involved in drug development, patenting and drug approval.
2. Will learn about Biopharmaceuticals
3. Will understand about management of drugs
4. Will be familiar with Pharmaceutical sectors

Unit I

15 Hours

Objectives of Pharmaceutical Biotechnology - Generic and Biogeneric drugs. Stages in the drug development process - Drug discovery - Drug designing - Drug production - Preclinical trials - Clinical trials - Pharmacokinetics and Pharmacodynamics - Patenting & Drug Approval - Drug Marketing - Post clinical trials.

Unit II

15 Hours

Production of recombinant proteins - Development of Nucleic acid based therapies - Biopharmaceutical considerations - Pharmaceutical regulations - Formulation of Biotechnology products - Drug delivery - Pharmacognosy

Unit III

15 Hours

Human Insulin (Humulin), Growth hormones (Humatrope) - Blood coagulating factor (factor VIII - Kogenate) - Erythropoietin - (Epopgen) Granulocyte colony stimulating factors (Neulasta) - Interferons (Avonex) - Antimicrobial peptides (β - defensin 2) - Vaccines (Pentavac), Biologics (Humira - Adalimumab), - Cancer based biologics (rituximab).

Unit IV

15 Hours

Drug toxicity analysis - Common side effects of drugs and managements - Drugs of abuse - Life changing complications - Prevention and management

Unit V

15 Hours



National and International Drug approval agencies - Top National and International pharmaceutical industries - Scope and career opportunities in pharmaceutical sectors

.Text Books

1. Chandrakant Kokate and Pramod H.J 1st Edition (2011), Text Book of Pharmaceutical Biotechnology, Elsevier
2. Crommelin, Dean J. A., Sindelar, Robert, Meobohm, Bernd (Eds.) (2019), Pharmaceutical Biotechnology: Fundamentals and Applications, Springer.
3. Ashish Dixit, Pawan Tiwari and Vivekanand Kishan Chatap (2015), Textbook of Pharmaceutical Biotechnology, Studium Press (India) Pvt. Ltd. John F. Corpenner, Mark C. Manning (2012). Rational Design of stable formulation Theory and Practice, (1st edition), US: Springer Science, ISBN: 9781461351313.

Reference Books

1. Gary Walsh (2003), Biopharmaceuticals ; biochemistry and Biotechnology, John Wiley & Sons Ltd.
2. Oliver Kayser and Heribert Warzecha (2012), Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications, Wiley - Blackwell.
3. Simon Wills, 2nd Edition (2005), Drugs of abuse, Pharmaceutical Press
4. Hiten J. Gutka, Harry Yang, Shefali Kakar (2018). Biosimilars: Regulatory, Clinical, and Biopharmaceutical Development, (1st ed), USA: Springer, ISBN: 978-3-319-99679-0.
5. Yui-Wing F. L. and Stuart S. (2019). Pharmacogenomics: Challenges and Opportunities in Therapeutic Implementation, (2nd Ed), TX, USA: Academic Press, ISBN: 9780128126264.



Course Code	Course Title	L	T	P	C
23117DSE63A	MARINE BIOTECHNOLOGY	5	0	0	3

Course Objective

1. Students will gain knowledge about Marine ecosystem and Resources. Will learn about bioactive compounds from Marine sources
2. Will learn about medicinal seaweeds
3. Will know about culture of seaweeds and Aquaculture Will know about Marine biotech products

Unit I

15 Hours

Marine Ecosystems & Its functioning, Ocean currents, Physical & chemical properties of seawater, Ecological divisions of the Sea- Euphotic-Mesopelagic-Bathypelagic- Benthos-Intertidal, Estuarine- Salt Marsh- Mangrove- Coral Reef.

Unit II

15 Hours

Marine microbial habitats- Screening for Secondary metabolites from marine microbes(Bacteria, Fungi, Actinomycetes and marine microalgae). Biofouling, Biofilm, Antifouling, Anticorrosion. Probiotic bacteria and their importance in aquaculture.

Unit III

15 Hours

Definitions- Medicinal compounds from flora (Seaweeds, Seagrass and Mangrove) and fauna (Sponges, Sea anemone and Corals)- marine toxins- antiviral and antimicrobial agents.

Unit IV

15 Hours

Culture aspect-Seaweed (*Kappaphycus alvarezii*), Fish chromosome manipulation in aquaculture- Hybridization- Gynogenesis- Androgenesis- Polyploidy, Artificial Insemination, Eyestalk ablation- Transgenesis and Cryopreservation.

Unit V

15 Hours

Agar- Agarose - Alginate- Carrageenan- Chitin- Chitosan- Heparin.



Text Books

Italy, E (Eds). 1998, New Developments in Marine Biotechnology, PlenumPub.

Corp.

Milton Fingerman and Rachakonda Nagabhushanam, 1996, Molecular Genetics of
Marine Organisms, Science Pub Inc.

Y. Le Gal and H.O. Halvorson 1998, New Developments in Marine
Biotechnology. Springer.

David H. Attaway, 2001. Marine Biotechnology, Volume 1, Pharmaceutical and
Bioactive Natural Products.

Rita R. Colwell 1984. Biotechnology in the Marine Sciences (Advances in
Marine Science & Biotechnology) Wiley Interscience

Reference Books

Scheupr, P.J. (Ed.), 1984. Chemistry of Marine Natural Products, Chemical and
Biological Perspectives. Vol. I III, Academic Press, New York

Marine Biology- Lalli C.M. and T.R. Parsons., 1997. Biological Oceanography
- An Introduction, Elsevier, 314 pp

Marine Pollution- Clark, R. B. 2001. Marine pollution, Fifth edition. Oxford
University press, New York Inc., 231pp

Gloria Sanchez, Elizabeth Hernandez,(2019), Environmental Biotechnology and
cleaner Bioprocess, (1st edition), CRC Press, ISBN 9780367455552

Kirchman, D.L. Gasol, J.M. (2018), Microbial ecology of the oceans,
(3rd edition), Wiley –Blackwell.



MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	1	2	3	3	3	3
CLO2	3	3	3	1	2	3	3	3	3
CLO3	3	3	2	1	2	3	3	3	3
CLO4	3	3	2	1	2	3	3	3	3
CLO5	3	3	3	1	2	3	3	3	3
TOTAL	15	15	13	5	10	15	15	15	15
Average	3	3	2,6	1	2	3	3	3	3



Course Code	Course Title	L	T	P	C
23117DSE63B	FOOD TECHNOLOGY	5	0	0	3

Course Objective

- Students will be able to understand the basic concepts of the food industry Will learn about classification of food
- Will learn about fruits, vegetables and horticulture Will learn about Non vegetarian food
- Will learn about food adulteration and biosensors to detect them

Unit I

15 Hours

Biotechnology relating to the food industry – Role of bioprocess engineering in biotechnology industry- Regulatory and social aspects of biotechnology in foods- Application of biotechnology in waste treatment of food industries. Historical evolution of food processing technology

Unit II

15 Hours

Cereals and Millets. Wheat- composition, types (hard, soft/ strong, weak). Malting, gelatinization of starch, types of browning- Maillard & caramelization. Rice- and composition, parboiling of rice- advantages and disadvantages. Structure and composition of pulses, toxic constituents in pulses, processing of pulses soaking, germination, decortications, cooking and fermentation. Fats and Oils. Refining of oils, types- steam refining, alkali refining, bleaching, steam deodorization, hydrogenation. Rancidity –Types- hydrolytic and oxidative rancidity and its prevention.

Unit III

15 Hours

Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments, Dietary fibre. Post-harvest changes in fruits and vegetables – Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes during the storage of fruits and vegetables



Unit IV

15 Hours

Concept of red meat and white meat, composition of meat, marbling, post-mortem changes in meat- rigor mortis, tenderization of meat, ageing of meat. Aquaculture, composition of fish, characteristics of fresh fish, spoilage of fish - microbiological, physiological and biochemical. Composition and nutritive value of egg, characteristics of fresh egg, deterioration of egg quality, difference between broiler and layers. Milk and Milk Products. Chemical composition of milk, its constituents, processing of milk, pasteurization, homogenization. An overview of types of market milk and milk products.

Unit V

15 Hours

Types of food adulterants – test to detect adulterants in foods – metal contaminants - contaminants of processed foods- Food products as analytical samples, general aspects of biosensors- biosensors for food contaminant analysis, commercially available biosensors for food analysis. Food additives, FSSAI regulations, Methods of fortifying and enriching foods.

Text Books

1. Bawa. A.S, O.P Chauhan et al. Food Science. New India Publishing agency,2013.
2. B. Srilakshmi, Food science, New Age Publishers,2002
3. Joshi, V.K. and Singh, R.S., A. (2013), Food Biotechnology- Principles and practices, I.K.International Publishing House Pvt. Ltd., New Delhi,.
4. Ravishankar Rai, V,(2015), Advances in Food Biotechnology, (First edition),John Wiley & Sons, Inc, ISBN 9781118864555.
5. Perry Johnson-Green.(2018), Introduction to Food Biotechnology, Special Indian Edition, CRC Press, ISBN 9781315275703.

Reference Books

1. Roday,S. Food Science, Oxford publication, 2011.
2. Meyer, Food Chemistry, New Age,2004 5. De Sukumar., Outlines of Dairy Technology, Oxford University Press, 2007
3. Foster, G.N., (2020), Food Biotechnology, (First edition), CBS Publishers & Distributors Pvt Ltd, ISBN 9789389396348.



4. Anthony Pometto, Kalidas Shetty, Gopinadhan Paliyath, Robert E. Levin(2005), Food Biotechnology, (2nd edition), CRC Press,ISBN9780824753290.
5. Roday,S. Food Science, Oxford publication, 2011.

**MAPPING WITH PROGRAMME OUTCOMES AND
PROGRAMMESPECIFIC OUTCOME**

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	2	1	1	2	2	3	3	3
CLO2	3	2	1	1	2	2	3	3	3
CLO3	3	2	1	1	2	2	3	3	3
CLO4	3	2	1	1	2	2	3	3	3
CLO5	3	2	1	1	2	2	3	3	3
TOTAL	15	10	5	5	10	10	15	15	15
Average	3	2	1	1	2	2	3	3	3



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

SCHOOL OF ARTS AND SCIENCE

**Department of Microbiology
B.Sc. Microbiology Syllabus**

[Regulation 2023]



PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

Bachelor of Science in Microbiology

Our curriculum is intended to educate our majors in a diversity of significant microbiological disciplines, as well as to inspire and improve Language and communicative skills and capabilities that take persistent value beyond the teaching space.

B. Sc Graduate Attributes

- ❖ Research, inquiry and analytical thinking abilities.
- ❖ Capability and motivation for intellectual development.
- ❖ Ethical, social and professional understanding.
- ❖ Communication in intra and inter disciplinary
- ❖ Teamwork, collaborative and management skills in scientific research
- ❖ Information literacy in respective discipline

Programme Educational Objectives-PEO

- ❖ **PEO1**-To gain and apply knowledge of microorganisms concept to solve the problems.
- ❖ **PEO2**-To identify, analyze and understand the problems related to microbes.
- ❖ **PEO3**-Ability to design and develop solutions to the environment using the microbes.
- ❖ **PEO4**-Ability to design performs experiments, analyze, and interpret data for investigating complex problems.
- ❖ **PEO5**-To decide and apply appropriate tools and techniques for manipulations.

Programme Outcomes:

PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study.

PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and address opposing viewpoints.

PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

PO7: Cooperation/Teamwork: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

PO8: Scientific reasoning: Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.

PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO 13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO 15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Programme Specific Outcomes (PSOs)

On successful completion of Bachelor of Physics with Computer Applications programme, the student should be able to:

PSO1: Disciplinary Knowledge: Understand the fundamental principles, concepts, and theories related to physics and computer science. Also, exhibit proficiency in performing experiments in the laboratory.

PSO2: Critical Thinking: Analyze complex problems, evaluate information, synthesize information, apply theoretical concepts to practical situations, identify assumptions and biases, make informed decisions and communicate effectively

PSO3: Problem Solving: Employ theoretical concepts and critical reasoning ability with physical, mathematical and technical skills to solve problems, acquire data, analyze their physical significance and explore new design possibilities.

PSO4: Analytical & Scientific Reasoning: Apply scientific methods, collect and analyze data, test hypotheses, evaluate evidence, apply statistical techniques and use computational models.

PSO5: Research related skills: Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects.

PSO6: Self-directed & Lifelong Learning: Set learning goals, manage their own learning, reflect on their learning, adapt to new contexts, seek out new knowledge, collaborate with others and to continuously improve their skills and knowledge, through ongoing learning and professional development, and contribute to the growth and development of their field.

PO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
PO1	✓					
PO2		✓				
PO3			✓			
PO4				✓		
PO5					✓	
PO6						✓

2. Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising statistical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced statistical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Statistics based problem solving skills are included as mandatory components in the ‘Training for Competitive Examinations’ course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Statistical Quality Control course is included to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.

- Project with a viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting an Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and interdisciplinary nature are incorporated as Elective courses, covering conventional topics to the latest DBMS and Computer software for Analytics.

Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	Foundation Course To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning Literature and analysing the world through the literary lens gives rise to a new perspective.	<ul style="list-style-type: none"> ❖ Instill confidence among students ❖ Create interest for the subject
I, II, III, IV	Skill Enhancement papers (Discipline centric / Generic / Entrepreneurial)	<ul style="list-style-type: none"> ❖ Industry ready graduates ❖ Skilled human resource ❖ Students are equipped with essential skills to make them employable
		<ul style="list-style-type: none"> ❖ Training on language and communication skills enable the students gain knowledge and exposure in the competitive world.
		<ul style="list-style-type: none"> ❖ Discipline centric skill will improve the Technical knowhow of solving real life problems.
III, IV, V & VI	Elective papers	<ul style="list-style-type: none"> ❖ Strengthening the domain knowledge ❖ Introducing the stake holders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and interdisciplinary nature ❖ Emerging topics in higher education/ industry/ communication network / health sector etc. are introduced with hands-on-training.

IV	Elective Papers	<ul style="list-style-type: none"> ➤ Exposure to industry moulds students into solution providers ➤ Generates Industry ready graduates ➤ Employment opportunities enhanced
V Semester	Elective Papers	<ul style="list-style-type: none"> ➤ Self-learning is enhanced ➤ Application of the concept to real situation is conceived resulting in tangible outcome
VI Semester	Elective Papers	<ul style="list-style-type: none"> ➤ Enriches the study beyond the course. ➤ Developing a research framework and presenting their independent and intellectual ideas effectively.
Extra Credits: For Advanced Learners / Honors degree		<ul style="list-style-type: none"> ➤ To cater to the needs of peer learners / research aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferable Skill



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF MICROBIOLOGY
B. Sc., MICROBIOLOGY-REGULATION 2023
COURSE STRUCTURE**

SEMESTER I					
Course Code	Course Title	L	T	P	C
THEORY					
23110AEC11/ 23111AEC11/ 23132AEC11/ 23135AEC11	Language-I (Tamil-I/ Advanced English-I/ Hindi-I/ French-I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23116AEC13	Fundamentals of Microbiology And Microbial Diversity	4	1	0	3
23115GEC14	Biochemistry	4	1	0	3
PRACTICAL					
23116SEC15L	Fundamentals of Microbiology And Microbial Diversity Lab	0	0	3	3
23115SEC16L	Biochemistry Lab	0	0	3	3
SKILL ENHANCEMENT COURSE					
23116SEC17	Social & Preventive Medicine	2	0	0	2
23116SEC18	FC (Foundation Course)	2	0	0	2
AUDIT COURSE					
231AECINC	Indian Constitution	2	-	-	2
231LSCUV	Universal Human Values	-	-	-	1
	Total Credit	20	4	6	25
SEMESTER II					
Course Code	Course Title	L	T	P	C
THEORY					
23110AEC21/ 23111AEC21/ 23132AEC21/ 23135AEC21	Language-II (Tamil-II/ Advanced English-II/ Hindi-II/ French-II	3	0	0	3
23111AEC22	English-II	3	1	0	3
23116AEC23	Microbial Physiology and Metabolism	4	1	0	3
23115GEC24	Bio Instrumentation	4	1	0	3
PRACTICAL					
23116SEC25L	Microbial Physiology and Metabolism Lab	0	0	3	3
23115SEC26L	Bio Instrumentation Lab	0	0	3	3

SKILL ENHANCEMENT COURSE						
23116SEC27	Nutrition & Health Hygiene	2	0	0	2	
23116SEC28	Sericulture	2	0	0	2	
Ability Enhancement						
231AECCCMS	Communication English	2	0	0	2	
AUDIT COURSE						
231SSCBE	Basic Behavioral Etiquette	-	-	-	1	
Total Credit		20	4	6	25	
SEMESTER III						
Course Code	Course Title	L	T	P	C	
THEORY						
23110AEC31/ 23111AEC31/ 23132AEC31/ 23135AEC31	Language-III (Tamil-III/ Advanced English-III/ Hindi-III/ French-III	3	1	0	3	
23111AEC32	English-III	3	1	0	3	
23116AEC33	Molecular Biology and Microbial Genetics	4	1	0	3	
23116GEC34	Clinical Laboratory Technology	4	1	0	3	
PRACTICAL						
23116SEC35L	Molecular Biology and Microbial Genetics Lab	0	0	3	3	
23116SEC36L	Clinical Laboratory Technology Lab	0	0	3	3	
SKILL ENHANCEMENT COURSE						
23116SEC37	Microbial marketable products	2	0	0	2	
23116SEC38	Aquaculture	2	0	0	1	
Ability Enhancement						
23116RMC39	Research Methodology	2	0	0	2	
AUDIT COURSE						
231ACLSOAN	Office Automation	-	-	-	1	
Total Credit		20	4	6	24	
SEMESTER IV						
Course Code	Course Title	L	T	P	C	
THEORY						
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC41	Tamil-IV/ Advanced English-IV/ Hindi-IV/ French-IV	3	0	0	3	
23111AEC42	English-IV	3	0	0	3	
23116AEC43	Immunology and Immunotechnology	4	1	0	3	
23116GEC44	Biostatistics & Bioinformatics	4	1	0	3	
PRACTICAL						
23116SEC45L	Immunology and Immunotechnology Lab	0	0	3	3	
23116SEC46L	Biostatistics & Bioinformatics Lab	0	0	3	3	
SKILL ENHANCEMENT COURSE						
23116SEC47	Vaccine Technology	2	0	0	2	
23116SEC48	Apiculture	2	0	0	2	
Ability Enhancement						
23116BRC49	Participation in Bounded Research	2	0	0	2	
231AECCEVS	Environmental Studies	2	-	-	2	
AUDIT COURSE						
231LSCLS	Leadership & Management Skills	-	-	-	1	
Total Credit		22	2	6	27	

SEMESTER V						
Course Code	Course Title	L	T	P	C	
THEORY						
23116AEC51	Bacteriology and Mycology	5	1	0	4	
23116AEC52	Virology and Parasitology	5	1	0	4	
23116AEC53	Environmental and Agriculture Microbiology	5	1	0	4	
23116DSE54_	Discipline specific elective -I	4	0	0	3	
PRACTICAL						
23116AEC55L	Bacteriology, Mycology Virology and Parasitology Lab	0	0	3	3	
23116AEC56L	Environmental, Agriculture, Food and Probiotic Microbiology Lab	0	0	3	3	
SKILL ENHANCEMENT COURSE						
23116SEC56	Internship/ Industrial Training/Field Visit	0	0	0	2	
AUDIT COURSE						
231ACLSPSL	Professional Skills	-	-	-	1	
231AECCVED	Value Education	2	0	0	2	
Total Credit		22	3	6	26	
SEMESTER VI						
Course Code	Course Title	L	T	P	C	
THEORY						
23116AEC61	Food, Dairy and Probiotic Microbiology	5	0	0	4	
23116AEC62	Recombinant DNA Technology	5	0	0	4	
23116DSE63_	Discipline specific elective -II	5	0	0	3	
23116PRW64	Group Project & Viva Voice	0	0	13	4	
23116SEC65	General Awareness for Competitive Exam	2	0	0	2	
231EXACT	Extension activity	-	-	-	1	
AUDIT COURSE						
231ACSIKWS	Indian Knowledge System	-	-	-	2	
Total Credit		17	0	13	20	
Total Credits -Programme					140	
Total Credits - Audit Courses					7	
Total Credits					147	

SEMESTER V	
Subject Code	Discipline specific
23116DSE54A	Biosafety & bioethics
23116DSE54B	Food Processing Technology
23116DSE54C	Disaster Management
SEMESTER VI	
Subject Code	Discipline specific
23116DSE65A	Pharmaceutical Microbiology
23116DSE65B	Entrepreneurship and Bio-business

Credit Distribution

Sem	AEC	SEC	GEC	DSC	AECC	Research	Others	Total
I	9	10	3	-	2	-	-	24
II	9	10	3	-	2	-	-	24
III	9	9	3	-	-	2	-	23
IV	12	10	-	-	2	2	-	26
V	12	8	-	3	2	-	-	25

VI	8	2	-	3	-	4	1	18
Total	59	49	9	6	8	8	1	140

Audit Course Credit Distribution

Sem	Audit
I	1
II	1
III	1
IV	1
V	2
VI	1
Total	7

HOD

DEAN

Course Code	Course Title	L	T	P	C
23110AEC11	Tamil-I இக்கால இலக்கியம்	3	1	0	3

முதல் பருவம்

பாடநோக்கம் :

இக்கால தமிழ் இலக்கிய வகைகளின் மாதிரிகளைக் கற்பித்து அவற்றில் ஈடுபாட்டையும், சுவைக்கும் திறனையும் ஏற்படுத்துதல்.

பயன்கள் :

CO1: மொழி ஆளுமைத் திறன் பெறுதல்.

- CO2:** சமூக சிந்தனையை வளர்த்துக் கொள்ளுதல்.
CO3: படைப்பாளர்களாக உருவாகும் திறனைப் பெறுதல்.
CO4: இலக்கியங்களின் அறிவை மேம்படுத்துதல்.
CO5: கவிதை எழுதும் முறையை புரிந்துக்கொள்ளுதல்

அலகு -1 மரபுக்கவிதை

- 1.பாரதியார்--விடுதலை, வந்தே மாதரம் ,காற்று
- 2.பாரதிதாசன் - அழகின் சிரிப்பு ,தமிழனுக்கு வீழ்ச்சி இல்லை
- 3.கவிமணி தேசியவிநாயகம் பிள்ளை-- தொழிலாளியின் முறையீடு
- 4.நாமக்கல் கவிஞர்-- தருணம் இதுவே ,
- 5.கண்ணதாசன்-- அனுபவம்

அலகு - 2 புதுக்கவிதைகள்

- 1.அப்துல் ரகுமான் -வெற்றி
- 2.அறிவுமதி-நட்புக் காலம்
- 3.வைரமுத்து- ருசி, சிற்பி- ஓடு ஓடு சங்கிலி
- 4.மு.மேத்தா- வெளிச்சம் வெளியே இல்லை

அலகு - 3 நாட்டுப்புறவியல்

- 1.பழமொழிகள்
- 2.விடுகதைகள்
- 3.தொழில் பாடல்

அலகு- 4 சிறுகதை

- 1.தடயம்- மா. ஜெயபிரகாசம்
- 2.எதார்த்தம் - சு. தமிழ்ச்செல்வி
- 3.நீதி - பூமணி

அலகு- 5 இலக்கியவரலாறு

கவிதை, சிறுகதை நாட்டுப்புறப்பாடல்

பொதுக்கட்டுரை : மனித நேயம், வாழ்வியல் அறங்கள்

மனப்பாடப் பகுதி : பாரதியார் கவிதை- வேண்டும்,
பாரதிதாசன் கவிதை-செந்தாமரை

பார்வை நூல்கள் :

- 1.பாரதியார் கவிதைகள் - மணிவாசகர் பதிப்பகம் சென்னை
- 2.பாரதிதாசன் கவிதைகள் - பாரி நிலையம், சென்னை
- 3.தமிழ் இலக்கிய வரலாறு - மு வரதராஜன் சாகித்திய அகாதெமி,சென்னை
- 4.நாட்டுப்புறவியல் - முனைவர். ஆறு. ராமநாதன் ,மணிவாசகர் பதிப்பகம், சென்னை
- 5.தமிழ் சிறுகதையும் தோற்றம் வளர்ச்சி - தமிழ் புத்தக நிலையம், சென்னை

இணையதளம் - www.tamilvu.org

www.noolulagam.com

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CO1	3	2	3	3	3	2	2	2	3	2	3	2
CO2	3	3	2	2	2	3	2	3	3	2	2	2
CO3	3	2	3	3	2	2	2	3	2	3	3	2
CO4	3	3	3	2	2	2	3	2	3	2	3	3
CO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
23111AEC11	Advanced English-I	3	1	0	3

Aim:

To improve the knowledge of English

Course Objective:

CO1:To familiarize the students with the glossary terms, figures of speech

CO2:To enhance vocabulary

CO3:To learn how to edit and proofread

CO4:To know the comparison and contrast and cause and effect forms

CO5:To understand the impact of the speeches of famous people

UNIT-I:

The Origin of Language - Development of Gesture, Sign, Words, Sounds, Speech and Writing
Language History and the Process of Language Change Core Features of Human Language, Animals and Human Language

UNIT-II:

Nature of Language Pure Vowels, Diphthongs and Consonants Language Varieties: Dialects, Idiolect, Pidgin and Creole Language and Gender, Language and Disadvantage

UNIT-III:

Linguistic Form Morphology, Grammar, Syntax Saussurean Dichotomies: Synchronic and Diachronic Linguistics Semantics, Pragmatics

UNIT-IV:

Branches of Linguistics Structural Linguistics, Sociolinguistics, Psycholinguistics, Neurolinguistics, Applied Linguistics

UNIT-V:

Stylistics and Discourse Analysis: Relationship between Language and Literature, Style and Function, Poetic Discourse, Narrative Discourse and Dramatic Discourse

Course Outcome:

CO1: Development of vocabulary

CO2: Learning to edit and do proof reading

CO3: Reading and comprehending literature

CO4: Comparison and contrast and cause and effect forms

CO5: The impact of the speeches of famous people

Author	Title of the book	Edition / Year	Publisher
Wren and Martin	English Grammar	2009	S.Chand & Company Ltd
Meenakshi Raman & Sangeetha Sharma	Technical Communication	Second Edition 2011	Oxford University Press
Sudhir Kumar Sharma	The World's Great Speeches	-	Galaxy Publishers

Course Code	Course Title	L	T	P	C
23111AEC12	English-I	3	1	0	3

Course Objectives

CO1: To enable learners to acquire the linguistic competence necessarily required in various life situations.

CO2: To help them understand the written text and able to use skimming, scanning skills

CO3: To assist them in creative thinking abilities

CO4: To enable them become better readers and writers

CO5: To assist them in developing correct reading habits, silently, extensively and intensively

Course Content:**UNIT I: Poetry**

- 1.1 A Patch of Land - Subramania Bharati
 1.3 A Nation's Strength - Ralph Waldo Emerson
 1.4 Love Cycle - Chinua Achebe

UNIT II: Prose

- 2.1 JRD - Harish Bhat
 2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim

UNIT III: Short Stories

- 3.1 The Faltering Pendulum - Bhabani Bhattacharya
 3.2 How I Taught my Grandmother to Read - Sudha Murthy
 3.3 The Gold Frame- R.K. Laxman

UNIT IV: Language Competency

- 4.1 Vocabulary : Synonyms, Antonyms, Word Formation
 4.2 Appropriate use of Articles and Parts of Speech
 4.3 Error correction

UNIT V: English for Workplace

- 5.1 Self - introduction, Greetings
 5.2 Introducing others
 5.3 Listening for General and Specific Information
 5.4 Listening to and Giving Instructions / Directions

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	PO1
CO2	Understand the total content and underlying meaning in the context.	PO1, PO2
CO3	Form the habit of reading for pleasure and for information	PO4, PO6
CO4	Comprehend material other than the prescribed text	PO4, PO5, PO6
CO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	PO3, PO8

Text books (Latest Editions)

1.	Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi: Sahitya Akademi, 1967
2.	How I taught my Grandmother to Read and other Stories, Murthy, Sudha, Penguin Books, India, 2004

Reference Books

(Latest Editions, and the style given must be strictly adhered to)

1.	English in use - A textbook for College Students (English ,Paper back, - T.Vijay Kumar, K Durga Bhavani, YL Srinivas
2.	Practical English Usage - 4th Edition By Michael Swan

3.	The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace -Margaret Shepherd,Penny Carter, (Illustrator), Sharon Hogan, 2005.
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WebResources

1.	A patch of land by Subramania Bharati translated by Usha Rajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
2.	The Sparrow by Paul Laurence Dunbar https://poets.org/poem/sparrow-0
3.	A Nation’s Strength by Emerson https://poets.org/poem/nations-strength
4.	Love cycle by Chinua Achebe : https://www.best-poems.net/chinua-achebe/love-cycle.html
5.	JRD by Harish Bhat https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories
.	Us and Them by David Sedaris From Dress Your Family in Corduroy and Denim https://legacy.npr.org/programs/morning/features/2004/jun/sedaris/usandthem.html
7.	Uncle Podger Hangs a Picture: http://rosyhunt.blogspot.com/2013/01/uncle-podger-hangs-picture.html
8.	The Gold Frame: https://fybaenglish.blogspot.com/2018/12/the-gold-frame-r-k-laxman.html

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PS O1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

Course Code	Course Title	L	T	P	C
23116AEC13	Fundamentals Of Microbiology And Microbial Diversity	4	1	0	3

Course Objectives

CO1: Learn the fundamental principles about different aspects of Microbiology including recent developments in the area.

CO2: Describe the structural organization, morphology and reproduction of microbes.

CO3: Explain the methods of cultivation of microbes and measurement of growth.

CO4: Understand the microscopy and other basic laboratory techniques – culturing, disinfection and sterilization in Microbiology.

CO5: Compare and contrast the different methods of sterilization.

Course Content:

UNIT I:

History and Evolution of Microbiology, Classification – Three kingdom, five kingdom, six kingdom and eight kingdom. Microbial biodiversity: Introduction to microbial biodiversity-ecological niche. Basic concepts of Eubacteria, Archaeobacteria and Eucarya. Conservation of Biodiversity.

UNIT II:

General characteristics of cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) and acellular microorganisms - (Viruses, Viroids, Prions), Differences between prokaryotic and eukaryotic microorganisms. Structure of Bacterial cell wall, cell membrane, capsule, flagella, pili, mesosomes, chlorosomes, phycobilisomes, spores, and gas vesicles. Structure of fungi (Mold and Yeast), Structure of microalgae.

UNIT III:

Bacterial culture media and pure culture techniques. Mode of cell division, Quantitative measurement of growth. Anaerobic culture techniques.

UNIT IV:

Microscopy – Simple, bright field, dark field, phase contrast, fluorescent, electron microscope – TEM & SEM, Confocal microscopy, and Atomic Force Microscopy. Stains and staining methods.

UNIT V:

Sterilization–moist heat - autoclaving, dry heat – Hot air oven, radiation – UV, Ionization, filtration – membrane filter and disinfection, antiseptic; Antimicrobial agents.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Study the historical events that led to the discoveries and inventions and understand the Classification of Microorganisms.	PO5, PO6, PO10
CO2	Gain Knowledge of detailed structure and functions of prokaryotic cell organelles.	PO10
CO3	Understand the various microbiological techniques, different types of media, and techniques involved in culturing microorganisms.	PO11
CO4	Explain the principles and working mechanism of different microscopes/Microscope, their function and scope of application.	PO4, PO11
CO5	Understand the concept of asepsis and modes of sterilization and disinfectants.	PO4, PO11

Text Books

1	Pelczar.M. J., Chan E.C.S. and Noel. R.K. (2007). Microbiology. 7 th Edition.,McGraw –Hill, New York.
2	Willey J., Sherwood L., and Woolverton C. J., (2017). Prescott’s Microbiology. 10 th Edition., McGraw-Hill International edition.
3	Tortora, G.J., Funke, B.R., Case,C.L. (2013). Microbiology. An Introduction 11 th Edition., A La Carte Pearson.
4	Salle. A.J (1992). Fundamental Principles of Bacteriology. 7 th Edition., McGraw Hill Inc.New York.
5	Boyd, R.F. (1998). General Microbiology,2 nd Edition., Times Mirror, Mosby CollegePublishing, St Louis.

References Books

1	Jeffrey C. Pommerville., Alcamo’s Fundamentals of Microbiology (9 th Edition). Jones &Bartlett learning 2010.
2	Stanier R.Y, Ingraham J. L., Wheelis M. L., and Painter R. R. (2010). General Microbiology, 5 th Edition., MacMillan Press Ltd
3	Tortora, G.J., Funke, B.R. and, Case, C.L (2013). Microbiology-An Introduction, 11 th Edition., Benjamin Cummings.
4	Nester E., Anderson D., Roberts C. E., and Nester M. (2006). Microbiology-A Human Perspective, 5 th Edition., McGraw Hill Publications.
5	Madigan M.T., Martinko J.M., Stahl D.A, and Clark D. P. (2010). Brock - Biology of Microorganisms, 13 th Edition Benjamin-Cummings Pub Co.

Web Resources

1	https://www.cliffsnotes.com/study-guides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology
2	https://www.keyence.com/ss/products/microscope/bz-x/study/principle/structure.jsp
3	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604941/#
4	https://bio.libretexts.org/@go/page/9188
5	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-nutrition/

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Course Code	Course Title	L	T	P	C
23115GEC14	Biochemistry	4	1	0	3

Course Objectives:

CO1: Introduce the structure and classification of carbohydrates

CO2: Comprehend the metabolism of carbohydrates

CO3: Study the classification and properties of amino acids

CO4: Elucidate the various levels of organization of Proteins

CO5: Study functions and deficiency diseases of vitamins

Course Content:

UNIT I:

Definition and classification of carbohydrates, linear and cyclic forms (Haworth projection) for glucose, fructose and mannose and disaccharides (maltose, lactose, sucrose). General properties of monosaccharides and disaccharides. Occurrence and significance of polysaccharides.

UNIT II:

Metabolism- Catabolism and Anabolism. Carbohydrate metabolism- Glycolysis, TCA cycle, HMP shunt and glycogen metabolism and energetic

UNIT III:

Amino acids -Classifications, physical properties -amphoteric nature, isoelectric point and chemical reactions of carboxyl, amino and both groups. Amino acid metabolism- transamination, deamination and decarboxylation.

UNIT IV:

:Proteins- classification - biological functions, physical properties- ampholytes, iso electric point, salting in and salting out, denaturation, nature of peptide bond. Secondary structure, α -helix and β -pleated sheet, tertiary structure, various forces involved- quaternary structure.

UNIT V:

Vitamins- Fat(A,D,E and K) and water soluble vitamins(B complex and C)- sources, RDA, biological functions and deficiency diseases.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Explain the structure, classification, biochemical functions and significance of carbohydrates	PO1
CO2	Explain the metabolism of carbohydrates and its significance	PO1
CO3	Classify amino acids and its properties	PO4, PO5, PO6
CO4	Explain the classification and elucidate the different levels of structural organization of proteins	PO4, PO5, PO6
CO5	Identify the disease caused by the deficiency of vitamins	PO5, PO6, PO9

Text Books

1	Satyanarayana, U. and Chakrapani, U(2014).Biochemistry,4 th Edition, Made Simple Publisher.
2	Jain J L, Sunjay Jain and Nitin Jain (2016).Fundamentals of Biochemistry, 7 th Edition, S Chand Company.
3	AmbikaShanmugam's (2016). Fundamentals of Biochemistry for Medical Students, 8 th Edition. Wolters Kluwer India Pvt Ltd.
4	Vasudevan. D.M.Sreekumari.S, Kannan Vaidyanathan (2019). Textbook Of Biochemistry For Medical Students. Kindle edition, Jaypee Brothers Medical Publishers
5	Jeremy M. Berg,LubertStryer, John L. Tymoczko, Gregory J. Gatto (2015). Biochemistry, 8 th edition. WH Freeman publisher.

References Books

1	AmitKessel&Nir Ben-Tal (2018). Introduction to Proteins: structure, function and motion. 2 nd Edition, Chapman and Hall.
2	David L. Nelson and Michael M. Cox (2017).Lehninger Principles of Biochemistry, 7 th Edition W.H. Freeman and Co., NY.
3	LupertStyrer, Jeremy M. Berg, John L. Tymaczko, Gatto Jr., Gregory J (2019). Biochemistry. 9 th Edition ,W.H.Freeman& Co. New York.
4.	Donald Voet, Judith Voet, Charlotte Pratt (2016). Fundamentals of Biochemistry: Life at the Molecular Level, 5 th Edition, Wiley.
5.	Joy PP, Surya S. and AswathyC (2015). Laboratory Manual of Biochemistry, Edition 1.,Publisher:Kerala agricultural university.

Web Resources

1	https://www.abebooks.com > plp
2	https://kau.in/document/laboratory-manual-biochemistry
3	https://metacyc.org
4	https://www.medicalnewstoday.com
5	https://journals.indexcopernicus.com

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	M										
CO2	M										
CO3				S	S	S					
CO4				S	S	S					
CO5					S	S			S		

Course Code	Course Title	L	T	P	C
23116SEC15L	Fundamentals of Microbiology and Microbial Diversity Lab	0	0	3	3

Course Objectives:

CO 1: Acquire knowledge on Cleaning of glass wares, GLP and sterilization.

CO 2: Gain knowledge on media preparation and cultural characteristics.

CO 3: Learn the pure culture technique

CO 4: Learn the microscopic techniques and staining methods.

CO 5: Acquire knowledge on stain and staining methods

UNIT I:

- ❖ Cleaning of glass wares, Microbiological good laboratory practice and safety. Sterilization and assessment of sterility– Autoclave, hot air oven, and membrane filtration.

UNIT II:

- ❖ Media preparation: liquid media, solid media, semi-solid media, agar slants, agar deeps, agar plates.

UNIT III:

- ❖ Preparation of basal, differential, enriched, enrichment, transport, and selective media preparation- quality control of media, growth supporting properties, sterility check of media.
- ❖ Pure culture techniques: streak plate, pour plate, decimal dilution.

UNIT IV:

- ❖ Culture characteristics of microorganisms: growth on different media, growth characteristics, and description. Demonstration of pigment production.
- ❖ Microscopy: light microscopy and bright field microscopy.

UNIT V:

- ❖ Staining techniques: smear preparation, simple staining, Gram's staining and endospore staining.
- ❖ Study on Microbial Diversity using Hay Infusion Broth-Wet mount to show different types of microbes, hanging drop.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Practice sterilization methods; learn to prepare media and their quality control.	PO4, PO7, PO8, PO9, PO11
CO2	Learn streak plate, pour plate and serial dilution and pigment production of microbes.	PO4, PO7, PO8, PO9
CO3	Understand Microscopy methods, different Staining techniques and motility test.	PO4, PO7, PO8, PO9, PO11
CO4	Observe Culture characteristics of microorganisms.	PO4, PO7, PO8, PO9
CO5	Study on Microbial Diversity using Hay Infusion Broth-Wet mount.	PO4, PO7, PO8, PO9

Text Books

1	James G Cappucino and N. Sherman MB(1996). A lab manual Benjamin Cummins, New York 1996.
2	Kannan. N (1996). Laboratory manual in General Microbiology. Palani Publications.
3	Sundararaj T (2005). Microbiology Lab Manual (1 st edition) publications.
4	Gunasekaran, P. (1996). Laboratory manual in Microbiology. New Age International Ld., Publishers, New Delhi.
5	R C Dubey and D K Maheswari (2002). Practical Microbiology. S. Chand Publishing.

References Books

1	Atlas.R (1997). Principles of Microbiology, 2 nd Edition, Wm.C.Brown publishers.
2	Amita J, Jyotsna A and Vimala V (2018). Microbiology Practical Manual. (1 st Edition). Elsevier India
3	Talib VH (2019). Handbook Medical Laboratory Technology. (2 nd Edition). CBS
4	Wheelis M, (2010). Principles of Modern Microbiology, 1st Edition. Jones and Bartlett Publication.
5	Lim D. (1998). Microbiology, 2 nd Edition, WCB McGraw Hill Publications.

Web Resources

1	http://www.biologydiscussion.com/micro-biology/sterilisation-and-disinfection-methods-and-principles-microbiology/24403 .
2	https://www.ebooks.cambridge.org/ebook.jsf?bid=CBO9781139170635
3	https://www.grsmu.by/files/file/university/cafedry//files/essential_microbiology.pdf
4	https://microbiologyinfo.com/top-and-best-microbiology-books/
5	https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				M			L	M	L		M
CO2				S			L	L	L		
CO3				S			M	M	L		M
CO4				S			M	L	L		
CO5				S			M	L	L		

Course Code	Course Title	L	T	P	C
23115SEC16L	Biochemistry Lab	0	0	3	3

Course Objectives:

CO 1: Identify carbohydrates by qualitative test

CO 2: Estimate biomolecules volumetrically

CO 3: Estimate protein quantitatively

I Qualitative analysis of carbohydrates

a) Monosaccharides-Glucose, Fructose

b) Disaccharides- Lactose, Maltose, Sucrose

c) Polysaccharides-Starch

II Volumetric analysis

a) Estimation of ascorbic acid using 2,6 dichlorophenolindophenol as link solution

b) Estimation of Glucose by Benedicts method

c) Estimation of Glycine by Sorenson Formal titration

III Quantitative analysis(Demonstration Expt)

a) Colorimetric estimation of protein by Biuret method

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Qualitatively analyze and report the type of carbohydrate based on specific tests	PO1,PO2.PO3
CO2	Quantitatively estimate the carbohydrates, amino acids and ascorbic acid	PO1,PO2.PO3
CO3	Estimate protein by colorimetric method	PO1,PO2.PO3

References Books	
1	Varley's practical clinical biochemistry, Alan. H. Gowen clock, 6th Edition, 1988, CBS publishers & distributors, India.
2	Practical manual of Biotechnology, Lab Manual, Dr.RituMahajan, Dr.Jitender Sharma & Dr. R.K. Mahajan, 1st Edition, 2010, Vayu education of India, New Delhi.
3	Laboratory manual and Practical biochemistry, T.N.Pattabiraman, 4th Edition, 2010. All India Publisher's & Distributors limited, New Delhi.42
4	Practical text book of biochemistry for MBBS students, D.M.Vasudevan, 1st Edition, 2007, Jaypee brothers, New Delhi
5	An introduction to practical biochemistry, David. T. Plummer, 3rd Edition, 1998, TataMc.Grawhill education private limited, NewDelhi

Web Resources

1	https://www.uchealth.org/professionals/uch-clinical-laboratory/specimen-collectinghandling-guide/specimen-collection-procedures/
2	https://www.rcpath.org/discover-pathology/news/fact-sheets/haematology.html 3.
3	https://labtestsonline.org/tests/urinalysis4 . https://www.nablindia.org/nabl/index.php?c=publicaccreditationdoc&m=index&docType=both&Itemid=199
4	https://www.cdc.gov/nchs/data/nhanes/nhanes_03_04/113_c_met_lipids.pdf
5	https://www.testing.com/tests/alkaline-phosphatase-alp/

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	M	S	S					S	S	S	S
CO2	M	S	S					S	S	S	S
CO3	M	S	S					S	S	S	S

Course Code	Course Title	L	T	P	C
23116SEC17	Social & Preventive Medicine	2	0	0	2

Course Objectives:

CO 1: Describe the concepts of health and disease and their social determinants

CO 2: Summarize the health management system

CO 3: Know about the various health care services

CO 4: Outline the goals of preventive medicine

CO 5: Gain knowledge about alternate medicine

Course Content:

UNIT I:

Introduction to social medicine:

History of social medicine-concepts of health and disease-social determinants of health and disease - Health and quality of life-Health information system- measures of population health-health policies.

UNIT II:

Health management:

Applications of behavioral sciences and psychology in health management- nutritional programs for health management-water and sanitation in human health-national programs for communicable and non-communicable diseases- environmental and occupational hazards and their control.

UNIT III:

Health care and services:

Health care of the community-information, education, communication and training in health-maternal & child health-school health services- Geriatrics-care and welfare of the aged-mental health-health services through general practitioners.

UNIT IV:

Preventive medicine:

Introduction- role of preventive medicine- levels of prevention-Risk assessment in communities and vulnerable population –surveillance, monitoring and reporting of disease outbreaks - forecasting and control measures in community setting – early detection methods.

UNIT V:

Prevention through alternate medicine:

Unani, Ayurveda, Homeopathy, Naturopathy systems in epidemic and pandemic outbreaks. International health regulations. Infectious disease outbreak case studies and precautionary response during SARS and MERS coronavirus, Ebola and novel SARS-COV2 outbreaks.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Identify the health information system	PO1,PO5, PO6
CO2	Associate various factors with health management system	PO1,PO2, PO3,PO5, PO6, PO9
CO3	Choose the appropriate health care services	PO1,PO5, PO6
CO4	Appraise the role of preventive medicine in community setting	PO4,PO5, PO6
CO5	Recommend the usage of alternate medicine during outbreaks	PO1,PO5, PO6

Text Books

1.	Park.K (2021). Textbook of preventive and social medicine, 26 th edition. BanarsidasBhanot publishers.
2.	Mahajan& Gupta (2013). Text book of preventive and social medicine, 4 th edition. JaypeeBrothers medical publishers.
3.	Chun-Su Yuan, Eric J. Bieber, Brent Bauer (2006). Textbook of Complementary and Alternative Medicine. Second Edition. Routledge publishers.
4.	Vivek Jain (2020). Review of Preventive and Social Medicine: Including Biostatistics. 12 th edition, Jaypee Brothers Medical Publishers.
5.	Lal Adarsh Pankaj Sunder (2011). Textbook of Community Medicine: Preventive and Social Medicine, CBS publisher.

References Books

1	Howard Waitzkin, Alina Pérez, Matt Anderson (2021). Social Medicine and the coming Transformation. First Edition. Routledge publishers.
2	GN Prabhakara (2010). Short Textbook of Preventive and Social Medicine. Second Edition. Jaypee publishers.
3	Jerry M. Suls, Karina W. Davidson, Robert M. Kaplan (2010).Handbook of Health Psychology and BehavioralMedicine.Guilford Press.
4	Marie Eloïse Muller, Marie Muller, MarthieBezuidenhout, KarienJooste (2006).Health Care Service Management. Juta and Company Ltd.
5	Geoffrey Rose (2008).Rose's Strategy of Preventive Medicine: The Complete.OUP Oxford.

Web Resources

1	https://www.omicsonline.org/scholarly/social--preventive-medicine-journals-articles-ppts-list.php
2	https://www.teacheron.com/online-md_preventive_and_social_medicine-tutors
3	https://www.futurelearn.com
4	https://www.healthcare-management-degree.net
5	https://www.conestogac.on.health-care-administration-and-service-management

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S				S	S					
CO2	S	S		M	S	S			M		
CO3				M	S	S					
CO4	S			S	S	M					
CO5	S				S	S					

Course Code	Course Title	L	T	P	C
23116SEC18	FC (Foundation Course)	2	0	0	2

Course Objectives:

CO 1: To get the basic knowledge of microbiology

CO2: To describe the relationship of microbes between plants and animals, advance infectious agent (virus) and immunology

CO 3: To get the knowledge parasitology and microbes in human welfare

CO 4: To get the basic knowledge of genetics and molecular Biology

CO 5: Introduction to Basic Instruments, Glassware, Instruments and Preparation of reagents and media

Course Content:

UNIT I:

Basics of Microbiology: Comparison of General Biology and Microbiology, Definition, Branches of Microbiology, and Its Importance in Science

Physiology: Basic Concept, Discussion of the Physiology of Plants, Animals, and Bacteria, Basic Components, and Their Relevance to Microbiology

Building block molecules: Discussion of four major biomolecules studied in general biology and their importance in microbiology, metabolism, and enzymes.

UNIT II:

Relationship of microbes between plants and animals: Discussion of microbes role in plant growth, photosynthesis, nitrogen fixation, biofertilizer, Discussion of microbes role in animals, good and bad bacteria, normal flora, and infections (typhoid, dysentery, food poisoning, etc.)

Advance infectious agent (virus): Definitions, physiology, classification (bacterial, plant, and animal viruses), diseases (Pandemic Corona), vaccines

Immunology: General concept of immunology, discussion on immunity, and terminology used in immunology in general, including antigens and antibodies and their roles.

UNIT III:

Parasitology: General Discussion on Parasites: Definition, Types, and Diseases Malaria, filariasis, amoebiasis, etc.

Microbes in human welfare: Microbes in household food processing, microbes in industries, and microbes in waste management, in brief, Microbes as biocontrol agents, Microbes in biogas production.

UNIT IV:

Genetics and Molecular Biology: Discussion of the specific role of genetics and molecular biology in general biology and its comparison with bacteria and viruses, Discussion of gene, genome, plasmid, genetic code, replication, transcription, and translation roles in bacteria

Advances in microbiology: Discussion of Recombinant DNA Technology, PCR, and Transgenic Plants and Animals.

UNIT V:

Introduction to Basic Instruments and Glassware: Glassware: conical flask, volumetric flask, beaker, pipette, burette, measuring cylinder, etc., their ranges, uses, and calibrations.

Instruments: Incubator, oven, balance (single pan and digital), BOD incubator, microscope, water bath, pH metre, colorimeter, autoclave, etc., uses, handling, and calibrations.

Preparation of reagents and media: percent, normal, and molar solution preparations, broth and media preparations, slant and plate preparations, storage and maintenance of culture.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Study and understand the basic of Microbiology	PO1,PO5, PO6
CO2	Gain Knowledge of relationship of microbes between plants and animals	PO1,PO2, PO3,PO5, PO6, PO9
CO3	Understand the parasitology and microbes in human welfare	PO1,PO5, PO6
CO4	Understand the concept of basic genetics and molecular Biology	PO4,PO5, PO6
CO5	Recommend the usage of basic instruments, glassware, instruments and preparation of reagents and media	PO1,PO5, PO6

Text Books	
1	Pelczar.M. J., Chan E.C.S. and Noel. R.K. (2007). Microbiology. 7 th Edition.,McGraw –Hill, New York.
2	Willey J., Sherwood L., and Woolverton C. J., (2017). Prescott’s Microbiology. 10 th Edition., McGraw-Hill International edition.
3	Tortora, G.J., Funke, B.R., Case,C.L. (2013). Microbiology. An Introduction 11 th Edition., A La Carte Pearson.
4	Salle. A.J (1992). Fundamental Principles of Bacteriology. 7 th Edition., McGraw Hill Inc.New York.
5	Boyd, R.F. (1998). General Microbiology,2 nd Edition., Times Mirror, Mosby CollegePublishing, St Louis.

References Books	
1	Jeffrey C. Pommerville., Alcamo’s Fundamentals of Microbiology (9 th Edition). Jones & Bartlett learning 2010.
2	Stanier R.Y, Ingraham J. L., Wheelis M. L., and Painter R. R. (2010). General Microbiology, 5 th Edition., MacMillan Press Ltd
3	Tortora, G.J., Funke, B.R. and, Case, C.L (2013). Microbiology-An Introduction, 11 th Edition., Benjamin Cummings.
4	Nester E., Anderson D., Roberts C. E., and Nester M. (2006). Microbiology-A Human Perspective, 5 th Edition., McGraw Hill Publications.
5	Madigan M.T., Martinko J.M., Stahl D.A, and Clark D. P. (2010). Brock - Biology of Microorganisms, 13 th Edition Benjamin-Cummings Pub Co.

Web Resources	
1	https://www.cliffsnotes.com/study-guides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology
2	https://www.keyence.com/ss/products/microscope/bz-x/study/principle/structure.jsp
3	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604941/#
4	https://bio.libretexts.org/@go/page/9188
5	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-nutrition/

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S				S	S					
CO2	S	S		M	S	S			M		
CO3				M	S	S					
CO4	S			S	S	M					
CO5	S				S	S					

Course Code	Course Title	L	T	P	C
231AECCINC	Indian Constitution	2	0	0	2

Course Objectives:

CO1: To make the students understand about the democratic rule and parliamentary administration

CO2: To appreciate the salient features of the Indian constitution

CO3: To know the fundamental rights and constitutional remedies

CO4: To make familiar with powers and positions of the union executive, union parliament and the supreme court

CO5: To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Course Content:

Unit I: The making of Indian constitution

The constitution assembly organization –character -work salient features of the constitution- written and detailed constitution -socialism –secularism-democracy and republic.

Unit II: Fundamental rights and fundamental duties of the citizens

Right of equality -right of freedom- right against exploitation -right to freedom of religion-cultural and educational rights -right to constitutional remedies -fundamental duties .

Unit III: Directive principles of state policy

Socialistic principles-Gandhi an principles-liberal and general principles -differences between fundamental rights and directive principles

Unit IV: The union executive, union parliament and Supreme Court

Powers and positions of the president -qualification _method of election of president and vice president -prime minister -Rajya Sabah -Lok Sabah .the supreme court -high court -functions and position of supreme court and high court

Unit V: State council -election system and parliamentary democracy in India

State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.

Outcome

CO1- To gain Democratic values and citizenship Training

CO2- To know the Awareness on fundamental Rights are established

CO3- To learn the functions of union Government and State Government

CO4- To learn the Power and functions of the Judiciary thoroughly

CO5- To learn the Appreciation of Democratic Parliamentary Rule

References:

1) Palekar.s.a. Indian constitution government and politics, ABD publications, India

2) Aiyer, alladi krishnaswami, Constitution and fundamental rights 1955.

3) Markandan. k.c.directive Principles in the Indian constitution 1966.

4) Kashyap. Subash c, Our parliament ,National book trust , New Delhi 1989

Course Code	Course Title	L	T	P	C
231LSCUV	Universal Human Values	-	-	-	1

Aim:

This course aims at making learners conscious about universal human values in an integral manner, without ignoring other aspects that are needed for learner's personality development.

Course Objectives :

The present course deals with meaning, purpose and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realise one's potentials.

Course Content:

Unit I

- Introduction: What is love? Forms of love—for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living
- Love and compassion and inter-relatedness
- Love, compassion, empathy, sympathy and non-violence
- Individuals who are remembered in history for practicing compassion and love.
- Narratives and anecdotes from history, literature including local folklore
- Practicing love and compassion: What will learners learn gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?
- Sharing learner's individual and/or group experience(s)
- Simulated Situations
- Casestudies

Unit II

- Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others)
- Individuals who are remembered in history for practicing this value
- Narratives and anecdotes from history, literature including local folklore
- Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?
- Learners' individual and/or group experience(s)
- Simulated situations
- Casestudies

Unit III

- Introduction: What is non-violence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non-violence
- Ahimsa as non-violence and non-killing
- Individuals and organisations that are known for their commitment to non-violence
- Narratives and anecdotes about non-violence from history, and literature including local folklore
- Practicing non-violence: What will learners learn/gain if they practice non-

violence? What will learners lose if they don't practice it?

- Sharing learner's individual and/or group experience(s) about non-violence
- Simulated situations
- Casestudies

Unit IV

- Introduction: What is righteousness?
- Righteousness and *dharma*, Righteousness and Propriety
- Individuals who are remembered in history for practicing righteousness
- Narratives and anecdotes from history, literature including local folklore
- Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Casestudies

Unit V

- Introduction: What is peace? Its need, relation with harmony and balance
- Individuals and organisations that are known for their commitment to peace
- Narratives and Anecdotes about peace from history, and literature including local folklore
- Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about peace
- Simulated situations
- Casestudies

Unit VI

- Introduction: What is service? Forms of service for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.
- Individuals who are remembered in history for practicing this value.
- Narratives and anecdotes dealing with instances of service from history, literature including local folklore
- Practicing service: What will learners learn/gain if they practice service? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s) regarding service
- Simulated situations
- Casestudies

Unit VII

- Introduction: What is renunciation? Renunciation and sacrifice. Self-restraint and Ways of overcoming greed. Renunciation with action as true renunciation
- Individuals who are remembered in history for practicing this value.
- Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.
- Practicing renunciation and sacrifice: What will learners learn/gain if they practice

Renunciation and sacrifice? What will learners lose if they don't practice it?

- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Casestudies

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Learn to introduce about Love and compassion and inter-relatedness	PO1
CO2	Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.	PO1
CO3	Learn from case studies of lives of great and successful people who followed and practiced human values and achieved self-actualisation.	PO5,PO7
CO4	Become conscious practitioners of human values.	PO11, PO13
CO5	Realize their potential as human beings and conduct themselves properly in the ways of the world.	PO5,PO9

SEMESTER II

Course Code	Course Title	L	T	P	C
23110AEC21	Tamil-II - பக்தி இலக்கியம்	3	1	0	3

இரண்டாம் பருவம்

நோக்கம் :

- காலந்தோறும் பக்தி இலக்கியம் வளர்ந்துள்ள தன்மையைக் கற்பித்தல்.
- நாயன்மார்கள், ஆழ்வார்களின் பக்திச் சிறப்பை அறிய செய்தல்.

பயன்கள்:

- CO1: நாயன்மார்கள் பக்திச் சிறப்பை அறிதல்.
- CO2: ஆழ்வார்களின் பக்தி நெறியை உணர்தல்.
- CO3: பக்தி இலக்கியம் காலம் தோறும் வளர்ந்ததே அறிதல்.
- CO4: பாடல்களில் இசை இன்பம், ஓசை நயம் அறிதல்.

அலகு - 1 பன்னிரு திருமுறைகள்

1. திருஞானசம்பந்தர்- திருத்தில்லைப் பதிகம்
2. திருநாவுக்கரசர் - திருநீற்றுப் பதிகம்
3. சுந்தரர் - திருவெண்ணைநல்லூர்
4. திருமூலர்- திருமந்திரம்(இளமை நிலையாமை)

அலகு - 2 பன்னிரு ஆழ்வார்கள்

1. ஆண்டாள் - திருப்பாவை
2. பெரியாழ்வார்- மூன்றாம் திருமுறை(பத்து பாடல்கள்)
3. மதுரைகவியாழ்வார் - கண்ணின் நுண் சிறு தாம்பு

அலகு - 3 சிற்றிலக்கியங்கள்

1. மீனாட்சியம்மைப் பிள்ளைத்தமிழ்- செங்கீரை பருவம், அம்புலி பருவம்
2. நந்திக்கலம்பகம்
3. குற்றால குறவஞ்சி- குறத்தி நகர்வளம் கூறுதல்
4. காளமேகப்புலவர் பாடல்கள்

அலகு - 4 புதினம்

1. நா .பார்த்தசாரதியின்- குறிஞ்சி மலர்

அலகு-5 தமிழ் இலக்கிய வரலாறு

1. பக்தி இலக்கியங்கள்
2. சைவமும் தமிழும்
3. வைணவ சமயம் போற்றி வளர்த்த தமிழ்
4. சிற்றிலக்கியங்கள்
5. நாவல் இலக்கியம்

பார்வை நூல்கள் :

1. தேவாரம் - மணிவாசகர் பதிப்பகம் சென்னை
2. நாலாயிர திவ்ய பிரபந்தம் - வர்த்தமான பதிப்பகம் சென்னை
3. தமிழ் இலக்கிய வரலாறு - முனைவர் ச சுபாஷ் சந்திர போஸ், இயல் வெளியீடு ,தஞ்சாவூர்
4. தமிழ் நாவல் இலக்கியம் -கா கைலாசபதி- தமிழ் புத்தக,நிலையம், சென்னை

Course Code	Course Title	L	T	P	C
23111AEC21	Advanced English-II	3	1	0	3

Aim:

To improve communication skills in English

Course Objective:

To understand the format of e-mail, fax and memos

To write itinerary, checklist, invitation, circular, instruction, recommendations

To understand the impact of the biographies of famous people

Course Content:

Unit I

Introduction Test of vocabulary range; test of verbal speed; test of verbal responsiveness; affixation-prefix, suffix; synonyms.

Unit II

Homonyms and homographs Words of foreign origin; antonyms; redundant words; phrases; acronyms; words commonly confused; slang and new words.

Unit III

Technical terms Personality types; relationships; medicines; science; business, education, law, technology, and the humanities.

Unit IV

Vocabulary for professional exams TOEFL; IELTS; SAT; GRE; CAT; MAT; TANCET; BEC; GMAT

Unit V

Vocabulary games synonyms; antonyms; compound word; homophone; idioms; literature; oxymoron; parts of speech; prefix; suffix; root word; spelling; word play.

Outcome:

Developing technological skill

Able to write in a variety of formats

Read biographies and develop personality

Author	Title of the book	Edition / Year Publisher	Edition / Year Publisher
Meenakshi Raman & Sangeetha Sharma	Technical Communication	2011	Oxford University Press
Rajendra Pal & J.S.Korlahalli	Business Communication	2015	Sultan

Course Code	Course Title	L	T	P	C
23111AEC22	Paper II - General English	3	1	0	3

Course Objectives

CO1: To introduce learners to the essential skills of communication in English

CO2: To enable them use these skills effectively in academic and non-academic contexts

CO3: To enable them use these skills effectively in academic and non-academic contexts

CO4: To enable them use various business communication strategies and to use advanced vocabulary

CO5: To familiarize them in writing descriptive essays and respond to arguments orally and in writing

Course Content:

UNIT I :

Poetry

1.1 Very Indian Poem in Indian English - Nissim Ezekiel

1.2 Still I Rise - Maya Angelou

1.3 On Killing a Tree - Gieve Patel

UNIT II :

Prose

2.1 If You Are Wrong Admit it- Dale Carnegie

2.2 Kindly Adjust Please - Shashi Tharoor

2.3 The Spoon-fed Age- W.R. Inge

UNIT III :

Fiction

Alchemist - Paulo Coelho

UNIT IV :

Language Competency

4.1 Homonyms, Homophones, Homographs Portmanteau words

4.2 Subject Verb Agreement

UNIT V :

English in the Workplace

5.1 Reading for General and Specific information [Charts, tables, schedules, graphs etc]

5.2 Reading news and weather reports

5.3 Writing paragraphs

5.4 Taking and making notes

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Learn to introduce themselves and talk about everyday activities confidently	PO1
CO2	Be able to write short paragraphs on people, places and events	PO1, PO2
CO3	Identify the purpose of using various tenses and effectively employ them in speaking and writing	PO4, PO6
CO4	Gain knowledge to write subjective and objective descriptions	PO4, PO5, PO6

CO5	Identify and use their skills effectively in formal contexts.	PO3, PO8
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TextBooks(LatestEditions)	
1.	The Alchemist - Paulo CoelhoHarper – 2005

ReferencesBooks (Latest editions,and the style as given below must be strictly adhered to)	
1.	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2.	Descriptive English. <u>SP Bakshi</u> , <u>Richa Sharma</u> · 2019, Arihant Publications (India) Ltd.
3.	The Reading Book: A Complete Guide to Teaching Reading. <u>Sheena Cameron</u> , <u>Louise Dempsey</u> , S & L. Publishing, 2019.
4.	Skimming and Scanning Techniques, <u>Barbara Sherman</u> , Liberty University Press, 2014
5.	Brilliant Speed Reading: Whatever you need to read, however ... <u>Phil Chambers</u> , Pearson, 2013.
6.	The Archer, <u>Paulo Coelho</u> . Penguin Viking, 2020.

WebResources	
1.	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40_%202020103001102714.pdf
2.	Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise
3.	The Flower by Tennyson: https://www.poemhunter.com/poem/the-flower-2/
4.	On Killing a tree by Gieve Patel: https://www.poemhunter.com/poem/on-killing-a-tree/
5.	If you are wrong, admit it: https://www.tbr.fun/if-youre-wrong-admit-it/
6.	Kindly Adjust please - Shashi Tharoor https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3IhtdXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKgiNKKwdkeSg3qWp-U/
7.	The Spoon Fed Age: https://www.nrkacademy.com/2016/04/spoon-feeding-by-wringe.html
8.	The Alchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO 1	PS O2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Code	Course Title	L	T	P	C
23116AEC23	Microbial Physiology and Metabolism	4	1	0	3

Course Objectives

CO1: Study the basic principles of microbial growth.

CO2: Understand the basic concepts of aerobic and anaerobic metabolic pathways.

CO3: Analyze the role of individual components in overall cell function.

CO4: Provide information on sources of energy and its utilization by microorganisms.

CO5: Study the different types of metabolic strategies.

Course Content:

UNIT I:

Physiology of microbial growth: Batch – continuous - synchronous cultures; Growth Curve and measurement method (turbidity, biomass, and cell count). Control of microbial growth.

UNIT II:

Nutrition requirements - Photoautotrophs, Photoorganotrophs, Chemolithotrophs (Ammonia, Nitrite, Sulfur, Hydrogen, Iron oxidizing Bacteria), Chemoorganotrophs. Nutrition transport mechanisms – Passive diffusion and Active transport. Factors affecting microbial growth.

UNIT III:

An overview of Metabolism - Embden Meyerhof Pathway, Entner-Doudoroff Pathway, Pentose Phosphate Pathway, Tricarboxylic Acid Cycle. Electron Transport Chain and Oxidative Phosphorylation. ATP synthesis. Fermentation-Homolactic Fermentation, Heterolactic Fermentation, Mixed Acid Fermentation, Butanediol Fermentation.

UNIT IV:

Photosynthesis - An Overview of chloroplast structure. Photosynthetic Pigments, Light Reaction-Cyclic and non-cyclic Photophosphorylation. Dark Reaction - Calvin Cycle.

UNIT V:

Bacterial reproduction - Binary fission, Budding, Reproduction through conidia, cyst formation, endospore formation. Fungi asexual and sexual reproduction, Microalgae reproduction. Asexual and sexual reproduction of protozoa.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Describe microorganisms based on nutrition.	PO6, PO9
CO2	Know the concept of microbial growth and identify the factors affecting bacterial growth.	PO6, PO7, PO9
CO3	Explain the methods of nutrient uptake.	PO6, PO9
CO4	Describe anaerobic and aerobic energy production.	PO6, PO9
CO5	Elaborate on the process of bacterial photosynthesis and reproduction.	PO6, PO9

Text Books

1	Schlegel, H.G. (1993). General Microbiology.,7 th Edition, Press syndicate of the University of Cambridge.
2	RajapandianK.(2010). Microbial Physiology, Chennai: PBS Book Enterprises India.
3	MeenaKumari. S. Microbial Physiology, Chennai 1 st Edition MJP Publishers 2006.
4	Dubey R.C. and Maheswari, S. (2003). A textbook of Microbiology, New Delhi: S. Chand & Co.
5	S. Ram Reddy, S.M. Reddy (2008). Microbial Physiology. Anmol Publications Pvt Ltd.

References Books

1	Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York, Volume 49.
2	Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.
3	Daniel R. Caldwell. (1995). Microbial Physiology & Metabolism Wm.C. Brown Communications, Inc. USA.
4	Moat, A.G and J.W Foaster (1995). Microbial Physiology, 3 rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.
5	BhanuShrivastava. (2011). Microbial Physiology and Metabolism: Study of Microbial Physiology and Metabolism. Lambert academic Publication.

Web Resources

1	https://sites.google.com/site/microbialphysiologyoddsem/teaching-contents
2	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition
3	https://onlinecourses.swayam2.ac.in/cec20_bt14/preview
4	http://web.iitd.ac.in/~amittal/2007_Addy_Enzymes_Chapter.pdf
5	https://www.frontiersin.org/microbial-physiology-and-metabolism

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						M			M		
CO2						M	L		M		
CO3						M			M		
CO4						M			M		
CO5						M			M		

Course Code	Course Title	L	T	P	C
23115GEC24	Bio Instrumentation	4	1	0	3

Course Objectives:

CO1: Understand the analytical instruments and study the basic principles in the field of sciences.

CO2: To gain knowledge about principles of spectroscopy

CO3: Understand the analytical techniques of Chromatography and electrophoresis

CO4: To understand the principle of different types of scans used in medical diagnosis

CO5: To gain information about the principles of radioactivity and its measurements

Course Content:

UNIT I:

Basic instruments: pH meter, Buffer of biological importance, Centrifuge- Preparative, Analytical and Ultra, Laminar Air Flow, Autoclave, Hot Air Oven and Incubator. Biochemical calculations-preparations of Molar solutions - Buffers- Phosphate, Acetate, TE, TAE- calculation of Normality ,PPM- Ammonium sulphate precipitation.

UNIT II:

Spectroscopic Techniques: Spectroscopic Techniques: Colorimeter, Ultraviolet and visible, Infra red and Mass Spectroscopy.

UNIT III:

Chromatographic and Electrophoresis Techniques: Chromatographic Techniques: Paper, Thin Layer, Column, HPLC and GC. Electrophoresis Techniques: Starch Gel, AGE, PAGE.

UNIT IV:

Imaging techniques: Principle, Instrumentation and application of ECG, EEG, EMG, MRI, CT and PET scan radioisotopes.

UNIT V:

Fluorescence and radiation based techniques: Spectrofluorimeter, Flame photometer, Scintillation counter, Geiger Muller counter, Autoradiography.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Gain knowledge about the basics of instrumentation.	PO1,PO4,PO11
CO2	Exemplify the structure of atoms and molecules by using the principles of spectroscopy.	PO4,PO10,PO11
CO3	Evaluate by separating and purifying the components.	PO4,PO7,PO11
CO4	Understand the need and applications of imaging techniques.	PO7,PO8,PO11
CO5	Categorize the working principle and applications of fluorescence and radiation.	PO10,PO11

Course Code	Course Title	L	T	P	C
23116SEC25L	Microbial Physiology and Metabolism Lab	0	0	3	3

Course Objectives

CO1: Understand the principles of motility tests.

CO2: Understand the basic concepts of staining methods.

CO3: Learn the bacterial count using different methods and anaerobic culture.

CO4: Study the morphological demonstration of microorganisms and identification.

CO5: Study the biochemical identification of the bacteria.

Course Content:

UNIT I:

Motility demonstration: hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method. Staining techniques: Smear preparation, permanent specimen preparation, Capsular, and Acid-fast staining

UNIT II:

Direct counts – Direct cell count (Petroff-Hausser counting chamber), Turbidometry. Viable count - pour plate, spread plate.

Bacterial growth curve.

UNIT III:

Anaerobic culture methods. Antibiotic sensitivity testing: Disc diffusion test- quality control with standard strains.

UNIT IV:

Morphological variations in algae, fungi and protozoa. Micrometry: Demonstration of the size of yeast, fungal filaments and protozoa.

UNIT V:

Methods of bacterial identification- morphological, physiological, and biochemical methods - IMViC test, H₂S, TSI, Oxidase, catalase, urease test, and Carbohydrate fermentation test. Maintenance of pure culture, paraffin method, stab culture, maintenance of mold culture.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Describe hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method.	PO6, PO7, PO8, PO9, PO11
CO2	Demonstrate Smear preparation, permanent specimen preparation, Capsular, and Acid-fast staining.	PO6, PO7, PO8, PO9, PO11
CO3	Explain antibiotic sensitivity testing: Disc diffusion test- quality control with standard strains.	PO6, PO7, PO8, PO9, PO11
CO4	Describe demonstration of the size of yeast, fungal filaments and protozoa.	PO6, PO7, PO8, PO9, PO11
CO5	Elaborate on the bacterial identification- morphological, physiological, and biochemical methods.	PO6, PO7, PO8, PO9, PO11

Text Books

1	James G Cappucino and N. Sherman MB (1996). A lab manual Benjamin Cummins, New York .
2	Kannan. N (1996).Laboratory manual in General Microbiology. Palani Publications.
3	Sundararaj T (2005). Microbiology Lab Manual (1 st edition) publications.
4	Gunasekaran. P (2007). Laboratory manual in Microbiology. New age international publisher.
5	Elsa Cooper (2018). Microbial Physiology: A Practical Approach. Callisto Reference publisher.

References Books

1	DavidWhite., James Drummond., Clay Fuqua (2012) Physiology and Biochemistry of Prokaryotes. 4th Ed. Oxford University Press, New York.
2	Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York, Volume 49.
3	Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.
4	Dawes, I.W and Sutherland L.W (1992). Microbial Physiology (2 nd edition), Oxford Blackwell Scientific Publications.
5	Moat, A.G and J.W Foaster, (1995). Microbial Physiology, 3 rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.

Web Resources

1	https://sites.google.com/site/microbialphysiologyoddsem/teaching-contents
2	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition
3	https://onlinecourses.swayam2.ac.in/cec20_bt14/preview
4	https://www.studocu.com/microbial-physiology-practicals
5	https://www.agr.hokudai.ac.jp/microbial-physiology

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						M	L	M	L		M
CO2						M	M	L	M		L
CO3						L	M	M	L		M
CO4						L	M	M	M		M
CO5						M	M	M	M		M

Course Code	Course Title	L	T	P	C
23115SEC26L	Bio Instrumentation Lab	0	0	3	3

Learning Outcomes:

CO1: To get the knowledge on the working principle of laboratory instruments.

CO2: To understand the procedure for the pH measurement.

CO3: To learn separation of amino acids and sugars using paper & thin layer chromatography

CO4: To understand how to estimate sugars, amino acids and sugars using spectroscopic techniques

CO5: To understand other instruments related to research.

Course Content:

UNIT I: Studies on pH titration curves of amino acids/ acetic acid and determination of pKavalues and Handerson-Hasselbach equation.

UNIT II: Separation of bacterial lipids/amino acids/sugars/ by TLC or Paper Chromatography.

UNIT III: Separation of serum protein by horizontal submerged gel electrophoresis.

UNIT IV: Study of UV absorption spectra of macromolecules (protein, nucleic acid, bacterial pigments).

UNIT V: Quantitative estimation of hydrocarbons/pesticides/organic Solvents /methane by Gas chromatography. (Demonstration) ,Demonstration of PCR, DNA sequencer, Fermenter, Flow cytometry

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Acquire knowledge on the working principle of laboratory instruments.	PO1,PO4,PO11
CO2	Understanding the procedure for the pH measurement.	PO4,PO10,PO11
CO3	Learn Separation of amino acids and sugars using paper & thin layer chromatography.	PO4,PO7,PO11
CO4	Understand how to estimate sugars, amino acids and sugars using spectroscopic techniques	PO7,PO8,PO11
CO5	Understanding other instruments related to research	PO10,PO11

Text Books	
1	Keith Wilson and John Walker 2002 practical biochemistry – Principles and techniques. Fifth edn.Cambridge Univ. Press.
2	P. Asokan 2002. Analytical biochemistry – Biochemical techniques. Firstedition– Chinnaa publications, Melvisharam, Vellore
3	Rodney Boyer, 2001. Modern Experimental Biochemistry.III Ed. Addison Wesley Longman Pte.Ltd, Indian Branch, Delhi, India
4	Chatterjea, M. N., &Shinde, R. (2011). Textbook of medical biochemistry. Wife GoesOn.
5	Lehninger, A. L. (2004). Lehninger Principles of Biochemistry: David L. Nelson, Michael M. Cox. Recording for the Blind &Dyslexic

References Books

1	N. Gurumani 2010 Research Methodology for Biological Sciences.MJP Publishers,Chennai.
2	David T. Plummer 1988. An introduction to practical biochemistry, Tata McGraw Hill pub. Co. Ltd, New Delhi.
3	J. Jeyaraman 1981. Laboratory Manual in Biochemistry.New Age International publishers, New Delhi. ReferenceBooks
4	S. Palanichamy and M. Shunmugavelu 2009.Research methods in biological sciences.Palani paramount publications,Palani.
5	K. Kannan 2003 Hand book of Laboratory culture media, reagents, stains and buffers Panima publishing corporation, NewDelhi.

Web Resources

1	http://www.biologydiscussion.com/biochemistry/centrifugation/centrifugeintroduction-types-uses-and-other-details-with-diagram/12489
2	https://www.watelectrical.com/biosensors-types-its-working-and-applications/
3	http://www.wikiscales.com/articles/electronic-analytical-balance/
4	https://study.com/academy/lesson/what-is-chromatography-definition-typesuses.html
5	http://www.rsc.org/learn-chemistry/collections/spectroscopy/introduction.

Course Code	Course Title	L	T	P	C
23116SEC27	Nutrition & Health Hygiene	2	0	0	2

Course Objectives

CO1: Learn about nutrition and their importance

CO2: Make students understand the nutritional facts for a better life.

CO3: Learn information to optimize our diet

CO4: Impart knowledge on different health care programs taken up by India

CO5: Learn knowledge on different health indicators and types of hygiene methods

Course Content:

UNIT I:

Nutrition – definition, importance, Good nutrition, and mal nutrition; Balanced Diet: Basics of Meal Planning. Carbohydrates, Lipids, Proteins and Vitamins –functions, dietary sources, effects of deficiency. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium, and Sodium; food sources of Iron, Iodine, and Zinc. Importance of water– functions, sources, requirements and effects of deficiency.

UNIT II:

Nutrition for Life Cycle: Balanced diet - Normal, Pregnant, lactating women, Infancy, young children Adolescents, Adults, and the Elderly; Diet Chart; Nutritive value of Indian foods.

UNIT III:

Improper diets: Definition, Identification, Signs and Symptoms - malnutrition, under-nutrition, over-nutrition, Protein Energy Malnutrition, obesity; Nutritional Disease and Disorder - hypertension, diabetes, anemia, osteomalacia, cardiovascular disease.

UNIT IV:

Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India; Functioning of various nutrition and health organizations in India.

UNIT V:

Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme. Rural Community Health: Village health sanitation & Nutritional committee. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Learn the importance of nutrition for a healthy life	PO5, PO6, PO7, PO8, PO10
CO2	Study the nutrition for life cycle	PO5, PO6, PO7, PO8, PO10
CO3	Know the health care programmes of India	PO5, PO6, PO7, PO8, PO10
CO4	Learn the importance of community and personal health & hygiene measures	PO5, PO6, PO7, PO10
CO5	Create awareness on community health and hygiene	PO5, PO6, PO7, PO10

Text Books

1.	Bamji, M.S., K. Krishnaswamy & G.N.V. Brahmam (2009) Textbook of Human Nutrition (3rd edition) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
2.	Swaminathan (1995) Food & Nutrition (Vol I, Second Edition) The Bangalore Printing & Publishing Co Ltd., Bangalore
3	SK. Haldar (2022). Occupational Health and Hygiene in Industry. CBS Publishers.
4	Acharya, Sankar Kr, Rama Das, Minati Sen (2021). Health Hygiene and Nutrition Perception and Practices. Satish Serial Publishing House
5	Dass (2021). Public Health and Hygiene, Notion Press

References Books

1	Vijaya Khader (2000) Food, nutrition & health, Kalyan Publishers, New Delhi
2	Srilakshmi, B., (2010) Food Science, (5 th Edition) New Age International Ltd., New Delhi
3	Arvind Kumar Goel (2005). A College Textbook of Health & Hygiene, ABD Publishers
4	Sharma D. (2015). Textbook on Food Science and Human Nutrition. Daya Publishing House.
5	Revilla M. K. F., Titchenal A. and Draper J. (2020). Human Nutrition. University of Hawaii, Mānoa.

Web Resources

1	National Rural Health Scheme: https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=49
2	National Urban Health Scheme: https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137
3	Village health sanitation & Nutritional committee https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=149&lid=225
4	Health Impact Assessment - https://www.who.int/hia/about/faq/en/
5	Healthy Living https://www.nhp.gov.in/healthylivingViewall

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					S	M	M	M		S	
CO2					S	M	M	M		S	
CO3					S	M	M	M		S	
CO4					S	S	L			S	
CO5					S	S	M			S	

Course Code	Course Title	L	T	P	C
23116SEC28	Sericulture	2	0	0	2

Course Objectives:

CO1: Acquire knowledge on the concepts of origin, growth and study of Sericulture as science and the scientific approach of the mulberry plant.

CO2: Describe the morphology and physiology of silkworm.

CO3: Discuss effective management of silkworm diseases.

CO4: Demonstrate field skills in mulberry cultivation and silkworm rearing with an emphasis on technological aspects.

CO5: Demonstrate entrepreneurship abilities, innovative thinking, planning, and setting up small-scale enterprises.

Course Content:

UNIT I:

General introduction to Sericulture, its distribution in India. Botanical distribution and taxonomical characters of mulberry varieties and species. Biology of Mulberry plant and Mulberry crop cultivation and protection.

UNIT II:

Silkworm- biology-morphology of silkworm. Life cycle of silkworm- egg, larva, pupa, and moth.

UNIT III:

Silkworm pathology: Introduction to Parasitism, Commensalism, Symbiosis and Parasite relationship - Mulberry Silkworm Diseases: Introduction, types, Pebrine, Grasserie, Muscardine, Flacherie, Symptoms and Pathogens, Mode of Infection, Prevention and Control -Non – mulberry silkworm diseases: Pebrine, Bacterial and viral diseases. Brief Account of Pests and Predators of Silkworms, Nature of damage and control measures.

UNIT IV:

Rearing of silkworms. Cocoon assessment and processing technologies. Value added products of mulberry and silkworms.

UNIT V:

Entrepreneurship and rural development in sericulture: Planning for EDP, Project formulation, Marketing, Insectary facilities and equipment: Location, building specification, air conditioning and environmental control, furnishings and equipment, sanitation and equipment, subsidiary facilities.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Discuss the overall aspects of Sericulture and the biology and varieties of mulberry plant. Creates awareness among students about the economic importance and suitability of Sericulture in Indian conditions.	PO1,PO5,PO7
CO2	Familiarize with the lifecycle of silk worm.	PO1, PO2
CO3	Explain common diseases of silkworm encountered during rearing, sources of infection, disease symptoms, pre-disposing factors and their management practices.	PO1, PO5
CO4	Attain thorough knowledge about the cultivation of mulberry, maintenance of the farm, seed technology, silkworm rearing, post cocoon techniques like stifling, reeling, and utilization of by-products.	PO7, PO8, PO10

CO5	Plan the facilities required for establishment of insectary. Competent to transfer the knowledge and technical skills to the Serifarmers. Analyze the importance of sericulture in entrepreneurship development and emerge as potential entrepreneur.	PO5, PO7, PO8
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Text Books

1	Ganga, G. and Sulochana Chetty (2010). Introduction to Sericulture,, J., Oxford and IBH Pub. Co. Pvt. Ltd., New Delhi.
2	Dr. R. K. Rajan&Dr. M. T. Himantharaj(2005). Silkworm Rearing Technology, Central Silk Board, Bangalore.
3	Dandin S B, Jayant Jayaswal and Giridhar K (2010). Handbook of Sericulture technologies,Central Silk Board, Bangalore.
4	M. C. Devaiah, K. C. Narayanaswamy and V. G. Maribashetty(2010). Advances in Mulberry Sericulture,,CVG Publications, Bangalore
5	T.V.SatheandJadhav.A.D.(2021). Sericulture and Pest Management, Daya Publishing House.

References Books

1	S. Morohoshi (2001). Development Physiology of Silkworms 2 nd Edition, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi
2	Hamamura, Y (2001). Silkworm rearing on Artificial Diet. Oxford & IBH publishing Co., Pvt. Ltd. NewDelhi.
3	M.Johnson, M.Kesary (2019). Sericulture, 5 th . Edition. Saras Publications.
4	Manisha Bhattacharyya (2019). <u>Economics of Sericulture</u> , Rajesh Publications.
5	Muzafar Ahmad Bhat, Suraksha Chanotra, Zafar Iqbal Buhroo, Abdul Aziz and Mohd. Azam (2020). <u>A Textbook on Entrepreneurship Development Programme in Sericulture</u> , IP Innovative Publication.

Web Resources

1	https://egyankosh.ac.in › bitstream
2	https://archive.org › details › SericultureHandbook
3	https://www.academic.oup.com
4	https://www.sericulture.karnataka.gov.in
5	https://www.silks.csb.gov.in

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S				S		S				
CO2	M				S						
CO3	S				S						
CO4							S	S		S	
CO5					S		S	S			

Course Code	Course Title	L	T	P	C
231AECCCMS	Communication English	2	0	0	2

Course Objectives :

This course has been developed with the following objectives:

CO1:Identify common communication problems that may be holding learner's back

CO2:Identify what their non-verbal messages are communicating to others

CO3:Understand role of communication in teaching-learning process

CO4:Learning to communicate through the digital media

CO5:Understand the importance of empathetic listening

CO6:Explore communication beyond language.

Unit I

- ❖ Techniques of effective listening
- ❖ Listening and comprehension
- ❖ Probing questions
- ❖ Barriers to listening

Unit II

- ❖ Pronunciation
- ❖ Enunciation
- ❖ Vocabulary
- ❖ Fluency
- ❖ CommonErrors

Unit III

Techniques of effective reading

Gathering ideas and information from a given text

- ❖ Identify the main claim of the text
- ❖ Identify the purpose of the text
- ❖ Identify the context of the text
- ❖ Identify the concepts mentioned

Evaluating these ideas and information

- ❖ Identify the arguments employed in the text
- ❖ Identify the theories employed or assumed into text

Interpret the text

- ❖ To understand what a text says
- ❖ To understand what a textdoes
- ❖ To understand what a text means

Unit IV

Clearly state the claims

Avoid ambiguity, vagueness, unwanted generalizations and over simplification of issues

Provide background information

Effectively argue the claim

Provide evidence for the claims

Use examples to explain concepts

Follow Convention

Be properly sequenced

Use proper signposting techniques

Be well structured

- ❖ Well-knit logical sequence
- ❖ Narrative Sequence
- ❖ Category Groupings

Different modes of Writing

- ❖ E-mails
- ❖ Proposal writing for Higher Studies
- ❖ Recording the proceedings of meetings
- ❖ Any other mode of writing relevant for learners

Unit V

Role of Digital literacy in professional life

Trends and opportunities in using digital technology in workplace

Internet Basics

Introduction to MS Office tools

- ❖ Paint
- ❖ Office
- ❖ Excel
- ❖ Powerpoint

Unit VI

- Introduction to social media websites
- Advantages of social media
- Ethics and etiquettes of social media
- How to use Google search better
- Effective ways of using Social Media
- Introduction to Digital Marketing

Unit VII

- Meaning of non-verbal communication
- Introduction to modes of nonverbal communication
- Breaking the misbeliefs
- Open and Closed Body Language
- Eye Contact and Facial Expression
- Hand Gestures
- Do's and Don'ts
- Learning from experts
- Activities-Based Learning

Course Outcome :

By the end of this program participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.

Reference:

1. Sen Madhuchanda (2010), *An Introduction to Critical Thinking*, Pearson, Delhi
2. Silvia P. J. (2007), *How to Read a Lot*, American Psychological Association, Washington DC

Course Code	Course Title	L	T	P	C
231SSCBE	Basic Behavioral Etiquette	-	-	-	1

Aim:

Aim of this program is Eliminating negative thought, developing enriching habits, unlocking individual potentials and well versed communication

Course Objectives:

Training is mainly focused on discipline, grooming, career planning and building personality. As it is the first year of university, students are given awareness about the job market right from the start so that they prepare accordingly at their own pace and potential.

Course Content:

- ❖ The module consists of
- ❖ Communication Skills
- ❖ Goal Setting
- ❖ Career Planning
- ❖ Reaching your Potential
- ❖ Time Management
- ❖ Stress Management
- ❖ Grooming and Discipline
- ❖ Learning skills
- ❖ Listening Skills
- ❖ Team Building

SEMESTER III

Course Code	Course Title	L	T	P	C
23110AEC31	Tamil-III - காப்பிய இலக்கியம்	3	1	0	3

மூன்றாம் பருவம்

பாடநோக்கம் :

- தமிழ்க் காப்பியங்களை அறிமுகப்படுத்துதல்.
- காப்பியங்கள் கூறும் வாழ்வியல் அறங்களை உணர்த்துதல்.
- காப்பிய இலக்கியங்களில் இலக்கியச் சுவையை பயிற்றுவித்தல்.
- நாடக இலக்கியத்தின் தனித்துவத்தைக் கற்பித்தல்.

பயன்கள் :

- CO1 : இலக்கியங்களின் சிறப்புகளை அறிவர்.
CO2 : காப்பியக் கதைகள் வழி அறச் சிந்தனை பெறுவர்
CO3 : பல்வேறு காப்பிய வடிவங்களை பற்றிய அறிவு பெறுவர்.
CO4 : நாடக படைப்பாக்கத்திற்கான தூண்டுதலைப் பெறுவர்.

அலகு -1 காப்பியங்கள்

1. சிலப்பதிகாரம் - மதுரை காண்டம் (வழக்குரை காதை)
2. மணிமேகலை - விழாவறை காதை
3. சீவக சிந்தாமணி - குணமாலையார் இலம்பகம்

அலகு -2 காவியங்கள்

1. கம்பராமாயணம்- மந்தரை சூழ்ச்சி படலம்
2. மகாபாரதம் - ஆரண்ய பருவம்

அலகு -3 புராணங்கள்

1. பெரியபுராணம்- இளையான்குடி மாற நாயனார் புராணம்
2. சீறாப்புராணம் - ஈத்தங்குழை வரவழைத்தப் படலம்
3. தேம்பாவணி- பிரிந்த மகனை காண்படலம்

அலகு-4 - நாடகம்

1. சாபம்? விமோசனம்

அலகு-5 இலக்கிய வரலாறு

1. காப்பியங்கள்
2. இரட்டைக் காப்பியங்கள்
3. நாடக இலக்கியம்

பார்வை நூல்கள் :

1. காப்பியத்திறன்- மணிவாசகர் நூலகம், சிதம்பரம்.
2. தமிழ் காப்பியங்கள் - கி. வா .ஜெகன் ஜெகநாதன் , அமுத நிலையம், சென்னை .
3. நவீன நாடக உருவாக்கம் - கோ பழனி , தமிழ் பல்கலைக்கழகம், தஞ்சாவூர்.
4. மு.இராமசுவாமி, செண்பகம் இராமசுவாமி, பாவை பதிப்பகம், ஜானிஜான் சாலை, சென்னை - 14

இணையதளம் -www.tamilvu.org , www.noolulagam.com

Course Code	Course Title	L	T	P	C
23111AEC31	Advanced English-III	3	1	0	3

Course Objective:

To familiarize with the organs of speech and the description and classification of speech sounds
To understand consonant cluster, syllable, word accent and intonation.

To know how to interpret graphics

To write slogans and advertisements

Course Content:

UNIT-I

The Origins of Language

The natural sound source

The social interaction source

The physical adaptation source: teeth and lips, mouth and tongue, larynx and pharynx

UNIT-II

The Sounds of Language -

Phonetics

Voiced and voiceless sounds

Place of articulation

Manner of articulation

Consonants, Vowels, Diphthongs

UNIT-III

The Sound Patterns of Language

Phonology

Phonemes: Natural classes

Syllables: Consonant clusters

Coarticulation effects: Assimilation, Nasalization,

Elision, Normal

UNIT-IV

Word formation -

Coinage, Acronyms, Derivation, Prefixes and suffixes,

Infixes, Multiple

UNIT-V

Syntax

Course Outcome:

- ❖ Understand phonetics
- ❖ Develop writing skill
- ❖ Able to develop creative writing

Author	Title of the book	Edition / Year	Publisher
T.B. Balasubramaniyan	A textbook of phonetics for Indian Students	Reprint 2008	Macmillian
Meenakshi Sharma & Sangeetha Sharma	Technical Communication	2011	Oxford University Press

Course Code	Course Title	L	T	P	C
23111AEC32	English-III	3	1	0	3

Course Objectives:

CO1: To enhance the level of literary and aesthetic experience of students and to help them respond creatively.

CO2: To sensitize them to the major issues in the society and the world.

CO3: To sensitize them to the major issues in the society and the world.

CO4: To equip them to utilize the digital knowledge resources effectively for their chosen fields of study.

CO5: To help them think and write imaginatively and critically.

Course Content:

UNIT I:

Poetry:

- 1.1 The Voice of the Mountains - Mamang Dai
- 1.2 A Song of Hope - Oodgeroo Noonuccal
- 1.3 In an Artist's Studio - Christina Rossetti

UNIT II:

Scenes From Shakespeare:

- 2.1 Romeo & Juliet -The Balcony Scene
- 2.2 Macbeth -Banquet Scene
- 2.3 Julius Caesar - Murder Scene

UNIT III:

Speeches of Famous personalities

- 3.1 Yes, We Can -Barack Obama
- 3.2 You've Got to Find What You Love -Steve Jobs

UNIT IV:

Language Competency

- 4.1 Writing letters and emails
- 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram.facebook]
- 4.3 Learning netiquette, email etiquette

UNIT V:

English for Workplace

- 5.1 Data Interpretation and Reporting
- 5.2 Data Presentation and analysis
- 5.3 Meeting Etiquettes - language, dress code, voice modulation.
- Online Meetings - Terms and expressions used
- 5.4 Conducting and participating in a meeting

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	PO1
CO2	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society	PO1,PO2
CO3	Produce grammatically and idiomatically correct language.	PO4,PO6
CO4	Gain knowledge in writing techniques to meet academic and professional needs.	PO4,PO5,PO6
CO5	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	PO3,PO8

Text Books (Latest Editions)

1	Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011)
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References Books

(Latest Editions, and the style as given below must be strictly adhered to)

1.	The Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
2.	Famous Speeches by Mahatma Gandhi, Createspace Independent Publishing Platform, 2016
3.	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish , Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
4.	Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse , Michigan Teacher Training, 2016.
5.	Role Play-Theory and Practice. Krysia M Yardley-Matwiejczuk , SAGE publications ltd, 1997

Web Resources

1.	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2.	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3.	In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4.	Sita by Toru Dutt: https://www.poetrynook.com/poem/s%20E2%94%9C%C2%ABta
5.	Tryst with Destiny: https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html#:~:text=Jawaharlal%20Nehru%2C%20delivering%20his%20Tryst%20with%20Destiny%20speech.&text=%22Long%20years%20ago%20we%20made,awake%20to%20life%20and%20freedom.

6.	Yes, We Can: https://www.englishspeecheschannel.com/english-speeches/barack-obama-speech/
7.	You've got to find what you love: https://www.businessbusinessbusiness.com.au/steve-jobs-youve-got-to-find-what-you-love/#:~:text=Steve%20Jobs%2C%20in%20his%20commencement,emphasizes%20on%20believing%20in%20oneself.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 – Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Code	Course Title	L	T	P	C
23116AEC33	Molecular Biology and Microbial Genetics	4	1	0	3

Course Objectives:

CO1: Provide knowledge on structure and replication of DNA.

CO2: Illustrate the significance and functions of RNA in protein synthesis.

CO3: Explain the cause and types of DNA mutation and DNA repair mechanisms.

CO4: Outline the role of plasmids and phages in genetics.

CO5: Examine mechanisms of gene transfer and recombination.

Course Content:

UNIT I:

DNA Structure - Salient features of double helix, forms of DNA. Denaturation and renaturation. DNA topology – Supercoiling, linking number, topoisomerases. DNA organization in prokaryotes, viruses, eukaryotes. Replication of DNA in prokaryotes and eukaryotes - Bidirectional and unidirectional replication, semi-conservative and semi-discontinuous replication. Mechanism of DNA replication – enzymes involved – DNA polymerases, DNA ligase, primase. DNA replication modes - rolling circle, D-loop modes.

UNIT II:

Transcription in Prokaryotes. Concept of transcription. RNA Polymerases - prokaryotic and eukaryotic. General transcription factors in eukaryotes. Distinction between transcription processes in prokaryotes versus eukaryotes. Translation in prokaryotes and eukaryotes - Translational machinery - ribosome structure in prokaryotes and eukaryotes, tRNA structure and processing. Inhibitors of protein synthesis in prokaryotes and eukaryotes. Overview of regulation of gene expression - *lac*, *trp* and *ara* operons as examples. Regulation of gene expression by DNA methylation.

UNIT III:

Mutation - Definition and types - base substitutions, frame shifts, deletions, insertions, duplications, inversions. Silent, conditional, and lethal mutations. Physical and chemical mutagens. Reversion and suppression. Uses of mutations. Repair Mechanisms - Photoreactivation, Nucleotide Repair, Base Excision Repair, Methyl Directed Mismatch Repair and SOS Repair.

UNIT IV:

Plasmid replication and partitioning, host range, plasmid incompatibility, plasmid amplification, regulation of plasmid copy number, curing of plasmids. Types of plasmids – R Plasmids, F plasmids, colicinogenic plasmids, metal resistance plasmids, Ti plasmid, linear plasmids, yeast 2 μ plasmid. Bacteriophage-T4, Virulent Phage – Structure and lifecycle. Lambda phage-

Structure, Lytic and Lysogenic cycle. Applications of Phages in Microbial Genetics.

UNIT V:

Gene Transfer Mechanisms- Conjugation and its uses. Transduction - Generalized and Specialized, Transformation - Natural Competence and Transformation. Transposition and Types of Transposition reactions. Mechanism of transposition: Replicative and non- replicative transposition. Transposable elements - Prokaryotic transposable elements – insertion sequences, composite, and non-composite transposons. Uses of transposons.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Analyze the significance of DNA and elucidate the replication mechanism.	PO4, PO5, PO7,PO9
CO2	Illustrate the types of RNA and protein synthesis machinery.	PO4, PO7,PO9
CO3	Infer the causes and types of DNA mutation and summarize the DNA repair mechanisms.	PO5, PO7,PO9
CO4	Evaluate the importance of plasmids and phages in genetics.	PO7,PO9
CO5	Analyze gene transfer and recombination methods.	PO5, PO6, PO7,PO9

Text Books	
1	Malacinski G.M. (2008). Freifelder's Essentials of Molecular Biology. 4 th Edition. Narosa Publishing House, New Delhi.
2	Gardner E. J. Simmons M. J. and Snusted D.P.(2006). Principles of Genetics. 8 th Edition. Wiley India Pvt. Ltd.
3	Trun N. and Trempey J. (2009). Fundamental Bacterial Genetics. 1 st Edition. Blackwell Science Ltd.
4	Brown T. A. (2016). Gene Cloning and DNA Analysis- An Introduction. (7 th Edition). John Wiley and Sons, Ltd.
5	Dale J. W., Schantz M.V. and Plant N. (2012). From Gene to Genomes – Concepts and Applications of DNA Technology. (3 rd Edition). John Wileys and Sons Ltd.

References Books	
1	Glick B. R. and Patten C.L. (2018). Molecular Biotechnology – Principles and Applications of Recombinant DNA. 5 th Edition. ASM Press.
2	Russell P.J. (2010). iGenetics - A Molecular Approach, 3rd Edition., Pearson New International edn.
3	Nelson, D.L. and Cox, M.M. Lehninger(2017). Principles of Biochemistry. 7 th Edition, W.H. Freeman.
4	Synder L., Peters J. E., Henkin T.M. and Champness W. (2013). Molecular Genetics of Bacteria, 4 th Edition, ASM Press Washington-D.C. ASM Press.
5	Primrose S.B. and Twyman R. M. (2006). Principles of Gene Manipulation and Genomics. (7 th Edition). Blackwell Publishing

Web Resources

1.	[PDF] Lehninger Principles of Biochemistry (8th Edition) By David L. Nelson and Michael M. Cox Book Free Download - StudyMaterialz.in
2.	https://microbenotes.com/gene-cloning-requirements-principle-steps-applications/
3.	https://courses.lumenlearning.com/boundless-biology/chapter/dna-replication/
4.	Molecular Biology Notes - Microbe Notes
5.	Molecular Biology Lecture Notes & Study Materials Easy Biology Class

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				S	S	M	S	M	S	M	
CO2				S	M	M	S	M	S	L	
CO3				M	S	M	S	M	S	L	
CO4				M	M	M	S	M	S	L	
CO5				M	S	S	S	M	S	L	

Course Code	Course Title	L	T	P	C
23116GEC34	Clinical Laboratory Technology	4	1	0	3

Course Objectives:

CO1: Demonstrate ethical and professional conduct with patients, laboratory personnel, health-care professionals, and the public.

CO2: Explain how accurate and reliable information might be obtained about proper procurement, storage, and *handling* of laboratory *specimens*.

CO3: Develop a sound scientific knowledge foundation that prepares them to interpret, analyze and evaluate scientific knowledge in clinical practice.

CO4: Perform a full range of laboratory tests with accuracy and precision.

CO5: Establish quality assurance principles and practices to ensure the accuracy and reliability of laboratory information.

Course Content:

UNIT I:

Introduction to Clinical Laboratory Science: Basic laboratory principles - Code of conduct for medical laboratory personnel -Organization of clinical laboratory and role of medical laboratory technician - Safety measures. Assessment of a patient and brief history of collection. Maintenance of Hygiene & Infection Control Practices.

UNIT II:

Specimen collection and processing - Blood, urine, stool, sputum CSF, amniotic fluid and bile. Separation of serum and plasma, Handling of specimens for testing, preservation of specimens, transport of specimens and factors affecting the clinical results.

UNIT III:

Introduction to histopathology-Methods of examination of tissues and cells, Fixation of tissues: Classification and properties of fixatives. Tissue processing - Collection of specimens, Labeling and fixation, Dehydration, Clearing, Impregnation, Embedding - Paraffin block making, Section Cutting, Microtomes – types and mounting of sections.

UNIT IV:

Introduction to Haematology- Laboratory methods used in the investigation of coagulation disorders - coagulation tests , Routine coagulation tests, (prothrombin time , plasma recalcification time,partial thromboplastin time , activated partial thromboplastin time, thrombin time), Laboratory diagnosis of bleeding disorders. Estimation of fibrinogen, Assay of coagulation factors.

UNIT V:

Quality Standards in Health Laboratories – Development and implementation of standards, Accreditation Boards –NABL, ISO, CAP, COLA, Performing quality assessment - pre-analytical, analytical, and post-analytical phases of testing.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Describe characteristics of laboratory organizations and demonstrate professionalism by displaying professional conduct, model ethical behavior and operate as a vital member of the medical lab team. Practice safety or infection control procedures in the clinical laboratory, properly use safety equipment and maintain a clean, safe work environment.	PO3, PO11
CO2	Accurately collect specimens for various purposes. Determine appropriate tests based on test request, Maintain standard and transmission-based precautions, Engage in the scientific process by understanding the principles and practices of clinical study design, implementation, and dissemination of results.	PO5, PO6, PO11
CO3	Identify the basic structure of cells, tissues and organs and describe their contribution to normal function. Interpret light and electron microscopic histological images and identify the tissue source and structures. Relate and recognize the histological appearance of affected tissues to the underlying pathology.	PO6, PO8, PO9, PO11
CO4	Recognize the pathologies behind benign and malignant disorders of erythrocytes, leucocytes, thrombocytes and familiar with the diagnosis, evaluation, and management of hematologic malignancies.	PO5, PO6, PO9, PO11
CO5	Interpret, implement, and complying with laws, regulations and accrediting standards and guidelines of relevant governmental and non-governmental agencies.	PO1,PO 10

Text Books

1.	Mukharji,K.L. (2000).Medical Laboratory Techniques, Vol - I, II & III, 5 th Edition. Tata McGrawHill, Delhi.
2.	Ochei,A., Kolhatkar.A. (2000).Medical Laboratory Science: Theory and Practice, McGraw Hill Education.
3	RamnikSood (2015).Concise Book of Medical Laboratory Technology: Methods and Interpretation, 2 nd Edition, Jaypee Brothers Medical Publishers, NewDelhi.
4.	S. Ramakrishnan, KN Sulochana(2012). Manual of Medical Laboratory Techniques,Jaypee Brothers Medical Publishers Pvt. Ltd
5.	Talib V.H. (2019).Handbook Medical Laboratory Technology, 2 nd Edition, Directorate of health services, Government of India.

Course Code	Course Title	L	T	P	C
23116SEC35L	Molecular Biology and Microbial Genetics Lab	0	0	3	3

Course Objectives:

CO1: Provide knowledge on structure and replication of DNA.

CO2: Elucidate the methods of Genomic and Plasmid DNA isolation.

CO3: Explain methods of protein separation.

CO4: Explain artificial transformation method.

CO5: Outline the role of phages in genetics.

Course Content:

UNIT I:

- ❖ Study of different types of DNA and RNA using micrographs and model / schematic representations.
- ❖ Study of semi-conservative replication of DNA through micrographs / schematic representations.

UNIT II:

- ❖ Isolation of Genomic and Plasmid DNA from *E. coli* and Analysis by Agarose gel electrophoresis.
- ❖ Estimation of DNA using colorimeter (diphenylamine reagent), UV spectrophotometer (A260 measurement).

UNIT III:

- ❖ Resolution and visualization of proteins by polyacrylamide gel electrophoresis (SDS-PAGE) – Demonstration.
- ❖ UV induced auxotrophic mutant production and isolation of mutants by replica plating technique – Demonstration.

UNIT IV:

- ❖ Perform artificial Transformation in *E. coli*.
- ❖ Isolation of antibiotic resistant mutants by gradient plate method. - Demonstration

UNIT V:

- ❖ Screening and isolation of phages from sewage.
- ❖ Perform RNA isolation.
- ❖ Estimate RNA.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Illustrate different types of DNA and RNA.	PO4, PO7, PO9, PO11
CO2	Utilize hands-on training in isolation of genomic and plasmid DNA.	PO4, PO7, PO9, PO11
CO3	Analyze importance of experimental microbial genetics.	PO4, PO7, PO9, PO11
CO4	Apply the knowledge of molecular techniques in various fields.	PO4, PO7, PO9, PO11
CO5	Investigate the significance of Phages.	PO4, PO7, PO9, PO11

Text Books

1.	Crichton. M. (2014). Essentials of Biotechnology. Scientific International Pvt Ltd. New Delhi.
2.	Sambrook J. and Russell D.W. (2001). Molecular Cloning - A Laboratory Manual – 7 th Edition. Cold Spring Harbor, N.Y: Cold Spring Harbor Laboratory Press.
3.	Dale J. W., Schantz M. V. and Plant N. (2012). From Gene to Genomes – Concepts and Applications of DNA Technology. (3 rd Edition). John Wileys and Sons Ltd.
4.	Gunasekaran P. (2007). Laboratory Manual in Microbiology. New Age International.
5.	James G Cappucino. and Natalie Sherman. (2016). Microbiology – A laboratory manual. (5 th Edition). The Benjamin publishing company. New York.

References Books

1	Glick B. R. and Patten C.L. Molecular Biotechnology – Principles and Applications of Recombinant DNA. 5 th Edition. ASM Press. 2018.
2	Russell P.J. (2010). iGenetics - A Molecular Approach, 3 rd Edition., Pearson New International edn.
3	Nelson, D.L. and Cox, M.M. Lehninger(2017). Principles of Biochemistry. 7 th Edition, W.H. Freeman.
4	Synder L., Peters J. E., Henkin T.M. and Champness W. (2013). Molecular Genetics of Bacteria, 4 th edition, ASM Press Washington-D.C. ASM Press.
5	Brown T.A. (2016). Gene Cloning and DNA Analysis. (7 th Edition). John Wiley and Jones, Ltd.

Web Resources

1	https://www.molbiotools.com/usefullinks.html
2	(PDF) Molecular Biology Laboratory manual (researchgate.net)
3	https://www.molbiotools.com/usefullinks.html
4	https://geneticgenie.org3 .
5	https://currentprotocols.onlinelibrary.wiley.com/doi/pdf/10.1002/cpet.5

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				S	L	M	S	M	S	M	S
CO2				S	L	M	S	M	S	M	S
CO3				S	L	M	S	M	S	M	S
CO4				S	L	M	S	M	S	M	S
CO5				S	L	M	S	M	S	M	S

Course Code	Course Title	L	T	P	C
23116SEC36L	Clinical Laboratory Technology Lab	0	0	3	3

Course Objectives:

CO1: To focus on basic concepts in biosafety

CO2: To get the knowledge of RBC, WBC and Platelets

CO3: To understanding the basic steps for tissue processing

CO4: To understand the estimation of glucose, albumin, Serum cholesterol in blood.

CO5: To get the knowledge of examination of urine

Course Content:

UNIT I:

- ❖ Bio safety Precautions and Guidelines- Disinfection practices in laboratory and wards- Assay for disinfection- Preparation of various reagents

UNIT II:

- ❖ Cell Counts- RBC, WBC and Platelets - Coomb's test- Staining of Blood Smear (Leishman Staining) - Bleeding and clotting time- Erythrocyte sedimentation rate

UNIT III:

- ❖ Basic steps for tissue processing - fixing, embedding, microtome, staining (Hematoxylin eosin stain) and mounting methods (Demonstration)

UNIT IV:

- ❖ Estimation of Glucose, albumin, Serum cholesterol in blood.

UNIT V:

- ❖ Physical examination of urine- Chemical Examination of urine- Sugar, Proteins, Ketone Bodies and Bile pigments

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Focus on basic concepts in biosafety	PO4, PO7, PO9, PO11
CO2	Study about Cell Counts- RBC, WBC and Platelets	PO4, PO7, PO9, PO11
CO3	Learn basic steps for tissue processing	PO4, PO7, PO9, PO11
CO4	Estimation of Glucose, albumin, Serum cholesterol in blood.	PO4, PO7, PO9, PO11
CO5	Study the Physical examination of urine	PO4, PO7, PO9, PO11

Text Books

1.	Gradwohls, 2000. Clinical Laboratory Methods and Diagnosis. (ed) Ales C. Sonnenwirth and Leonardjarret, M.D.B.I., NewDelhi.
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References Books

1	Kaplan, Clinical Chemistry, Mosby Company, St. Louis Washington, D.C. Toronto
2	Teitz, Clinical Chemistry. W.B. Saunders Company Harcourt (India) Private Limited NewDelhi.
3	Biochemistry, U. Satyanarayan, Books and Allied (P) Ltd.Kolkata-India
4	Mukharji, Medical Laboratory Techniques, Vol - I, II & III, 5th Edn. Tata McGrawHill,Delhi.
5	RamanicSood, Laboratory Technology (Methods and interpretation) 4th Ed. J.P. Bros, NewDelhi

Web Resources

1	https://www.uhealth.org/professionals/uch-clinical-laboratory/specimen-collectinghandling-guide/specimen-collection-procedures/
2	https://www.rcpath.org/discover-pathology/news/fact-sheets/haematology.html
3	https://labtestsonline.org/tests/urinalysis4 . https://www.nablindia.org/nabl/index.php?c=p ublicaccreditationdoc&m=index&docType=both&Itemid=199

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				S	L	M	S	M	S	M	S
CO2				S	L	M	S	M	S	M	S
CO3				S	L	M	S	M	S	M	S
CO4				S	L	M	S	M	S	M	S
CO5				S	L	M	S	M	S	M	S

Course Code	Course Title	L	T	P	C
23116SEC37	Microbial marketable products	2	0	0	2

Course Objectives:

CO1: Impart knowledge about the significance of organic farming and strategies to increase the yield to conserve the environment..

CO2: To encourage organic farming in urban areas.

CO3: Comprehensive knowledge about bacterial biofertilizers, its advantages and future perspective.

CO4: Structure and characteristic features of Cyanobacteria and fungal biofertilizer

CO5: Develop the knowledge and skill to produce, analyze the quality of packaging, storage and assess the shelf life and bioefficacy of biofertilizers.

Course Content:

UNIT I:

Principle of organic farming: principles of health, fairness, ecological balance, and care. Environmental benefits of organic farming: sustainability- reduces non-renewable energy by decreasing agrochemical need. Biodiversity-crop rotation, inter-cropping. Ecological services – biological control, soil formation and nutrient cycling

UNIT II:

Organic farming for urban space; Create a Sustainable Organic Garden (Backyard- Square Foot Gardening, Small Space Gardening, Mini Farming) Composting, Vermicomposting

UNIT III:

Biofertilizers: Introduction, advantages and future perspective. Structure and characteristic features of bacterial biofertilizers- *Azospirillum*, *Azotobacter*, *Bacillus*, *Pseudomonas*, *Rhizobium* and *Frankia*

UNIT IV:

Structure and characteristic features of Cyanobacterial biofertilizers- *Anabaena*, *Nostoc*; Structure and characteristic features of fungal biofertilizers- AM mycorrhiza

UNIT V:

Production of *Rhizobium*, *Azotobacter*, *Anabena*; Biofertilizers -Storage, shelf life, quality control and marketing

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Acquire the knowledge about <i>Spirullina</i> and its cultivation	PO1, PO2, PO7, PO8, PO10
CO2	Gain in depth knowledge about edible mushroom and its cultivation	PO1, PO5, PO10
CO3	Acquire a thorough understanding of the importance of probiotics in human health and their production on a large scale	PO1, PO5, PO7, PO8, PO10
CO4	Get an awareness of the availability of natural pigment and its application, Bio fertilizers and their application	PO1, PO5, PO7, PO8, PO10
CO5	Imbibe knowledge on the various marketing strategy such as patenting, trade mark, marketing, license procurement etc	PO1, PO5, PO7, PO8, PO10

Text Books	
1.	. Whitton, B. A. and potts, M. (2000). The ecology of cyanobacteria: their diversity in time and space. Kluwer Academic publisher, Dordrecht.
2.	Dubey, R.C. 2018. Text book of Biotechnology. S.Chand& company Ltd., New Delhi.
3.	Trivedi P.C. 2001. Algalbiotechnology.
4.	Fritsch, F.E. (1935) The Structure and Reproduction of the Algae ; Volume 1, First Edition . Cambridge UniversityPress
5.	Fritsch F. E. (1952) The Structure and Reproduction of the Algae ; Volume 2, First Edition. Cambridge UniversityPress.
References Books	
1	Masanobu Fukuoka, Frances Moore Lappe Wendell Berry (2009). The One-Straw Revolution: An Introduction to Natural Farming, 1st edition, YRB Classics.
2	SujitChakrabarty(2018). Organic Home Gardening Made Easy, 1 st Edition,
3	Singh and Purohit (2008). Biofertilizer technology. Agrobios, India.
4	Bansal M (2019). Basics of Organic Farming CBS Publisher.
5	Hurst, C.J., Crawford R.L., Garland J.L., Lipson D.A., Mills A.L. and Stetzenbach L.D. (2007). Manual of Environmental Microbiology. (3 rd Edition). American Society for Microbiology.

Web Resources:

1. <https://www.agrifarming.in/growing-spirulina>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6463069/>
3. <https://www.wincloveprobiotics.com/quality/production-process>
4. <https://www.frontiersin.org/articles/10.3389/fnut.2019.00007/full>

Mapping with Programme Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S	S					S	S		S	
CO2	S				S					S	
CO3	S				S		S	S		S	
CO4	S				S		S	S		S	
CO5	S				S		S	S		S	

Course Code	Course Title	L	T	P	C
23116SEC38	Aquaculture	2	0	0	1

Course Objectives:

CO1: Provide a deeper knowledge in aquaculture systems and methods.

CO2: Explain the significance and functions of design, types and construction of aquaculture ponds.

CO3: Demonstrate the biological characteristics of various aquaculture species.

CO4: Discuss the methods involved in post stocking management.

CO5: Illustrate major cultivable species for aquaculture.

Course Content:

UNIT I:

Aquaculture Systems and Methods - Scope and definition. Traditional, extensive, semi-intensive and intensive culture. Monoculture, polyculture, composite culture, mixed culture, mono-sex culture, cage culture, pen culture, raft culture, raceway culture.

UNIT II:

Aquaculture Engineering - Design and construction of pond, lay-out and design of aquaculture farm, construction, water intake system, drainage system - aeration and aerators. Ponds - Types of ponds.

UNIT III:

Selection of Species - Biological characteristics of aquaculture species; economic and market considerations; seed resources, collection and transportation. Pre-Stocking Management-Sun drying, ploughing / tilling, desilting, liming and fertilization, eradication of weed fishes. Stocking - Acclimatization of seed and release - species combinations - stocking density and ratio.

UNIT IV:

Post Stocking Management - Water and soil quality parameters required for optimum production, control of aquatic weeds and aquatic insects, algal blooms and microorganisms. Food conversion ratio (FCR). Growth - Measurement of growth, length - weight relationship.

UNIT V:

Major cultivable species for aquaculture –Culture of Indian Major Carps. Culture of Giant freshwater prawn, *Macrobrachium rosenbergii* - seed collection formation sources. Hatchery management. Culture of tiger shrimp, *Penaeus monodon* and *Litopenaeus Vannamei*. Culture of pearl oysters. Culture of seaweeds. Methods of Crab culture. Culture of ornamental fishes. Culture of Molluscs.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Analyze the significance and importance of aquaculture	PO4, PO5, PO7,PO9
CO2	Illustrate the types and construction of aquaculture ponds	PO4, PO7,PO9
CO3	Analyze the biological characteristics of species and choose the best species for aquaculture.	PO5, PO7,PO9
CO4	Follow methods involved for optimal growth of aquaculture species	PO7,PO9
CO5	Summarize major species suitable for aquaculture in a particular environment	PO5, PO6, PO7,PO9

Text Books

1.	Santhanam, R. Velayutham, P. Jegatheesan, G. A (2019).Manual of Freshwater Ecology: An Aspect of Fishery Environment. Daya Publishing House, New Delhi.
2.	Stickney, R.R. (2016). Aquaculture: An Introductory Text. 3 rd Edition. Centre for Agriculture and Bioscience International Publishing.
3.	Ackefors H., Huner J and Konikoff M. (2009). Introduction to the General Principles of Aquaculture. CRC Press.
4.	Mushlisin Z. A. (2012). Aquaculture. In Tech.
5.	Akpaniteaku R.C. (2018).Basic Handbook of Fisheries and Aquaculture. AkiNik Publications.

References Books

1.	Arumugam N. (2014). Aquaculture. Saras Publication.
2.	Pillay T. V. R. and Kutty M.N. (2005). Aquaculture : Principles and Practices. 2 nd Edition. Wiley India Pvt. Ltd.
3.	Tripathi S. D., Lakra W.S. and Chadha N.K. (2018). Aquaculture in India. Narendra Publishing House.
4.	Rath R.K.(2011). Fresh Water Aquaculture. 3 rd Edition. Scientific Publishers.
5.	Lucas J. S., Southgate P.C. and Tucker C.S. (2019). Aquaculture: Farming Aquatic Animals and Plants. Wiley Blackwell.

Web Resources

1.	Aquaculture: Types, Benefits and Importance (Fish Farming) - Conserve Energy Future (conserve-energy-future.com)
2.	Fisheries Department - Tamil Nadu (tn.gov.in)
3.	Aquaculture - Google Books
4.	aquaculture Definition, Industry, Farming, Benefits, Types, Facts, & Methods Britannica
5.	Fisheries & Aquaculture (investindia.gov.in)

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				S	S	M	S	M	S	M	
CO2				S	M	M	S	M	S	L	
CO3				M	S	M	S	M	S	L	
CO4				M	M	M	S	M	S	L	
CO5				M	S	S	S	M	S	L	

Course Code	Course Title	L	T	P	C
23116RMC39	Research Methodology	2	0	0	2

Aim:

To create a basic appreciation towards research process and awareness of various research publication

Objectives:

- To understand the steps in the research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-bases
- To give exposure to MATLAB platform for effective computational and graphic works required for quality research

Course Content:

UNIT I: Introduction to Research Methodology

Meaning of research – Objectives of research – Types of research – Significance of research – Research approaches

UNIT II: Research Methods

Research methods versus methodology – Research and scientific method – Criteria of good research – Problems encountered by researchers in India.

UNIT III: Literature Survey

Articles – Thesis – Journals – Patents – Primary sources of journals and patents – Secondary sources – Listing of titles – Abstracts – Reviews – General treatises – Monographs.

UNIT IV: Database Survey

Database search – NIST – MSDS – PubMed – Scopus – Science citation index – Information about a specific search.

UNIT V:

Basic Principles of Laboratory Safety and Waste management

Introduction - Access to Laboratory and Emergency Exits - Personal Protective Clothing and Equipment - Good Working Practices-Maintenance of Laboratory Equipment - Working with Hazardous Substances - Storage of Chemicals - Working with Flammable Solvents - Gas Cylinders-Fire Precautions - Emergency Procedures - First Aid - Accident Follow-Up - Safety Manual - Safety Training - Management of Laboratory Safety and Responsibilities - Waste Management.

Outcomes:

- CO1- Understand research questions and tools
- CO2- Experience in scientific writings
- CO3- Practice in various aspects of scientific publications
- CO4- Understand database survey
- CO5- Analysis principles of laboratory safety and waste management

Prerequisites:

Basic computer literacy & skills for working in window-environment

Course Code	Course Title	L	T	P	C
231ACLSOAN	Office Automation	-	-	-	1

Course Objectives :

To provide an in-depth training in use of office automation, internet and internet tools. The course also helps the candidates to get acquainted with IT.

Course Content:

UNIT I

Knowing the basics of Computers

UNIT II

Word Processing (MS word)

UNIT III

Spread Sheet (MS XL)

UNIT IV

Presentation (MS Power Point)

UNIT V

Communicating with Internet

Course Outcomes:

After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with the internet.

Reference:

1. Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
2. Microsoft Office 2007 Bible - John Walkenbach,Herb Tyson,Faithe Wempen,cary N.Prague,Michael R.groh,Peter G.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
3. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
4. Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
5. <https://en.wikipedia.org>
6. <https://wiki.openoffice.org/wiki/Documentation>
7. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

SEMESTER IV

Course Code	Course Title	L	T	P	C
23110AEC41	Tamil-IV சங்க இலக்கியம்	3	0	0	3

நான்காம் பருவம்

பாடநோக்கம் :

- பழந்தமிழ் இலக்கிய வளத்தை உணர்த்துதல்.
- சங்க அக, புற பாடல் மரபுகளைப் பயிற்றுவித்தல்.
- புற இலக்கியங்கள் காட்டும் வாழ்வியல் அறங்களை உணர்த்துதல்.

பயன்கள்:

CO1:பழந்தமிழ் இலக்கிய மரபை அறிவார்.

CO2 :சங்க இலக்கியங்களில் உள்ள அழகியல் கூறுகளை உணர்வார்.

CO3 : வாழ்வியல் அறங்கள் மற்றும் வரலாற்றுச் செய்திகளை அறிவார்.

அலகு-1

1. குறுந்தொகை- பாடல் எண்: 28 & 38
2. நற்றிணை- பாடல் எண்: 1, 27, 28,167 & 168
3. ஐங்குறுநூறு- பாடல் எண்: இளவேனில் பத்து

அலகு-2

1. கலித்தொகை- பாடல் எண்: 3 & 7
2. அகநானூறு- பாடல் எண்: 5, 42 & 100
3. புறநானூறு- பாடல் எண்: 182, 204, 41 & 121

அலகு-3

1. சிறுபாணாற்றுப்படை முழுவதும்

அலகு-4

1. திருக்குறள்- செய்நன்றி அறிதல், கூடா நட்பு ,நலம்புனைந்துரைத்தல்
2. நாலடியார் - பாடல் எண்: 1,172,215 & 253

அலகு-5 இலக்கிய வரலாறு

1. சங்க இலக்கியம்
2. எட்டுத்தொகை
3. பத்துப்பாட்டு
4. பதினெண் கீழ்க்கணக்கு நூல்கள்

பார்வை நூல்கள்

- 1.குறுந்தொகை - கழக வெளியீடு ,சென்னை
- 2.நற்றிணை - கழக வெளியீடு ,சென்னை
- 3.ஐங்குறுநூறு - கழக வெளியீடு ,சென்னை
- 4.கலித்தொகை - கழக வெளியீடு ,சென்னை
- 5.அகநானூறு - கழக வெளியீடு ,சென்னை
- 6.புறநானூறு - கழக வெளியீடு ,சென்னை
- 7.திருக்குறள் - பரிமேலழகர் உரை ,கழக வெளியீடு ,சென்னை

இணையதளம் -www.tamilvu.org , www.noolulagam.com

Course Code	Course Title	L	T	P	C
23111AEC41	Advanced English-IV	3	0	0	3

Aim:

To improve the knowledge of English

Objective:

To familiarize with the objectives and types of interview

To know the types of questions and answering techniques

To prepare reviews and proposals

To learn the grammatical forms

To understand the meaning of a poem and write the content

To write for and against a topic

To draw a flowchart

To write definitions

Course Content:

UNIT 1

Parts of speech –Noun –Pronoun-Adjective-Verb-Adverb-Conjunction-PrepositionInterjection-Definition-Types-Examples

UNIT 2

Types Of Sentences-Statement-Interrogative-Exclamatory-Imperative

UNIT 3

Sentence Pattern-Types-SV-SVO-SVC-SVA-SVOO-SVOC-SVOA

UNIT 4

Tenses- Subject -Verb-Concord

UNIT5

Phrases And Clauses-Definition And Types

Outcome:

- ❖ Develop writing skill
- ❖ Comprehend and describe poems
- ❖ Learn interviewing skills

ReferencesBooks

Author	Title of the book	Edition / Year	Publisher
Rajendra Pal & J.S Korlahalli	Essentials of Business Communication	2015	Sultan Chand & Sons

Course Code	Course Title	L	T	P	C
23111AEC42	English-IV	3	1	0	3

Course Objectives:

CO1: To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.

CO2: To enable them use receptive skills through reading and listening to acquire good exposure to language and literature

CO3: To help them develop style in speech and writing and manipulate the tools of language for effective communication.

CO4: To provide exposure to plays, autobiographies and expose them to value based ideas.

CO5: To enhance their language skills especially in the areas of grammar and pronunciation.

Course Content:

UNIT I:

Life Writing

1.1 I am Malala-Malala Yousafzai - Chapter 1

1.2 My Inventions - Nikola Tesla - Chapter 2

UNIT II:

One Act Plays

2.1 The Zoo Story- Edward Albee

2.2 The Proposal- Anton Chekhov

UNIT III:

Interviews

3.1 Nelson Mandela's Interview with Larry King.

3.2 Rakesh Sharma's Interview with Indira Gandhi from Space

3.3 Lionel Messi with Sid Lowe (Print)

UNIT IV:

Language Competency

4.1 Refuting, Arguing & Debating

4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help 4.3

Interviews (face to face, telephone and video conferencing)

UNIT V:

English for Workplace

5.1 Job Applications: Covering letters, CV and Resume

5.2 Creating a digital profile - LinkedIn

5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card

5.4 Body Language -Practical Skills for Interviews

Course Outcomes	
Course Outcomes	On completion of this course, students will;

CO1	Learn to communicate effectively and appropriately in real life situation.	PO1
CO2	Use English effectively for study purpose across the curriculum	PO1,PO2
CO3	Develop interest in and appreciation of Literature	PO4,PO6
CO4	Develop and integrate the use of the four language skills	PO4,PO5,PO6
CO5	Enhance their language skills especially in the areas of grammar and pronunciation.	PO3,PO8

TextBooks(LatestEditions)

1	I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by <u>Malala Yousafzai, Christina Lamb</u> , Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition

ReferencesBooks

(Latest editions,and the style as given below must be strictly adhered to)

1	Writing Your Life: A Guide to Writing Autobiographies .Mary Borg, Taylor & Francis, 2021
2	One-act Plays for Acting Students: An Anthology of Short <u>Norman A. Bert</u> · 1987 ·
3	The One-Act Play Companion: A Guide to plays, playwrights ... <u>Colin Dolley, Rex Walford</u> · 2015
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Role Play-Theory and Practice.Kryisia M Yardley-Matwiejczuk, SAGE publications ltd, 1997

Web Resources

1	For Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s (the link to the performance; refer scripts by Aaron Sheperd)
2	http://BBC learn English.com
3	http://onestopenglish.com
4	http://hearn-english-today.com
5	http://talkenglish.com
6	The Zoo Story: http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pdf
7	The Proposal: https://www.one-act-plays.com/comedies/proposal.html
8	Nelson Mandela with Larry King Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lk1.00.html
9	Rakesh Sharma with Indira Gandhi Interview : https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-told-indira-gandhi-about-india-from-space-2204839

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2

CO5	3	2	3	3	3	3	3	2	2	3
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3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PS O2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Code	Course Title	L	T	P	C
23116AEC43	Immunology and Immunotechnology	4	1	0	3

Course Objectives:

CO1: To gain knowledge about the immune system, organs of immunity and cells involved.

CO2: To distinguish the types of antigens and antibodies; their properties.

CO3: To provide in-depth knowledge on immuno-techniques.

CO4: To discuss the role of MHC system in transplantation; functions of Tumor specific antigens

CO5: To impart knowledge on immunological disorders.

Course Content:

UNIT I:

Organs and Cells in Immune System and Immune Response: Primary lymphoid organs, secondary lymphoid organs, and lymphoid tissues; T – cell and B –cell membrane bound receptors – apoptosis; T - cell processing, presentation and regulation; T –cell subpopulation, properties, functions and T – cell suppression; Physiology of immune response- innate, humoral and cell mediated immunity; Immunohematology.

UNIT II:

Antigen and Antibody: Antigens - Properties of haptens, epitopes, adjuvants, and cross reactivity; Antibodies- structure, properties, classes; Antigen and Antibody Reactions: precipitation, agglutination, complement fixation, opsonization, neutralization; Vaccines – active and passive immunization; Classification of vaccines; Other approaches to new vaccines; Types of vaccine - antibacterial, antiviral; Vaccination schedule.

UNIT III:

Immunoassay and Immunotechniques - Preparation and standardization of bacterial antigens; Raising of monoclonal and polyclonal antibodies; Purification of antibodies. Immunotechniques - RIA, RAST, ELISA, Immunofluorescence techniques and Flow cytometry

UNIT IV:

Transplantation and Tumor Immunology - MHC Antigens - structure and function; HLA system - Regulation and response to immune system; Transplantation immunology - tissue transplantation and grafting; Mechanism of graft acceptance and rejection; HLA typing; Tumor specific antigens; Immune response to tumors; Immune diagnosis; cancer immunotherapy.

UNIT V:

Immunological disorders and diseases - Hypersensitivity reactions (Type I, II, III and IV); acquired immunodeficiency syndrome; Autoimmune disorders and diseases: organ specific and non-organ specific.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Assess the fundamental concepts of immunity, contributions of the organs and cells in immune responses.	PO1, PO4, PO6, PO9,
CO2	Investigate the structures of Ag and Ab; Immunization.	PO1, PO4, PO5, PO9
CO3	Justify the Immunoassay and Immunotechniques.	PO1, PO4, PO5, PO7
CO4	Explain about the immunologic processes governing graft rejection and therapeutic modalities for immunosuppression in transplantation	PO1, PO3, PO4, PO5, PO9
CO5	Analyze the overreaction by our immune system leading to hypersensitive conditions and its consequences.	PO1, PO4, PO5, PO6

Text Books

Richard Coico, Geoffrey Sunshine, Eli Benjamini. (2003). Immunology – A Short Course. 5 th Edition., Wiley-Blackwell, New York.
Judith A.Owen, Jenni Punt, Sharon A. Stranford, Janis Kuby. (2013). Immunology, 7 th Edition., W. H. Freeman and Company, New York.
Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai. (2021). Cellular and Molecular Immunology, 10 th Edition., Elsevier.
Robert R. Rich, Thomas A. Fleisher, William T. Shearer, Harry Schroeder, Anthony J. Frew, Cornelia M. Weyand. (2018).Clinical Immunology: Principles and Practice, 5 th Edition. Elsevier.
Pravash Sen. Gupta. (2003). Clinical Immunology. Oxford University Press.

References Books

Janeway Travers. (1997). Immunobiology- the immune system in health and disease. Current Biology Ltd. London, New York. 3 rd Edition.
Peter J. Delves, Seamus Martin, Dennis R. Burton, Ivan M. Roitt. (2006). Roitt's Essential Immunology, 11 th Edition., Wiley-Blackwell.
William R Clark. (1991). The Experimental Foundations of Modern Immunology. 3 rd Edition. John Wiley and Sons Inc. New York.
Frank C. Hay, Olwyn M. R. Westwood. (2002). Practical Immunology, 4 th Edition., Wiley-Blackwell.
Noel R. Rose, Herman Friedman, John L. Fahey. (1986). Manual of Clinical Laboratory Immunology. ASM.3 rd Edition.

Web Resources	
1	https://www.ncbi.nlm.nih.gov/books/NBK279395/
2	https://med.stanford.edu/immunol/phd-program/ebook.html
3	https://ocw.mit.edu/courses/hst-176-cellular-and-molecular-immunology-fall-2005/pages/lecture-notes/
4	Immunology Overview - Medical Microbiology - NCBI Bookshelf (nih.gov)
5	Immunology - an overview ScienceDirect Topics

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S			M		S			M
CO2	S			M	M				M
CO3	S			S	S		S		
CO4	S		M	S	S				M
CO5	S			S	M	M			

Course Code	Course Title	L	T	P	C
23116GEC44	Biostatistics & Bioinformatics	4	1	0	3

Course Objectives:

CO1: Acquire knowledge about the Developments and Applications of Bioinformatics.

CO2: Gain knowledge about the importance of the bioinformatics, databases, tools and software of bioinformatics and explain different types of Biological Databases.

CO3: Understand the basics of sequence alignment, sequence analysis and Protein structure prediction method.

CO4: Demonstrate the basic methods of data collection, graph construction and sampling techniques and Calculate measures of central tendency.

CO5: Correlate and analyze biological data through various statistical methods and interpret biological data via various probabilistic distribution methods.

Course Content:

UNIT I:

Introduction to Bioinformatics – Genome, Transcriptome and Proteome, Gene prediction rules and software. Nucleic acid Databases – Primary and Secondary Databases – Structure Database – CATH, SCOP – Data base Searching – BLAST and FASTA, BLOSSUM.

UNIT II:

Sequence analysis (Proteins and Nucleic acids), Protein Database: Comparison of Protein sequences and Database searching – methods for protein structure prediction - Homology modeling of proteins, visualization tools (RASMOL)

UNIT III:

Multiple Sequences alignment – method of multiple sequences alignment- Evolutionary analysis, clustering methods Phylogenic trees - Methods to generate phylogenetic tree- Tools for multiple sequences alignment and phylogenetic analysis - History of Drug Discovery, Steps in Drug design - Chemical libraries – Role of molecular docking in drug design.

UNIT IV:

Statistics – collection, classification, tabulations of Statistical Data – Diagrammatic representation – Graphs – Sampling method and standard error. Measures of central tendency – measures of dispersion.

UNIT V:

Correlations and regression. Probability distribution-Binomial, Negative binomial, multinomial distribution, Poisson distribution. Tests of significance – t tests – F tests – Chi square test. Analysis of variance – Statistical Soft wares.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Understand the importance of principal concepts about biostatistics	PO1, PO4, PO6, PO9,
CO2	Know the knowledge about statistics and its relation with other science and research aspects	PO1, PO4, PO5, PO9
CO3	Obtain the knowledge on bioinformatics databases, perform text- and sequence-based searches	PO1, PO4, PO5, PO7
CO4	To become familiar with the use of a wide variety of internet applications, biological databases and will be able to apply these methods to research problems.	PO1, PO3, PO4, PO5, PO9
CO5	Correlate and analyze biological data through various statistical methods and interpret biological data via various probabilistic distribution methods	PO1, PO4, PO5, PO6

Text Books

Andreas D. Baxevanis And B. F. Francis Ouellette. 2001. Bioinformatics . A Practical Guide to the Analysis of Genes and Proteins (Second Edition). John Wiley & Sons, Inc.
Arthur M. LESK, 2003 Introduction to Bioinformatics Oxford University Press
Attwood T. K. And Parry-Smith D. J. 2003. Introduction to Bioinformatics. Pearson Education (Singapore) Pvt. Ltd.
Balasubramanian, D., Bryce, C. F. A., Dharmalingam, K., Green, J. And Kunthala Jayaraman. 1996. Concepts in Biotechnology (Edts.) University Press (India) Ltd.
Basu, O., S.K. Thukral. 2007. Bioinformatics-Databases, Tools and Algorithms. Oxford University Press, New Delhi.

References Books

Bryan Bergeron, M.D. 2006. Bioinformatics Computing. 2006. Prentice Hall of India Pvt Limited, New Delhi.
Gautham, N. 2006. Bioinformatics- Databases and Algorithms, Narosa Publishing House Hall of India Pvt. Ltd, New Delhi.
Ignacimuthu, S.S.J. 2005. Basic Bioinformatics, Narosa Publishing House, India.
Lesk, A.M. 2006. Introduction to Bioinformatics. (2 nd Edition). Oxford University Press, New Delhi.

Web Resources

https://pubmed.ncbi.nlm.nih.gov/24272431/#:~:text=Bioinformatics%20is%20an%20interdisciplinary%20field,a%20computational%20point%20of%20view.
https://www.ncbi.nlm.nih.gov/protein/
https://www.ebi.ac.uk/Tools/msa/clustalo/
https://www.statisticssolutions.com/statistical-data-analysis/
https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression

Course Code	Course Title	L	T	P	C
23116SEC45L	Immunology and Immunotechnology Lab	0	0	3	3

Course Objectives:

CO1: To gain hands-on knowledge to identify Blood group and typing.

CO2: To acquire adequate skill to perform latex agglutination reactions.

CO3: To analyze precipitation reactions in gels.

CO4: To investigate the antigen & antibody reactions in electrophoresis.

CO5: To familiarize with Separation of Lymphocytes.

Course Content:

UNIT I:

Identification of blood group and typing.

Coomb's test. TPHA

UNIT II:

T cell identification (Demonstration)

Latex Agglutination reactions- RF, ASO, CRP

UNIT III:

Ouchterlony's Double Diffusion Method (antigen pattern).

Single Radial Immuno Diffusion Method.

UNIT IV:

Electrophoresis - Serum, Counter and Immuno.

UNIT V:

Separation of Lymphocytes by gradient centrifugation method.

ELISA: Hepatitis/ HIV

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Assess the blood groups and types	PO1,PO5, PO6, PO7, PO8
CO2	Competently perform serological diagnostic tests such as RF, ASO, CRP	PO4, PO5, PO6, PO7, PO8
CO3	Illustrate the antigen antibody reactions in gel.	PO5, PO6, PO7, PO8, PO9
CO4	Compare & contrast antigens and antibodies in electrophoresis	PO5, PO6, PO7, PO8, PO9
CO5	Examine the concept of ELISA.	PO5, PO6, PO7, PO8, PO9

Text Books

1.	Talwar. (2006). Hand Book of Practical and Clinical Immunology, Vol. I, 2nd edition, CBS.
2.	Asim Kumar Roy. (2019). Immunology Theory and Practical, Kalyani Publications.
3.	Richard Coico, Geoffrey Sunshine, Eli Benjamini. (2003). Immunology – A Short Course. 5 th Edition., Wiley-Blackwell, New York.
4.	Judith A.Owen, Jenni Punt, Sharon A. Stranford, Janis Kuby. (2013). Immunology, 7 th Edition., W. H. Freeman and Company, New York.
5.	Pravash Sen. Gupta. (2003). Clinical Immunology. Oxford University Press.

References Books

1	Frank C. Hay, Olwyn M. R. Westwood. (2008). Practical Immunology, 4th Edition, Wiley-Blackwell.
2	Wilmore Webley. (2016). Immunology Lab Manual, LAD Custom Publishing.
3	Rose. (1992). Manual of Clinical Lab Immunology, ASM.
4	Janeway Travers. (1997). Immunobiology- the immune system in health and disease. Current Biology Ltd. London, New York. 3 rd Edition.
5	Peter J. Delves, Seamus Martin, Dennis R. Burton, Ivan M. Roitt. (2006). Roitt's Essential Immunology, 11 th Edition., Wiley-Blackwell.

Web Resources

1	https://www.researchgate.net/publication/275045725_Practical_Immunology-_A_Laboratory_Manual
2	https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger-lab/documents/Immunology-Lab-Manual.pdf
3	https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC106J-lab-manual.pdf
4	Immunology Overview - Medical Microbiology - NCBI Bookshelf (nih.gov)
5	Immunology - an overview ScienceDirect Topics

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	M				S	S	S	S	
CO2				S	M	M	S	S	
CO3					M	S	S	S	M
CO4					M	M	S	S	M
CO5					M	M	S	S	M

Course Code	Course Title	L	T	P	C
23116SEC46L	Biostatistics & Bioinformatics Lab	0	0	3	2

Course Objectives:

CO1:Analyze the Biological databases

CO2: Able to perform BLAST and FASTA

CO3: Represent data in to graphical form

CO4: Test the level of significance of biological data and interpret the results.

CO5: Determine averages of the biological data

Course Content:

UNIT I:

- ❖ Biological databases (NCBI, Swissprot and PDB)

UNIT II:

- ❖ BLAST FASTA

UNIT III:

- ❖ Identification of functional domains in nucleotide binding proteins using a domain analysis server like SMART

UNIT IV:

- ❖ Preparation of bar diagram, line diagram and pie diagram using MS EXCEL.
- ❖ Calculation of Central tendency- mean, geometric mean, median using MS EXCEL

UNIT V:

- ❖ Calculation of dispersion – Mean deviation, quartile deviation and standard deviation using MS EXCEL
- ❖ Calculation of student's t test using MS EXCEL

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	To identify the protein sequence of the species using PIR and Swissprot /	PO1, PO4, PO6, PO9,
CO2	To understand the nucleotide sequence data of the given species using NCBI / EMBL / DDBJ.	PO1, PO4, PO5, PO9
CO3	To study the multivariate analysis in biostatistics	PO1, PO4, PO5, PO7
CO4	To analysis the data from experiments and interpretation of the <i>results</i>	PO1, PO3, PO4, PO5, PO9
CO5	To Read and learn statistical measures individually.	PO1, PO4, PO5, PO6

Web Resources	
1.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC102476/
2.	https://pediaa.com/difference-between-blast-and-fasta/

Course Code	Course Title	L	T	P	C
23116SEC47	Vaccine Technology	2	0	0	2

Course Objectives:

CO1:To provide knowledge on the basics of immunization and induction of immunity.

CO2: To learn the types of vaccines, its immunological effects and regulatory guidelines.

CO3: To learn the role of rDNA in vaccine technology.

CO4: To provide the knowledge on conventional to recent technology of vaccine production

CO5: To learn about ethical issues and regulations in vaccine production and clinical trials

Course Content:

UNIT I:

History of vaccination, Active and passive immunization; requirements for induction of immunity, Epitopes, linear and conformational epitopes, characterization and location of APC, MHC and immunogenicity.

UNIT II:

Viral/bacterial/parasite vaccine differences, methods of vaccine preparation – Live, killed, attenuated, sub unit vaccines; Licensed vaccines, Viral Vaccine - Poliovirus vaccine-inactivated & Live, Rabies vaccines, Hepatitis A & B vaccines, Bacterial Vaccine - Anthrax vaccines, Cholera vaccines, Diphtheria toxoid, Parasitic vaccine - Malaria Vaccine.

UNIT III:

Vaccine technology- Role and properties of adjuvants, recombinant DNA and protein-based vaccines, plant-based vaccines, reverse vaccinology; Peptide vaccines, conjugate vaccines. Recent advances in Malaria, Tuberculosis, HIV.

UNIT IV:

Fundamental research to rational vaccine design. Antigen identification and delivery, T-Cell expression cloning for identification of vaccine targets for intracellular pathogens, Rationale vaccine design based on clinical requirements: Scope of future vaccine strategies.

UNIT V:

Vaccine additives and manufacturing residuals, Regulation and testing of vaccines, Regulation of vaccines in developing countries, Quality control and regulations in vaccine research, Animal testing, Rational design to clinical trials, Large scale production, Commercialization. Vaccine safety ethics and Legal issues.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Explain the significance of critical antigens, immunogens and adjuvants in developing effective vaccines.	PO1,PO10
CO2	Understand the types of vaccines.	PO5
CO3	Construct vaccine applying rDNA technology.	PO7,PO10
CO4	Formulate the strategies for developing an innovative vaccine technology with different mode of vaccine delivery.	PO9,PO10
CO5	Evaluate the regulatory issues and guidelines for the management of vaccine production.	PO3,PO5

Text Books

1.	Ronald W. Ellis.(2001). New Vaccine Technologies.Landes Bioscience.
2.	Cheryl Barton. (2009). Advances in Vaccine Technology and Delivery.Espicom Business Intelligence.
3	Male, David. Ed. (2007). Immunology. 7 th Edition. Mosby Publication.
4	Kuby, RA Goldsby, Thomas J. Kindt, Barbara, A. Osborne. (2002). Immunology. 6 th Edition, Freeman.
5	Brostoff J, Seaddin JK, Male D, Roitt IM. (2002). Clinical Immunology. 6 th Edition, Gower Medical Publishing.

References Books

1	Stanley A. Plotkin, Walter Orenstein & Paul A. Offit.(2013). Vaccines, 6 th Edition. BMA Medical Book Awards Highly Commended in Public Health. Elsevier Publication.
2	Coico, R. etal. (2003). Immunology: A Short Course. 5 th Edition, Wiley – Liss.
3	Parham, Peter.(2005). The Immune System. 2 nd Edition, Garland Science.
4	Abbas, A.K. etal. (2007). The Cellular and Molecular Immunology. 6 th Edition, Sanders / Elsevier.
5	Weir, D.M. and Stewart, John (2000). Immunology. 8 th Edition, Churchill Pvt. Ltd.

Web Resources

1	https://www.slideshare.net/adammbs/pathogenesis-3-rd-internal-updated-43458567
2	https://www.bio.fiocruz.br/en/images/stories/pdfs/mpti/2013/selecao/vaccine-processtechnology.pdf
3	https://www.dcvmn.org/IMG/pdf/ge_healthcare_dcvmn_introduction_to_pd_for_vaccine_production_29256323aa_10mar2017.pdf
4	https://www.sciencedirect.com/science/article/pii/B9780128021743000059
5	https://www.researchgate.net/publication/313470959_Vaccine_Scaleup_and_Manufacturing

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	M									M	
CO2					S						
CO3							M			M	
CO4									L	M	
CO5			L		M						

Course Code	Course Title	L	T	P	C
23116SEC48	Apiculture	2	0	0	2

Course Objectives:

CO1: To understand the biology of honey bees.

CO2: To study honey bee colony establishment.

CO3: To develop knowledge on honey extraction.

CO4: To understand the diseases of honey bees and their control.

CO5: To gain information on financial assistance and funding agencies for beekeeping industry.

Course Content:

UNIT I:

Biology of Bees: Honeybee – Systematic position – Species of Honey bees – Life history of Honey bee – behaviour – swarming – Pheromone.

UNIT II:

Social life in Bees: Bee colony – Castes – natural colonies and their yield – Types of bee hives – Structure – location, care and management.

UNIT III:

Bee Rearing: Apiary – Care and Management – Artificial bee hives – types – construction of spaceframes – Selection of sites – Handling – Maintenance – Instruments employed in Apiary – Extraction instruments.

UNIT IV:

Bee Economy: Honey – Composition – uses – Bee wax and its uses – yield in national and international market – Diseases of honey bees and their control methods. Economics of bee culture.

UNIT V:

Entrepreneurship: venture – Preparing proposals for financial assistance and funding agencies – Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the systematic position and life history of honey bee.	PO1, PO2, PO10
CO2	Reveal the different stages and types of bees and discuss about the care and management of apiculture.	PO1, PO2, PO4, PO5
CO3	Describe the practice of bee rearing process and analyze instruments employed in apiary.	PO2, PO4, PO5, PO10, PO11
CO4	Compare and contrast the composition of honey and bee wax and interpret the yield in National and International markets.	PO4, PO5, PO7, PO8, PO10
CO5	Clarify the proposal for financial assistance and funding agencies and reveal the modern methods employed in artificial bee hives.	PO5, PO8, PO9, PO10, PO11

Text Books

1.	Dewey M. Caron. (2013). Honey Bee Biology and Beekeeping. Revised Edition. Wicwas Press, Kalamazoo. ISBN 10: 1878075292
2.	R. A. Morse. (1993). Rearing queen honey bees. Wicwas press, NY. ISBN-10 : 1878075055
3.	Ted Hooper. (2010). Guide to Bees & Honey: The World's Best Selling Guide to Beekeeping. Northern Bee Books. Oxford. ISBN 10: 1904846513
4.	Jayashree K. V., Tharadevi C.S. and Arumugam N. (2014) Apiculture. Saras Publication
5.	Raj H. (2020). Vinesh Text Book of Apiculture. S. Vinesh and Co.

References Books

1	Dewey M. Caron. (2020). The Complete Bee Handbook: History, Recipes, Beekeeping Basics, and More, Rockridge Press. ISBN-10 : 1646119878
2	Joachim Petterson. (2016). Beekeeping: A Handbook on Honey, Hives & Helping the Bees, Weldon Owen.
3	Eva Crane. (1999). The World History of Beekeeping and Honey Hunting. Routledge. India. ISBN-10 : 0415924677
4	Pagar B. S. (2016). Textbook Of Apiculture. Sahitya Sagar.
5	Sehgal P.K. (2018). Text Book of Sericulture, Apiculture and Entomology. Kalayani.

Web Resources

1	Bee Keeping Basics. Retrieved from: https://denton.agrilife.org/files/2013/08/beekeeping-basics.pdf
2	Beekeeping as an Entrepreneurship, Retrieved from: https://lupinepublishers.com/agriculture-journal/pdf/CIACR.MS.ID.000270.pdf
3	Raising Bumble Bees at Home: A Guide to Getting Started. Retrieved from: https://www.ars.usda.gov/ARSUserFiles/20800500/BumbleBeeRearingGuide.pdf
4	Apiculture – Biology for Everybody (homeomagnet.com)
5	Apiculture: Introduction to Apiculture (iasri.res.in)

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S	S								S	
CO2	S	S		S	S						
CO3		S		S	M					S	S
CO4				S	M		S	S		M	
CO5					S			S	S	S	S

Course Code	Course Title	L	T	P	C
23116BRC49	Participation in Bounded Research	2	0	0	2

Course Code	Course Title	L	T	P	C
231AECCEVS	Environmental Studies	2	-	-	2

Course Objectives:

- Creating awareness about environmental problems among people.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating the public to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.
- Striving to attain harmony with Nature.

Course Content:

1. Nature of Environmental Studies

- ❖ Definition, scope and importance.
- ❖ Multidisciplinary nature of environmental studies
- ❖ Need for public awareness.

2. Natural Resources and Associated Problems.

- ❖ Forest resources: Use and over — exploitation, deforestation, dams and their effects on forests and tribal people.
- ❖ Water resources: Use and over — utilization Of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- ❖ Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources.
- ❖ Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer — pesticide problems.
- ❖ Energy resources: Growing energy needs, renewable and non — renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.
- ❖ Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification,
- ❖ Role of an individual in conservation of natural resources.

3. Ecosystems

- ❖ Concept of an ecosystem.
- ❖ Structure and function of an ecosystem.
- ❖ Producers, consumers and decomposers.
- ❖ Energy flows in the ecosystem.
- ❖ Ecological succession.
- ❖ Food chains, food webs and ecological pyramids.
- ❖ Introduction, types, characteristics features, structure and function of the following ecosystem:

- a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

4. Biodiversity and its conservation

- ❖ Introduction — Definition: genetic, species and ecosystem diversity.
- ❖ Bio — geographical classification of India.
- ❖ Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- ❖ India is a mega — diversity nation.
- ❖ Western Ghat as a biodiversity region.
- ❖ Hot— spot of biodiversity.

- ❖ Threats to biodiversity habitat loss, poaching of wildlife, man — wildlife conflicts.
- ❖ Endangered and endemic species of India.
- ❖ Conservation of biodiversity: In — situ and Ex — situ conservation of biodiversity.

5.Environmental Pollution

- ❖ Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
- ❖ Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- ❖ Role of an individual in prevention of pollution.

6.Social Issues and the Environment

- ❖ Disaster management: floods, earthquake, cyclone, tsunami and landslides.
- ❖ Urban problems related to energy Water conservation, rain water harvesting, watershed management
- ❖ Resettlement and rehabilitation of people; its problems and concerns.
- ❖ Environmental ethics: Issue and possible solutions.
- ❖ Global wanTling, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation.
- ❖ Consumerism and waste products.

7.Environmental Protection

- ❖ From Unsustainable to Sustainable development.
- ❖ Environmental Protection Act.
- ❖ Air (Prevention and Control of Pollution) Act.
- ❖ Water (Prevention and control of Pollution) Act.
- ❖ Wildlife Protection Act.
- ❖ Forest Conservation Act.
- ❖ Population Growth and Human Health, Human Rights.

8.Field Work

- ❖ Visit to a local area to document environmental assets — River / Forest / Grassland / Hill / Mountain.
or
- ❖ Visit to a local polluted site — Urban / Rural / Industrial / Agricultural.
or
- ❖ Study of common plants, insects, birds.
or
- ❖ Study of simple ecosystems — ponds, rivers, hill slopes, etc.

References:

1. Agarwal, K.C,2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt, Ltd., Ahmedabad 380013, India, Email: rn4pin@icenet.net (R)
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clank R.S., Marine Pollution, Clarendon Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Western Ltd.
7. Down to Earth, Centre for Science and Environment, New Delhi. (R)
8. Gleick, H., 1993, Water in crisis, Pacific Institute for studies in Dev., Environment & Security. Stockholm Env Institute. Oxford Univ. Press 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bompay (R)
10. Heywood, V.K. & Watson, R.T.1995, Global Biodiversity Assessment, Cambridge Univ. Press 1140 p.
11. Jadhav, H. and Bhosale, V.J. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.

12. Mickinney, M.L. and School. R.M. 1196, Environmental Science Systems and Solutions, Web enhanced edition, 639p.
13. Miller T.G. Jr. Environmental Science. Wadsworth Publications Co. (TB).
14. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574zp.
15. Rao M.N. and Dana, A.K. 1987, Waste Water Treatment, Wxford & IBH Publ. Co. Pvt. Ltd., 345p
16. Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse, Meerut, Survey of the Environment, The Hindu (M)
17. Townsend C., Harper, J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
18. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. 1 and II, Environmental Media (R)
19. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno— Science Publications (TB)
20. Wagner K.D., 1998, Environmental management, W.B. Saunders Co. Philadelphia, USA 499p,

Learning Outcomes:

Students who graduate with a major in environmental science will be able to:

1. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale;
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment;
3. Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community;
4. Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues; and
5. Understand how politics and management have ecological consequences.

Course Code	Course Title	L	T	P	C
231LCSCLS	Leadership & Management Skills	-	-	-	1

Course Objectives:

CO 1: Help students to develop essential skills to influence and motivate others

- CO 2:**Inculcate emotional and social intelligence and integrative thinking for effective leadership
CO 3:Create and maintain an effective and motivated team to work for the society
CO 4:Nurture a creative and entrepreneurial mindset
CO 5:Make students understand the personal values and apply ethical principles in professional and social contexts.

Course Content:

UNIT I:

Leadership Skills

- a. Understanding Leadership and its Importance
 - What is leadership?
 - Why Leadership required?
 - Whom do you consider as an ideal leader?

- b. Traits and Models of Leadership
 - Are leaders born or made?
 - Key characteristics of an effective leader
 - Leadership styles
 - Perspectives of different leaders

- c. Basic Leadership Skills
 - Motivation
 - Teamwork
 - Negotiation
 - Networking

UNIT II:

Managerial Skills

- a. Basic Managerial Skills
 - Planning for effective management
 - How to organize teams?
 - Recruiting and retaining talent
 - Delegation of tasks
 - Learn to coordinate
 - Conflict management

- b. Self Management Skills
 - Understanding self concept
 - Developing self-awareness
 - Self-examination
 - Self-regulation

UNIT III:

Entrepreneurial Skills

- a. Basics of Entrepreneurship
 - Meaning of entrepreneurship
 - Classification and types of entrepreneurship
 - Traits and competencies of entrepreneur

- b. Creating Business Plan
 - Problem identification and idea generation
 - Idea validation
 - Pitch making

UNIT IV:

Innovative Leadership and Design Thinking

- a. Innovative Leadership
 - Concept of emotional and social intelligence

- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

b. Design Thinking

- What is design thinking?
- Key elements of design thinking:
 - Discovery
 - Interpretation
 - Ideation
 - Experimentation
 - Evolution.
- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

UNIT V:

Ethics and Integrity

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How do leaders sail through difficult situations?

b. Ethics and Conduct

- Importance of ethics
- Ethical decision-making
- Personal and professional moral codes of conduct
- Creating a harmonious life

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision	PO1
CO2	Learn and demonstrate a set of practical skills such as time management, self management, handling conflicts, team leadership, etc.	PO1,PO2
CO3	Understand the basics of entrepreneurship and develop business plans	PO4,PO6
CO4	Apply the design thinking approach for leadership	PO4,PO5, PO6
CO5	Appreciate the importance of ethics and moral values for making a balanced personality.	PO3,PO8

References Books

1	<i>Elkington, J., & Hartigan, P. (2008). The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World. Harvard Business Press.</i>
2	<i>Goleman D. (1995). Emotional Intelligence. Bloomsbury Publishing India Private Limited</i>
3	<i>Kalam A. A. (2003). Ignited Minds: Unleashing the Power within India. Penguin Books India</i>
4	<i>Kelly T., Kelly D. (2014). Creative Confidence: Unleashing the Creative Potential Within Us All. William Collins</i>
5	<i>Kurien V., & Salve G. (2012). I Too Had a Dream. Roli Books Private Limited</i>
6	<i>Livermore D. A. (2010). Leading with cultural intelligence: The New Secret to Success. New York: American Management Association</i>

7	McCormack M.H. (1986). <i>What They Don't Teach You at Harvard Business School: Notes From A Street-Smart Executive</i> . RHUS
8	O'Toole J. (2019) <i>The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good</i> . Harpercollins
9	Sinek S. (2009). <i>Start with Why: How Great Leaders Inspire Everyone to Take Action</i> . Penguin
10	Sternberg R. J., Sternberg R. J., & Baltes P. B. (Eds.). (2004). <i>International Handbook of Intelligence</i> . Cambridge University Press.

SEMESTER V

Course Code	Course Title	L	T	P	C
23110AEC51	Bacteriology and Mycology	5	1	0	4

Course Objectives:

CO1: Understand the role of normal flora and pathogenic microbes of various diseases and clinical microbiological techniques.

CO2: Basic knowledge about Gram positive pathogenic bacteria and their epidemiology

CO3: Acquire knowledge about Gram negative pathogenic bacteria and nosocomial infections

CO4: Comprehensive knowledge about medically important, its classification and its significance

CO5: Gain knowledge about the general characteristics and mode of action of various antibacterial agents.

Course Content:

UNIT I:

History, Classification of Medically Important Microbes, Koch's, and River's postulates-A brief account on the normal microbial flora of the healthy human body – Host-pathogen interactions: Definitions of infection, invasion, primary and opportunistic pathogens, pathogenicity, virulence, toxigenicity, carriers, endemic, epidemic, pandemic diseases and epidemiology – putative virulence factors of human pathogens –infectious disease cycle. Collection and transport of clinical specimens for bacterial and fungal infections.

UNIT II:

Medically important Gram Positive infections - Causative agent, clinical symptoms, pathogenesis, mode of transmission, prevention and treatment of the following bacterial diseases (a) Streptococcal infections (*Streptococcus pyogenes*, *Streptococcus faecalis*), (b) Staphylococcal infections (*Staphylococcus aureus*), (c) Tetanus (*Clostridium tetani*)(d) Diphtheria (*Corynebacterium diphtheriae*) (e) Anthrax (*Bacillus anthracis*) (f) Tuberculosis (*Mycobacterium tuberculosis*), (g) Leprosy (*Mycobacterium leprae*).

UNIT III:

Medically important Gram-Negative infections - Causative agent, clinical symptoms, pathogenesis, mode of transmission, prevention, and treatment of the following bacterial diseases (a) Meningitis (*Streptococcus pneumoniae*, *Neisseria meningitidis*) (b) typhoid (*Salmonella typhi*, *Salmonella paratyphi*) (c) cholera (*Vibrio cholerae*) (d) bacillary dysentery (*Shigella dysenteriae*); Sexually Transmitted disease (syphilis–*Treponema pallidum*.Gonorrhoea - *Neisseria gonorrhoeae*); Nosocomial infections – definition, importance, and their control (*Pseudomonas aeruginosa*).

UNIT IV:

Medically important Fungi - Classification of medically important fungi; Superficial mycoses: Pityriasis Versicolor; Tinea Nigra; Piedra. Cutaneous mycoses: *Microsporum* spp., *Trichophyton* spp., and *Epidermophyton floccosum*. Subcutaneous mycoses: Chromoblastomycosis; Sporotrichosis; Systemic Mycoses - Blastomycosis; Histoplasmosis; Opportunistic Infections - Candidiasis; Cryptococcosis; Zygomycosis; Mycotoxins: Aflatoxin

UNIT V:

Antimicrobial agents -General characteristics and mode of action of Antibacterial agents: Modes of action with an example for each: Inhibitor of nucleic acid synthesis; Inhibitor of cell wall synthesis; Inhibitor of cell membrane function; Inhibitor of protein synthesis; Inhibitor of metabolism
Antifungal agents: Mechanism of action of Amphotericin B, Griseofulvin.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Understand the importance of normal flora of the human body and acquire knowledge on the process of infectious disease.	PO1, PO3, PO5, PO7, PO10, PO11
CO2	Explain the various bacterial pathological events during the progression of an infectious disease, and apply the underlying mechanisms of spread of disease and its control.	PO1, PO3, PO5, PO7, PO10, PO11
CO3	Compile a list of disease-causing bacteria and compare their modes of infection, symptoms, diagnosis and treatment.	PO1, PO3, PO5, PO7, PO10, PO11
CO4	Comprehend human-fungal interaction, which can be applied to obtain in-depth knowledge on fungal diseases and the mechanism behind the disease process.	PO1, PO3, PO5, PO7, PO10, PO11
CO5	Explain the types of mycoses caused in humans and categorize the modes of infection, pathogenesis, and treatment with introduction to mycotoxins.	PO1, PO3, PO4, PO5, PO6, PO7, PO9, PO10

Text Books

1	Tom Parker, M. Leslie H. Collier. (1990). Topley & Wilson's Principles of Bacteriology, Virology and Immunity, 8 th Edition. London: Edward Arnold.
2	Greenwood, D., Slack, R.B. and Peutherer, J.F. (2012) Medical Microbiology, 18 th Edition. Churchill Livingstone, London.
3	Finegold, S.M. (2000) Diagnostic Microbiology, 10 th Edition. C.V. Mosby Company, St. Louis.
4	Ananthanarayanan, R. and Jayaram Panicker C.K. (2020) Text book of Microbiology. Orient Longman, Hyderabad.
5	Jagdish Chander (2018). Textbook of Medical Mycology, 4 th edition, Jaypee Brothers medical publishers.

References Books

1	Gerhardt, P., Murray, R.G., Wood, W.A. and Kreig, N.R. (Editions) (1994) Methods for General and Molecular Bacteriology. ASM Press, Washington, DC.
2	Kevin Kavanagh, (2018). Fungi Biology and Applications 3 rd Edition. Wiley Blackwell publishers.
3	C.J. Alexopoulos, C.W. Mims, M. Blackwell, (2007). Introductory Mycology, 4 th edition. Wiley publishers.
4	A.J. Salle (2007). Fundamental principles of bacteriology, fourth edition, Tata McGraw-Hill Publications.
5	Christopher C. Kibbler, Richard Barton, Neil A. R. Gow, Susan Howell, Donna M. MacCallum, Rohini J. Manuel (2017). Oxford Textbook of Medical Mycology. Oxford University Press.

Web Resources

1	http://textbookofbacteriology.net/nd
2	https://microbiologysociety.org/members-outreach-resources/links.html
3	http://mycology.cornell.edu/fteach.html
4	https://www.adelaide.edu.au/mycology/
5	https://www.isham.org/mycology-resources/mycological-links

Mapping with Programme Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S		S		S		S			M	S
CO2	S		S		S		S			M	S
CO3	S		S		S		S			M	S
CO4	S		S		S		S			M	S
CO5	S		S	M	S	M	S		S	M	

Course Code	Course Title	L	T	P	C
23111AEC52	Virology and Parasitology	5	1	0	4

Course Objectives:

CO1: To gain knowledge on properties and classification of viruses and collection of relevant clinical samples for diagnosing viral infections.

CO2: To understand pathogenic microorganisms of viruses and the mechanisms by which they cause disease in the human body.

CO3: To gain knowledge about reemerging viral infections and develop diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.

CO4: Understand the types of parasites causing infections in the intestine.

CO5: To develop skills in the diagnosis of parasitic infections.

Course Content:

UNIT I:

General Properties, replication and Classification of viruses (Baltimore classification), Cultivation of viruses- in animals, embryonated eggs and tissue culture, Virus purification assays - collection and transport of clinical specimens for viral infections.

UNIT II:

Viral diseases with reference to symptoms, pathogenesis, transmission, prophylaxis and control – Arboviruses (Flavi virus), Picorna viruses (Polio virus and Rhinovirus), Hepatitis viruses (HAV, HBV, HCV, HDV, HEV), Rabies virus, Orthomyoviruses (Influenza virus) and Paramyxoviruses (Mumps and Measles virus), Pox viruses (Variola, Vaccinia), Herpes viruses (Herpes simplex, Varicella zoster), Adeno viruses, Rota viruses and HIV viruses. Oncogenic viruses (Human Papilloma virus): Introduction, characteristics of transformed cells, mechanism of viral oncogenesis and clinical manifestations.

UNIT III:

Emerging and reemerging viral infections (SARS, Swine flu, Ebola, Dengue, Chikungunya- and Corona) – causes, spread and preventive measures. Detection of viruses in clinical specimens – Serological and Molecular diagnosis of virus infections – Antiviral agents, Interferons and Viral Vaccines, Immunization schedules.

UNIT IV:

General introduction to Medical Parasitology, Classification of medically important parasites. Morphology, life cycle, pathogenesis, clinical features, laboratory diagnosis, prevention and treatment of diseases caused by the following organisms: *Entameobahistolytica*, flagellates (*Giardia lamblia*, *Leishmania donovani*), Sporozoa- *Plasmodiums* pps.

UNIT V:

Introduction to Helminthes, Platyhelminthes – *Taenia* – *Fasciola* – *Paragonimus* – *Schistosomas*pps.. Nematelminthes – *Ascaris*– *Ankylostoma* – *Enterobius* – *Trichuris* – *Trichinella* – *Wuchereria* – *Dracanculus*. Collection, transport and examination of specimen Laboratory techniques in parasitology Examination of faeces for ova and cyst by direct wet mount and iodine wet mount, Concentration methods (Floation and Sedimentation techniques), Examination of blood for parasites. Cultivation of parasites.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Understand the structure and properties of viruses, cultivation methods and diagnosis of viral diseases.	PO5,PO10
CO2	Knowledge of basic and general concepts of causation of disease by the pathogenic microorganisms and various parameters of assessment of their severity and the methods of diagnosis.	PO5,PO10
CO3	Insights to treatment options of viral diseases.	PO5,PO10
CO4	Knowledge about the importance of protozoans in the intestine.	PO5,PO10
CO5	Knowledge of Nematodes as infectious agent	PO5,PO10

TEXT BOOKS

1.	S., Rajan(2007). Medical microbiology, MJP publisher.
2.	JeyaramPaniker, C.K. (2006). Text Book of Parasitology Jay Pee Brothers,NewDelhi.
3	AroraD.R. and AroraB. (2002). Medical Parasitology, 1 st Edition CBS Publishers & Distributors, New Delhi.
4	Chatterjee (1986). Medical Parasitology. Tata McGraw Hill, Calcutta.
5	Parija S. C. (1996). Text Book of Medical Parasitology.4th edition, Orient Longman, AllIndia Publishers & Distributors.

References Books

1	Jawetz, E., Melnick, J.L. and Adelberg, E.A. (2000). Review of Medical Microbiology, 19 th Edition. Lange Medical Publications, U.S.A.
2	Ananthanarayan, R. and JeyaramPaniker, C.K. (2009). Text Book of Microbiology, 8 th Edition. Orient Longman, Chennai .
3	Conrat HF, Kimball PC and Levy JA. (1988). Virology. II edition. Prentice Hall, Englewood Cliff, New Jersey..
4	Topley& Wilsons's (1990). Principles of Bacteriology, Virology and Immunity, 8 th Edition, Vol. III Bacterial Diseases, Edward Arnold, London.
5	Finegold, S.M. (2000). Diagnostic Microbiology, 10 th Edition. C.V. Mosby Company,St.Louis.

Web Resources

1	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4047123/
2	https://www.ncbi.nlm.nih.gov/pubmed/21722309
3	https://www.sciencedirect.com/science/article/pii/S2211753919300193
4	https://cmr.asm.org/content/30/3/811
5	https://www.nejm.org/doi/full/10.1056/NEJMoa1811400

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					M					M	
CO2					M					M	
CO3					M					M	
CO4					M					M	
CO5					M					M	

Course Code	Course Title	L	T	P	C
23116AEC53	Environmental and Agriculture Microbiology	5	0	0	4

Course Objectives:

CO1: To discuss the distribution and association of microorganism in various ecosystems and to know about the role of microorganism in water pollution and water quality.

CO2: To acquire knowledge about the role of microorganism in water pollution and water quality

CO3: Gain knowledge about microbes as biofertilizers and the aspects of application.

CO4: To learn about the process of solid waste management and sewage water treatment.

CO5: Gain knowledge on various plant diseases and pathogens

Course Content:

UNIT I:

Microorganisms and their Habitats: Structure and function of ecosystems.

Terrestrial Environment: Soil profile and soil microflora, Microbial succession in decomposition of soil organic matter. Role of microorganisms in elemental cycles in nature: Carbon, Nitrogen.

Aquatic Environment: Microflora of freshwater and marine habitats, factors influencing microbial growth in aquatic environments.

Atmosphere: Aeromicroflora and dispersal of microbes, Assessment of air quality, Enumeration of microorganism in air, Air sanitation.

Extreme Habitats: Extremophiles: Microbes thriving at high & low temperatures, pH, high hydrostatic & osmotic pressures, salinity, & low nutrient levels.

Predisposing factors for Environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases. Environmental Protection Agency (EPA) - role in environmental protection

UNIT II:

Water potability: Sources and types of water surface, ground, stored, distilled, mineral and de-mineralized water and their pollution, biological indicators of water Pollution, Eutrophication.

Conventional Bacteriological standards of Water Quality, MPN index, coliform test, Membrane filtration. BOD, COD. Advanced molecular methods for water analysis. Water borne diseases.

Central Pollution Control Board (CPCB) standards.

UNIT III:

Microbial Interactions: Rhizosphere microflora. Concepts of Nitrogen fixation – Symbiotic and asymbiotic nitrogen fixers. Brief account of microbial interactions: Symbiosis, neutralism, commensalism, competition, Ammensalism, Synergism, parasitism, and predation. General account and Significance of Biofertilizers and biocontrol agents – Bacterial, cyanobacterial, VAM. Mass production of Rhizobialbiofertilizer. Biocontrol agents – Bacterial, viral, fungal.

UNIT IV:

Waste treatment and bioremediation: Solid waste management: Sources and types of solid waste, composting, vermin composting, production of biogas. Liquid waste management: Primary, secondary, and tertiary sewage treatment. Bioremediation and waste management: Need and scope of bioremediation. Degradation of hydrocarbons, oil spills, heavy metals – Chromium, lead, and xenobiotics – PCB.

UNIT V:

Plant pathology: Mode of entry of pathogens, Microbial enzymes, toxins, growth regulators and suppressor of plant defense in plant diseases. Plant defense mechanisms. Bacterial diseases –

Citrus canker, Blight of paddy. Viral disease – TMV, CMV. Fungal disease- red rot of sugarcane, Tikka disease. Plant disease management.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Describe about the structure and function of ecosystems and understand the role of microbes in various environments	PO1
CO2	Identify the cause of water pollution, and perform methods to assess the quality of water.	PO4,PO5,PO6,PO7,PO8
CO3	Explain the production of biofertilizers and biopesticides.	PO1, PO7,PO8
CO4	Explain about waste treatment process and microbial decomposition and bio-remediation process.	PO6
CO5	Describe about plant diseases caused by microbes and acquire a clear idea on plant pathogenic interaction	PO1,PO5

Text Books	
1.	Joseph C. Daniel. (2006). Environmental aspects of Microbiology 2 nd Edition. BrightSun Publications.
2.	Pradipta. K.M. (2008). Textbook of Environmental Microbiology. I.K. Publishing. House.
3.	Ramanathan, and Muthukaruppan SM. (2005). Environmental Microbiology. Om Sakthi Pathipagam, Annamalai Nagar.
4.	K. Vijaya Ramesh. (2004). Environmental Microbiology. 1 st Edition. MJP Publishers.
5.	Subba Rao. N.S. (2017). Soil Microbiology. 4 th Edition. Oxford and IBH Publishing Pvt. Ltd.

References Books	
1	Dirk, J. Elsas, V., Trevors, J.T., Wellington, E.M.H. (1997). Modern Soil Microbiology, Marcel Dekker INC, New York, Hong Kong.
2	Ec Eldowney S, Hardman D.J., Waite D.J., Waite S. (1993). Pollution: Ecology and Biotreatment – Longman Scientific Technical.
3	Mitchel, R. (1992). Environmental Microbiology. Wiley – John Wiley and Sons. Inc. Publications, New York.
4	Clescri, L.S., Greenberg, A.E. and Eaton, A.D. (1998). Standard Methods for Examination of Water and Wastewater, 20 th Edition. American Public Health Association.
5	Atlas, R.M. and Bartha, R. (1992). Microbial Ecology: Fundamentals and Applications, 2 nd Edition. The Benjamin / Cummings Publishing Co., Redwood City, CA.

Web Resources	
1	https://nptel.ac.in/courses/126105016
2	https://www.classcentral.com/course/swayam-plant-pathology-and-soil-health-14236
3	https://www.wasteonline.org.uk/resources/InformationSheets/WasteDisposal.htm
4	https://plantpath.cornell.edu/labs/enelson/PDFs/Hill_et_al_2000.pdf
5	https://onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2389.2005.00781.x

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S										
CO2				M	S	S	S	S			
CO3	S						S	S			
CO4						S					
CO5	M				M						

Course Code	Course Title	L	T	P	C
23116DSC54A	Biosafety & bioethics	5	1	0	4

Course Objectives:

CO1: To create a research environment - encourage investigation, analysis and studying the bioethical principles, values, concepts, and social and juridical implications contained in the Universal Declaration on Bioethics and Human

CO2: Rights in order to assist their application and promotion in the areas of science, biotechnology and medicine.

CO3: To discuss various aspects of biosafety regulations, IPR and bioethics concerns arising from the commercialization of biotech products.

CO4: To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.

CO5: To understand the importance of IPR, Patents and Patent laws.

Course Content:

UNIT I:

Basics of Biosafety - Laboratory Hazards and Hazard symbols. Definitions on Biohazard, Biosafety and Biosecurity- Biohazard- LAI, BP. Biohazard Classification. Biological Risk Groups. Need and application of biosafety. Good Laboratory Practices (GLP), Good Manufacturing Practices (GMP).

UNIT II:

Hazardous materials in Biotechnology - Categories of Waste in the Biotechnology Laboratories, Biohazardous waste and their disposal and treatments- issues in use of GMO's, risk for animal/human/ agriculture and environment owing to GMO. Hazardous materials, Emergency response/ first aids in Laboratories.

UNIT III:

Biological Safety Containment in Laboratory - Primary and secondary containments - Physical and biological containment. Types of biosafety containments (level I, II, III), PPE, Biosafety guidelines in India - Roles of Institutional Biosafety Committee, RCGM, GEAC.

UNIT IV:

Introduction and need of Bioethics - its relationship with other branches, Ethical implications of biotechnological products and techniques. Ethical Issues involving human cloning, human genome project, prenatal diagnosis, agriculture and animal rights, Social and ethical implications of biological weapons

UNIT V:

IPR, Patents and Patent laws - Intellectual property rights-TRIP- GATT International conventions patents, Methods of application of patents, Legal implications. Biodiversity and farmer rights, Objectives of the patent system, Basic principles and general requirements of patent law, Biotechnological inventions, and patent law. Legal development-Patentable subjects and protection in biotechnology. The patenting of living organisms.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Understand the control measures of laboratory hazards (chemical, biological and physical) and to practice safety strategies and personal protective equipment	PO1, PO2, PO3, PO7, PO10
CO2	Develop stratagems for the use of genetically modified organisms and Hazardous materials	PO1, PO3, PO4
CO3	Develop skills of critical ethical analysis of contemporary moral problems in medicine and health care.	PO1, PO6
CO4	Analyze and respond to the comments of other students regarding philosophical issues.	PO3, PO4
CO5	Pave the way for the students to catch up Intellectual Property(IP) as a career option a. R&D IP Counsel b. Government Jobs – Patent Examiner c. Private Jobs d. Patent agent and Trademark agent e. Entrepreneur	PO1, PO7, PO10

Text Books

1.	Usharani .B, S Anbazhagi, C K Vidya, (2019). Biosafety in Microbiological Laboratories- Edition, Notion Press, ISBN-101645878856
2.	Satheesh.M.K.,(2009). Bioethics and Biosafety- 1 st Edition, J. K International Publishing House Pvt. Ltd: Delhi, ISBN :9788190675703
3	DeepaGoel and ShominiParashar, (2013). IPR, Biosaftey and Bioethics- 1 st Edition, Pearson education: Chennai, ISBN-13: 978-8131774700
4	Rajmohan Joshi (2006). Biosafety and Bioethics. Gyan Books publisher.
5	Sateesh. M.K. (2013). Bioethics and Biosafety. i.K. International pvt,Ltd.

References Books

1	Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management, India, IN: Cengage Learning India Private Limited, ISBN-10: 9386668572
2	Neeraj, P., &Khusdeep, D. (2014). Intellectual Property Rights, India, IN: PHI learning Private Limited, ISBN : 9788120349896
3	Ahuja, V K. (2017). Law relating to Intellectual Property Rights, India, IN: Lexis Nexis, ISBN 10: 8131251659.
4	Edited by Sylvia Uzochukwu, Nwadiuto (Diuto) Esiobu, Arinze Stanley Okoli, Emeka Godfrey Nwoba, EzebuiroNwagboChristpeace, Charles OluwaseunAdetunji, Abdulrazak B. Ibrahim Benjamin Ewa Ubi (2022). Biosafety and Bioethics in Biotechnology-Policy, Advocacy, and Capacity Building, 1st edition. CRC Press
5	Sree Krishna. V (2007). Bioethics and Biosafety in Biotechnology. New age international publishers.

Web Resources

1	Subramanian, N., &Sundararaman, M. (2018). Intellectual Property Rights – An Overview Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf .
2	World Intellectual Property Organisation. (2004). WIPO Intellectual propertyHandbook. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf
3	https://www..niehs.nih.gov/bioethics
4	https://www.sist.sathyabama.ac.in
5	https://www.longdom.org/bioethics-and-biosafety

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S	S	S				M			M	
CO2	S		S	S							
CO3	S					S					
CO4			S	S							
CO5	S						M			S	

Course Code	Course Title	L	T	P	C
23116DSC54B	Food Processing Technology	5	0	0	3

Course Objectives:

CO1: To provide knowledge on objectives of food preservation.

CO2: To explain the freshness criteria and quality assessment of meat and fish.

CO3: To outline the methods of milk processing and fermented milk products.

CO4: To explain the importance of fat and oil processing.

CO5: To discuss the methods of microbiological examination of foods.

Course Content:

UNIT I:

Introduction to food preservation –objectives and techniques of food preservation. Preservation: principles of high temperature, low temperature, radiation, chemical preservatives and bio preservatives.

UNIT II:

Freshness criteria and quality assessment of meat and fish –spoilage and methods of preservation. Production of byproducts after processing waste and their utilization. Role of packaging material, types of packaging material.

UNIT III:

Composition of milk; assessment of milk, thermal processing of fluid milk-pasteurization (LTH, HTST&UHT techniques). Fermented milk products-cheese, Butter milk, Yogurt, Kumis, Kefir and Acidophilus milk. Hygiene and sanitation requirement in food processing and fermentation industries.

UNIT IV:

Importance of fats and oils in Food-Extraction of fats and Oils-Rendering, pressing, solvent extraction, pressing of oil- degumming, refining, bleaching, deodorization, fractionation, pyrolysis of fats, toxicity of frying oil.

UNIT V:

Methods for the microbiological examination of foods. Food borne illness and diseases. Microbial cultures for food fermentation. Indian Factories Act on safety, HACCP, Safety from adulteration of food.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Assess the fundamental concepts of food preservation.	PO1, PO3, PO5, PO6, PO8
CO2	Investigate the quality assessment of meat and fish.	PO1, PO5, PO6, PO7, PO8
CO3	Design the processing of milk and milk quality assessment.	PO1, PO5, PO6, PO7, PO8
CO4	Explain about the importance of fats and oils.	PO1, PO4, PO6, PO7, PO8
CO5	Plan the food safety and adulteration detection.	PO3, PO4, PO6, PO7, PO8

Text Books	
1.	Avantina Sharma. (2006). Text Book of Food Science and Technology, International Book Distributing Co, Lucknow, UP.
2.	Sivasankar. (2005). Food Processing and Preservation, 3rd Edition.,Prentice hall of India Pvt Ltd, NewDelhi.
3	Ramaswamy H & Marcotte M. (2006). Food Processing: Principles & Applications. Taylor & Francis.
4	NIIR Board of Food and Technologist. (2005). Modern Technology of Food Processing and Agrobased industries, National Institute of Industrial Research, Delhi.
5	Adams M.R. and Moss M. O (2007). Food Microbiology. New Age International.

Reference Books	
1	Fellos PJ. (2005). Food Processing Technology: Principle &Practice 2 nd Edition. CRC.
2	Peter Zeuthen and Leif Bogh-Sorenson. (2005). Food Preservation Techniques, WoodlandPublishing Ltd, Cambridge, England.
3	Gustavo V. Barbosa-Canovas, Maria S. Tapia, M. Pilar Cano. (2004). Novel Food Processing Technologies, CRC.
4	Suman Bhatti, Uma Varma. (1995). Fruit and vegetable processing organizations and institutions, 1 st Edition., CBS Publishing, New Delhi.
5	MirdulaMirajkar, Sreelatha Menon. (2002). Food Science and Processing Technology Vol-2,Commercial processing and packaging, Kanishka publishers, New Delhi.
Web Resources	
1	https://sites.google.com/a/uasd.in/ecomse/food-processing-technology
2	https://nptel.ac.in/courses/126105015
3	https://engineeringinterviewquestions.com/biology-notes-on-food-adulteration/
4	food processing Definition, Purpose, Examples, & Facts Britannica
5	Food Processing Technology Food News & Views Updated Daily (foodprocessing-technology.com)

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	M		M		S	M		S	
CO2	M				S	M	S	S	
CO3	M				S	M	S	S	
CO4	M			S		S	S	S	
CO5			M	M		M	S	S	

Course Code	Course Title	L	T	P	C
23116DSC54C	Disaster Management	5	1	0	4

AIM:

Disaster management aims to reduce, or avoid the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery.

Course Objectives:

CO1: To provide students an understanding the need for studying the disaster management

CO2: Develop an understanding about the various types of disasters.

CO3: To expose students to the risk and vulnerability analysis

CO4: To create awareness about disaster prevention and risk reduction

CO5: To establish a relationship between disasters and developments.

CO6: To understand Rehabilitation, Reconstruction and Recovery in the event of Disaster

CO7: To gain knowledge on Climate Change Adaptation and IPCC Scenario and Scenarios in the context of India.

Course Content

Unit I: Introduction to Disasters

Chapter No. 1 Disaster: Concept, Meaning, and Definition

Chapter No. 2 History of Major Disaster Events in India

Chapter No. 3 Types of Disasters – Natural Disasters: Famine, Drought, Flood, Cyclone, Tsunami, Earthquake

Unit II: Disaster Mitigation and Disaster Management

Chapter No. 4 Man-made Disasters: Riots, Blasts, Industrial, Militancy

Chapter No. 5 Profile, Forms and Reduction of Vulnerability

Chapter No. 6 Disaster Mitigation: Concept and Principles

Unit III: Impact of Disaster

Chapter No. 7 Disaster Management: Concept and Principles

Chapter No. 8 Pre-disaster- Prevention and Preparedness

Chapter No. 9 Physical, Economic, Social, Psycho-socio Aspects, Environmental Impacts

Unit IV: Disaster Process and Intervention

Chapter No. 10 During Disaster- Rescue and Relief

Chapter No. 11 Post-disaster- Rehabilitation and Reconstruction

Chapter No. 12 Victims of Disaster- Children, Elderly, and Women

Chapter No. 13 Displacement- Causes, Effects and Impact

Unit V: Disaster Intervention

Chapter No. 14 Major Issues and Dynamics in the Administration of Rescue, Relief, Reconstruction and Rehabilitation

Chapter No. 15 Components of Rescue, Relief, Reconstruction; Rehabilitation

Chapter No. 16 Disaster Policy in India; Disaster Management Authority- NDMA, SDMA, DDMA; Disaster Management Act, 2005

Key Words: Disaster, Disaster Mitigation, Disaster Management and Disaster Process

Course Outcomes:

CO1: Understand the need and significance of studying disaster management

CO2: Understand the different types of disasters and causes for disasters.

CO3: Gain knowledge on the impacts Disasters on environment and society

CO4: Study and assess vulnerability of a geographical area.

CO5: Students will be equipped with various methods of risk reduction measures and risk mitigation.

CO6: Understand the role of Information Technology in Disaster Management

CO7: Understand Geographical Information System applications in Disaster Management

References:

1. Anil Sinha (2001), Disaster Management-Lessons Drawn and Strategies for Future. New Delhi, Jain Publications.
2. Backer, C.W. and Chapman, W. (ed.). (1969), Man and Society in Disasters, New Delhi,
3. Clarke, J.I., Peter Curson, et. al. (ed.) (1991), Population and Disaster, Oxford, Basil Blackwell Ltd.
4. Cuny, Frederick (1984), Disasters and Development, Oxford, Oxford University Press. Disaster Management Act 2005
5. Garb, S. and Eng. E (1969), Disasters Hand Book, New York, Springer.
6. Gupta, M.C, L.C. Gupta, B. K. Tamini and Vinod K. Sharma (2000), Manual on Natural Disaster Management in India, New Delhi, National Institute of Disaster Management.
7. Hoff, A. (1978), People in Crisis- Understanding and Helping, California, Addison Wesley.
8. Maskrey, Andrew (1989), Disaster Mitigation: A Community Based Approach, Oxford, Oxfarm.
9. Narayan, Sachindra (ed.) (2000), Anthropology of Disaster Management, New Delhi, Gyan Publishing House.
10. Nidhi G Dhawan (2014), Disaster Management and Preparedness, New Delhi, Jain Publications.
11. Parasuraman, S. and Unnikrishnan, P.V. (2000), India Disasters Report: Towards Policy Initiative, New Delhi, Oxford University Press.
12. Satendra, K.J. Anandha Kumar and V.K. Naik (2013), India's Disaster Report, New Delhi, National Institute of Disaster Management.
13. Singh, R.B. (ed.) (2000), Disaster Management, New Delhi, Rawat Publications.
14. Sinha, P.C. (ed.) (1998), Encyclopedia of Disaster Management (Vol.1-10), New Delhi, Anmol Publications.
15. Tata Institute of Social Sciences (2002). Special Volume on Disaster Management, Indian Journal of Social Work, Vol.63, Issue 2, April.

Course Code	Course Title	L	T	P	C
23116SEC55L	Bacteriology, Mycology Virology and Parasitology Lab	0	0	5	4

Course Objectives:

CO1: To familiarize students with medical microbiology techniques and technical knowledge on collection and processing of clinical samples.

CO2: To learn the techniques for isolation and identification of bacterial pathogens.

CO3: To gain expertise in various techniques of clinically important viral pathogens and their identification.

CO4: To get acquainted with medically important fungi and their metabolism.

CO5: To categorize parasites and understand their role in infections.

Course Content:

UNIT I:

1. Collection and Transport of Clinical specimens.
2. Simple, Differential and Special staining of Clinical materials.
3. Culture techniques used to isolate microorganisms.

UNIT II:

1. Identification of bacterial pathogens by their biochemical reactions.
2. Antimicrobial susceptibility testing by disc-diffusion technique and determination of Minimum Inhibitory Concentration.

UNIT III:

1. Isolation of Bacteriophages from Sewage and other natural sources.
2. Identification of Viruses in Slides/Smears/Spotters. Demonstration of Negri bodies (Staining).
3. Cultivation of Viruses in Embryonated eggs – Amniotic, Allantoic, Yolk sac routes and Chorio-allantoic membrane.

UNIT IV:

1. Microscopic identification of medically important Fungi – KOH and Lactophenol cotton Blue staining.
2. Slide culture techniques for fungal Identification
3. Identification of Dermatophytes.
Germ tube test, Carbohydrate fermentation and assimilation tests for Yeasts.

UNIT V:

1. Direct Examination of Faeces – wet mount and Iodine mount – Demonstration of Protozoan cysts and Helminthes eggs.
2. Concentration techniques of stool specimen – Flootation and Sedimentation methods.
3. Examination of blood for Malarial parasites – thin and thick smear preparations.
4. Identification of Medically important parasites in slides / specimens as spotters.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Demonstrate methods to observe and measure microorganisms by standard microbiological techniques	PO4, PO5, PO7.
CO2	Identify pathogenic microorganisms in the laboratory set-up and interpret their sensitivity towards commonly administered antibiotics.	PO4, PO5, PO7, PO8.
CO3	Understand experimental tools used to cultivate and characterize clinically important viruses and bacteriophages	PO4, PO5, PO7, PO8.
CO4	Elucidate clinically important fungi.	PO4, PO5, PO7, PO8.
CO5	Investigate Parasites of medical importance and identify them from clinical specimens.	PO4, PO5, PO7, PO8.

TEXT BOOKS

1.	Dubey, R.C. and Maheswari, D.K. (2020). S. Chand Publishers. ISBN-13: 978-8121921534, ISBN-10: 8121921538.
2.	K.R. Aneja (2017). Experiments in Microbiology, Plant Pathology, Tissue Culture and Microbial Biotechnology. 5 th Edition. New Age International Publishers. ISBN-10: 9386418304, ISBN-13: 978-9386418302.
3	Collee, J.G., Fraser, A.G., Marnion, B.P. and Simmons, A. (1996). Mackie & McCartney Practical Medical Microbiology. 14 th Edition. Elsevier. ISBN-10: 813120393X, ISBN-13: 978-8131203934.
4	Prince CP (2009). Practical Manual of Medical Microbiology, 1st edition, Jaypee digital publishing.
5	James H. Jorgensen, Karen C. Carroll, Guido Funke, Michael A. Pfaller, Marie Louise Landry, Sandra S. Richter, David W. Warnock (2015). Manual of Clinical Microbiology, 11th Edition, ASM press

References Books

1	Patricia M. Tille (2021). Bailey & Scott's Diagnostic Microbiology, 15 th Edition. Elsevier. ISBN-10: 0323681050, ISBN-13: 978-0323681056.
2	Monica Cheesbrough (2006). District Laboratory Practice in Tropical Countries. Part 1. 2 nd Edition. Cambridge University Press. ISBN-10: 0521171571, ISBN-13: 978-0521171571.
3	Michael A. Pfaller (ed.) (2015). Manual of Clinical Microbiology. Vol. 1 and 2. 11 th Edition. ASM Press. ISBN-10: 9781555817374, ISBN-13: 978-1555817374.
4	Josephine A. Morello, Paul A. Granato and Helen EckelMizer (2002). Laboratory Manual and Workbook in Microbiology. 7 th Edition. The McGraw Hill Company. ISBN: 0-07-246354-6.
5	Rowland, S.S., Walsh, S.R., Teel, L.D. and Carnahan, A.M. ((1994). Pathogenic and Clinical Microbiology: A Laboratory Manual. Lippincott Williams & Wilkins. ISBN-10: 0316760498, ISBN-13: 9780316760492.

Web Resources

1	https://www.microcarelab.in/media/microcarelab.in/files/Sample-Collection-Manual.pdf
2	http://ssu.ac.ir/cms/fileadmin/user_upload/Daneshkadaha/pezeshki/microb/file_amuzeshi/Lab_Q A_Microbiology_QA.pdf
3	https://www.academia.edu/11977315/Basic_Laboratory_Procedures_in_Clinical_Bacteriology
4	https://cmr.asm.org/content/31/3/e00062-17.full.pdf
5	https://microbiologyinfo.com/techniques-of-virus-cultivation/

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				S	M		S				
CO2				S	S		S	L			
CO3				S	S		S	L			
CO4				S	S		S	L			
CO5				S	S		S	L			

Course Code	Course Title	L	T	P	C
23116SEC56L	Environmental, Agriculture, Food, Dairy and Probiotic Microbiology Lab	0	0	5	4

Course Objectives:

CO1: To Assess the water quality and potability.

CO2: To acquire knowledge on enumeration of bacteria from milk and milk quality analysis

CO3: To investigate various extracellular enzyme producers in soil and to gain knowledge on preparation of biofertilizers

CO4: Improve knowledge on plant pathogens

CO5: To acquire knowledge on preparation of probiotics and prebiotics

Course Content:**UNIT I:**

1. Physical, chemical, and microbiological assessment of water and potability test for water.

❖ Physical a – Color, pH,

❖ Chemical - alkalinity, acidity, DO, BOD, COD

❖ Microbiological – MPN index (Presumptive, Completed and Confirmatory test)

2. Study of air microflora by settle plate method.

UNIT II:

3. Isolation and identification of bacteria and fungi from fruits and vegetables

4. Direct microscopic count of milk.

5. Methylene blue reductase test and Resazurin test

6. Microbiological examination of milk by SPC.

UNIT III:

8. Isolation of extracellular enzyme producers – Amylase, protease, lipase

8. Microbiological assay of antibiotics by cup plate method and other methods

9. Isolation of *Rhizobium/ Azotobacter/* phosphate solubilizing organisms

10. Preparation of biofertilizers – Demonstration

UNIT IV:

11. Study of plant pathogens- Tikka Disease, Red rot of sugarcane, Citrus canker, Blight of paddy.

12. Study of fungi - *Mucor, Curvularia, Alternaria, Rhizopus, Aspergillus*

UNIT V:

13. Isolation of constituent flora of fermented milk.

14. Growth of probiotic LAB in broth, milk and whey.

15. Preparation of probiotic fermented milks like dahi, yoghurt, lassi and whey drink.

16. Effect of prebiotics on the growth of LAB in milk and broth.

17. Survivability of probiotic organisms in fermented milks.

18. Antimicrobial potential of the functional dairy products.

Course Outcomes

Course Outcomes	On completion of this course, students will;
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CO1	Assess the microbial quality of water and relate the experimental results to the prescribed standards by the statutory bodies	PO1, PO4,PO5,PO6, PO7, PO8
CO2	Evaluate the quality of milk and enumerate bacteria in milk by standard plate count method	PO5,PO6, PO7, PO8
CO3	Identify extracellular enzyme producing and nitrogen fixing microorganism from soil and to prepare a biofertilizer.	PO1,PO8
CO4	Identify various plant pathogenic bacteria	PO1
CO5	Synthesize probiotic fermented milks using microorganisms	PO1,PO7,PO8

Text Books

1.	Cappucino J and Sherman N.(2010). Microbiology: A Laboratory Manual. 9 th Edition. Pearson Education Limited.
2.	Kannan. N. (1996). Laboratory manual in General Microbiology. Palani Publications.
3.	R C Dubey and D K Maheswari.(2002). Practical Microbiology. S. Chand Publishing.
4.	Neelima Garg, K.L. Garg, K.G. Mukerji (2010).Laboratory Manual of Food Microbiology, Wiley publication
5.	Aneja, KR.(2010). Experiments in Microbiology, Plant pathology and Biotechnology. New Age International (P) Limited.

References Books

1	Christon J. Hurst Editor in Chief, Ronald L. Crawford, Jay L. Garland, David A. Lipson, Aaron L. Mills, Linda D. Stetzenbach (2007). Manual of Environmental Microbiology, Third Edition, Wiley publication.
2	James G Cappucino and Natalie Sherman.(2016). Microbiology – A laboratory manual. 4 th Edition. The Benjamin publishing company, New York.
3	Marylynn V. Yates, Cindy H. Nakatsu, Robert V. Miller, Suresh D. Pillai 2016). Manual of Environmental Microbiology, 4 th Edition, ASM press.
4	Burns, Richard G (2005). Environmental Microbiology A Laboratory Manual, 2 nd Edition .Lippincott Williams & Wilkins, Inc.
5	Ian Pepper, Charles Gerba, Jeffrey Bredecke (2004). Environmental Microbiology-A laboratory manual, Elsevier.

Web Resources

1	https://micobenotes.com/fields-of-microbiology/
2	https://bio.libretexts.org
3	https://www.google.com
4	https://www.sfamjournals.onlinelibrary.wiley.com
5	https://www.degruyter.com

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S			M	S	S	S	S
CO2					M	M	M	M
CO3	M							S
CO4	M							
CO5	M						S	S

Course Code	Course Title	L	T	P	C
231AECCVED	Value Education	2	-	-	2

VALUE EDUCATION - 1

Course Objectives

CO 1: Provide insights into the central dogma of molecular biology and explain the mechanism of DNA replication.

CO 2: Elaborate the mechanism of transcription and reverse transcription.

CO 3: Highlight the characteristics of genetic code and describe the process of protein synthesis.

CO 4: Introduce the concept of regulation of gene expression in prokaryotes

CO 5: Familiarize the different types of mutations and explain the mechanism of DNA repair.

Course Content:

UNIT I:

Central Dogma of molecular Biology, DNA as the unit of inheritance. Experimental evidences by Griffith's transforming principle, Avery, McLeod and McCarthy's experiment, and Hershey and Chase Experiment. Replication in prokaryotes: Modes of replication, Meselson and Stahl's experimental proof for semiconservative replication. Mechanism of Replication – Initiation, events at Ori C, Elongation – replication fork, semi discontinuous replication, Okazaki fragments, and termination. Bidirectional replication, Inhibitors of replication. Models of replication-theta, rolling circle and D loop model.

UNIT II:

Transcription - Mechanism of transcription: DNA dependent RNA polymerase(s), recognition, binding and initiation sites, TATA/ Pribnow box, elongation and termination. Post-transcriptional modifications; inhibitors of transcription. RNA splicing and processing of mRNA, tRNA and rRNA. Reverse transcription.

UNIT III:

Genetic Code and its characteristics, Wobble hypothesis. Translation: Adaptor role of tRNA, Activation of amino acids, Initiation, elongation and termination of protein synthesis, post-translational modifications and inhibitors of protein synthesis

UNIT IV:

Regulation of gene expression in Prokaryotes – Principles of gene regulation, negative and positive regulation, concept of operons, regulatory proteins, activators, receptors, regulation of lac operon and trp operon.

UNIT V:

Mutation: Types-Nutritional, Lethal, Conditional mutants. Missense mutation and other point mutations. Spontaneous mutations; chemical and radiation – induced mutations. DNA repair: Direct repair, Photo reactivation, Excision repair, Mismatch repair, Recombination repair and SOS repair.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Illustrate the Central Dogma of molecular biology, explain the multiplication of DNA in the cell and describe the types and modes of replication.	PO1
CO2	Elaborate the mechanism of transcribing DNA into RNA, discuss the formation of different types of RNA.	PO1,PO2
CO3	Decipher the genetic code and summarize the process of translation.	PO4,PO6
CO4	Comprehend the principles of gene expression and explain the concept of operon in prokaryotes.	PO4,PO5, PO6
CO5	Distinguish the types of mutations and explain the various mechanisms of DNA repair.	PO3,PO8

Text Books (Latest Editions)

1	Veer Bala Rastogi, 2008, Fundamentals of Molecular Biology, 1 st edition, Anebooks India.
2	David Friefelder, 1987, Molecular Biology, 2 nd edition, Narosa Publishing House.
3	Dr.P.S.Verma and Dr.V.K.Agarwal, 2013, Cellbiology, Genetics, Molecular Biology, Evolution and Ecology, 1 st edition, S.Chand&Company Pvt.Ltd.

References Books

1	Karp, G., 2010, Cell and Molecular Biology: Concepts and Experiments, 6 th edition, John Wiley & Sons. Inc.
2	DeRobertis, E.D.P. and DeRobertis, E.M.F., 2010, Cell and Molecular Biology, 8 th edition, Lippincott Williams and Wilkins, Philadelphia.
3	James.D.Watson, 2013, Molecular Biology of the Gene 7 th edition, Benjamin Cummings.

Web Resources

1	www.mednotes.net/notes/biology
2	https://www.onlinebiologynotes.com/repair-mechanism-of-mutation/
3	https://teachmephysiology.com/biochemistry/protein-synthesis/dna-translation/

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3						3			3
CO 4	3	2					3			3
CO 5	3	2					3	1		3

3 – Strong, 2 – Medium, 1 - Low

SEMESTER VI

Course Code	Course Title	L	T	P	C
23116AEC61	Food, Dairy and Probiotic Microbiology	5	0	0	4

Course Objectives:

CO1: To impart current knowledge of basic and applied microbiological aspects of fluid milks and dairy products for improved quality and food safety.

CO2: Gives an insight into various types of food borne diseases and their prevention

CO3: To gain information about microflora of milk

CO4: To study about the production of fermented dairy products

CO5: To impart current knowledge of probiotics, prebiotics and functional dairy foods for the health benefits. To create a sustainable environmentally and technologically advanced dairy farm

Course Content:

UNIT I:

Food as a substrate for micro organisms-.Micro organisms important in food microbiology; Molds, yeasts and bacteria -General Characteristics - Classification and importance. Principles of food preservation - Asepsis - Removal of micro organisms, - High temperature - Low temperature - Drying - Food additives. Nanoscience in food preservation; microencapsulation.

UNIT II:

Contamination and spoilage of food products -Food borne infections (*Bacillus cereus*, *Salmonellosis*, *Shigellosis*, *Listeria monocytogenes* and *Campylobacter jejuni*) and intoxications – (*Staphylococcus aureus*, *Clostridium botulinum*, *Clostridium perfringens* and mycotoxins) Food borne disease outbreaks - newly emerging pathogens. Conventional and Novel technology in control of food borne pathogens and preventive measures - Food sanitation - plant sanitation - Employees' health standards. Regulatory Agencies & criteria for food safety.

UNIT III:

Microflora of raw milk - sources of contamination. Spoilage and preservation of milk and milk products. -antimicrobial systems in raw milk. Importance of biofilms, their role in transmission of pathogens in dairy products and preventive strategies.

UNIT IV:

Food fermentations: Indian Pickles Bread, vinegar, fermented vegetables (sauerkraut), fermented dairy products (yoghurt, cheese, *Acidophilus Milk*, Kefir, Koumiss). Oriental fermented foods-Miso –Tempeh Ontjom . Natto, Idli Spoilage and defects of fermented dairy products -. Functional fermented foods and nutraceuticals, bioactive proteins and bioactive peptides, genetically modified foods.

UNIT V:

Probiotic microorganisms, concept, definition safety of probiotic microorganisms, legal status of probiotics Characteristics of Probiotics for selection: stability maintenance of probiotic microorganisms. Role of probiotics in health and disease: Mechanism of probiotics. Application of bacteriocins in foods. Biopreservation. Prebiotics: concept, definition, criteria, types and sources of prebiotics, prebiotics and gut microflora - Prebiotics and health benefits: mineral absorption, immune response, cancer prevention, elderly health and infant health, prebiotics in foods.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Gain knowledge about food as a substrate for various microbes, Understand about the principles and application of different types of food spoilage and preservation technique,	PO7,PO8,PO10
CO2	Acquire a thorough understanding of food borne diseases, testing methods, and preventive technique	PO5,PO10
CO3	Gain information about spoilage of milk and its products and its antimicrobial properties	PO5,PO7
CO4	Learn about the various fermented product and its various stage spoilage	PO7,PO8,PO10
CO5	Impart current knowledge of probiotics, prebiotics and functional dairy foods for the health benefits	PO5,PO6

Text Books

1.	Frazier WC and West off DC. (2017). Food microbiology. 5 th Edition TATA McGraw Hill Publishing Company Ltd. New Delhi.
2.	Adams, M.R., Moss, M.O.(2018). Food Microbiology 1 st edition. New Age Publishers by New Age International (P) Ltd., Publishers.
3	R.C. Dubey. (2014). Advanced Biotechnology. S. Chand publishers.
4	Banwart GJ. (1989). Basic food microbiology, Chapman & Hall, New York.
5	Sugumar D. (1997). Outlines of dairy technology, Oxford University press. 1997.

References Books

1	Jay JM, Loessner MJ and Golden DA.(2005). Modern Food Microbiology. 7 th Edition CBS Publishers and Distributors, Delhi, India.
2	Prescott, Harley and Klein Wim.(2008). Microbiology, 7 th Edition McGraw Hill Publications.
3	Robinson, R. K.(2002). Dairy Microbiology Handbook - The Microbiology of Milk and Milk Products (Third Edition), A John Wiley & Sons, Inc., New York.
4	Yuankunlee,Sepposalminen. (2008). Handbook of probiotics and prebiotics Second Edition. A John Wiley & Sons publication Inc.
5	DharumauraiDhansekaran, AlwarappanSankaranarayanan. (2021). Advances in Probiotics Microorganisms in Food and Health 1 st Edition. eBook ISBN:9780128230916.

WEB RESOURCES

1	https://www.researchgate.net/publication/15326559_A_Dynamic_Approach_to_Predicting_BacterialGrowth_in_Food/link/5a1d2e02aca2726120b28eba/download
2	https://www.fda.gov/food/laboratory-methods-food/bam-foodsamplingpreparation-sample-homogenate
3	https://www.researchgate.net/publication/243462186_Foodborne_diseases_in_India_-_A_review
4	https://www.researchgate.net/publication/228662659_Fermented_Dairy_Products_Starter_Cultures_and_Potential_Nutritional_Benefits/link/000084160cf23f86393d5764/

	download
5	https://www.fda.gov/food

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1							S	S		M	
CO2					S					M	
CO3					S		M				
CO4							S	S		M	
CO5					M	M					

Course Code	Course Title	L	T	P	C
23116AEC62	Recombinant DNA Technology	5	1	0	4

Course Objectives:

CO1: Understand the principles of rDNA technology.

CO2: Illustrate the molecular tools employed in gene cloning.

CO3: Discuss the importance of various molecular techniques and their importance in Biotechnology.

CO4: Acquire knowledge about the concepts of tissue culture methods and transgenic organisms

CO5: Examine recent trends in genetic engineering and its application in human welfare.

Course Content:

UNIT I:

Milestones in rDNA Technology - Gene Manipulation - Steps involved in Gene Cloning. Isolation of Chromosomal and Plasmid DNA. Restriction endonuclease - Discovery, Types, Mode of action- Application of Ligase, DNA Polymerase, DNA Modifying enzymes and Topoisomerases. Use of Linkers and Adapters.

UNIT II:

Artificial Gene Transfer methods- Calcium Chloride Induction, Electroporation, Microinjection, Biolistic method, Liposome and Viral-mediated delivery. Cloning vectors – Properties and Applications - Plasmid Based Vectors- Natural Vectors-pSC101 and pMB1. Artificial Vectors- pBR322 and pUC. Phage Based Vectors- Lambda phage. Hybrid Vectors, Phagemid, Cosmid, BAC and YAC. Screening of Recombinants. Genomic DNA and cDNA library - Construction and Screening.

UNIT III:

Molecular Tools- PCR- Types. Gel Electrophoresis- AGE and PAGE Blotting Techniques- Southern, Western & Northern. DNA sequencing methods- Sanger's and Automated method. Recent Trends in Genetic Engineering- Targeted Genome Editing- ZFNs, TALENs, CRISPRs. Gene Targeting- Knock-in & Knock-outs. DNA Finger Printing.

UNIT IV:

Plant Biotechnology – Media, Growth Regulators and Equipment for Plant Tissue Culture- Explant Culture- Micropropagation- Callus and Protoplast Culture- Production of Bio-Active Secondary Metabolites by Plant Tissue Culture - Agrobacterium and Crown Gall Tumors, Ti-Plasmid and RiPlasmid - Animal Biotechnology - Principles of Animal Cell Culture, Media and Equipment for Animal Cell Culture – Primary and Secondary Cultures- Cell Lines- Types, Establishment and Maintenance of Cell Lines

UNIT V:

Applications of Genetic Engineering - Transgenic Animals – Mice and Sheep- Recombinant Cytokines and their use in the Treatment of Animal infections- Monoclonal Antibodies in Therapy- Vaccines and their Applications in Animal Infections - Human Gene Therapy- Germline and Somatic Cell Therapy - *Ex-vivo* Gene Therapy- SCID (Severe Combined Immuno Deficiency) – *In-vivo* Gene Therapy- CFTR (Cystic Fibrosis Transmembrane Regulator) – Vectors in Gene Therapy- Viral and Non - Viral Vectors. Transgenic Plants– Bt Cotton, Bt Corn, Round Ready soybean, Flavr Savr Tomato and Golden Rice.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Illustrate the steps involved in introduction and expression of foreign DNA into bacteria, animal and plants cells and their screening.	PO4, PO6, PO7, PO9
CO2	Discuss the various cloning vectors and their applications.	PO4, PO6, PO7, PO9
CO3	Assess the usage and advantages of molecular tools.	PO4, PO6, PO7, PO9
CO4	Explain plant and animal tissue culture protocols and gene transfer mechanisms.	PO4, PO6, PO7, PO9
CO5	Elucidate and understand the application of genetic engineering and gene therapy.	PO4, PO6, PO7, PO9

Text Books

1.	Brown T.A.(2016). Gene Cloning and DNA Analysis. 7 th Edition . John Wiley and Jones, Ltd.
2.	Dale J. W., Schantz M.V. and Plant N. (2012). From Gene to Genomes – Concepts and Applications of DNA Technology. 3 rd Edition. John Wileys and Sons Ltd.
3.	Keya Chaudhuri (2013). Recombinant DNA technology. The Energy and Resources Institute
4.	Siddra Ijaz, Imran UIHaq (2019). Recombinant DNA Technology. Cambridge Scholars Publishing.
5.	Monika Jain (2012). Recombinant DNA Techniques: A Textbook, I Edition,Alpha Science International Ltd

References Books

1.	Maloy S. R., Cronan J.E. Jr. and FreifelderD.(2011). Microbial Genetics. 2 nd Edition. Narosa Publishing Home Pvt Ltd.
2.	Glick B. R. and Patten C.L.(2018). Molecular Biotechnology – Principles and Applications of Recombinant DNA. 5 th Edition. ASM Press.
3.	Russell P.J. (2010). iGenetics - A Molecular Approach, 3 rd Edition. Pearson New International Edition.
4.	Synder L., Peters J. E., Henkin T.M. and Champness W. (2013). Molecular Genetics of Bacteria,4th Edition. ASM Press Washington-D.C. ASM Press.
5.	James D.Watson, Michael Gilman, Jan Witkowski, Mark Zoller (1992). Recombinant DNA. Scientific American Books

Web Resources

1	https://www.britannica.com/recombinant-DNA-technology
2	https://www.byjus.com/recombinant-dna-technology
3	https://www..rpi.edu
4	https://www..ncbi.nlm.nih.gov
5	https://www.le.ac.uk/recombinant-dna-and-genetic-techniques

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				S	L	S	S	M	S		
CO2				S	L	S	S	M	S		
CO3				S	L	S	S	M	S		
CO4				S	L	S	S	M	S		
CO5				S	L	S	S	M	S		

Course Code	Course Title	L	T	P	C
23116DSC63A	Pharmaceutical Microbiology	5	1	0	4

Course Objectives:

CO1: To provide the knowledge on basics of chemotherapy

CO2: To learn the assays and testing methods of antibiotics.

CO3: To gain information about spoilage of pharmaceutical products

CO4: To provide the knowledge on drug discovery and clinical trials

CO5: To learn about regulations in pharmaceutical industry

Course Content:

UNIT I:

Introduction to Pharmaceutical microbiology: Ecology of microorganisms in pharmaceutical industry: Atmosphere, water, skin and respiratory flora of workers, raw materials, packaging, building and equipments and their control measures; Design and layout of sterile manufacturing.

UNIT II:

Microbial contamination and spoilage of pharmaceutical products: Microbial aspects of pharmaceutical products; Sterilization of pharmaceutical products: Heat, gaseous, radiation and filtration; Contamination and Spoilage of Pharmaceutical products: sterile injectable and non-injectable, ophthalmologic preparation, implants.

UNIT III:

Production of antibiotics: Production of antibacterial – Penicillin, Tetracycline; antifungal – Griseofulvin, Amphotericin; antiparasitic agents – Artemesin, Metronidazole; Semi-synthetic antibiotics and anticancerous agents; Additional application of microorganisms in pharmaceutical sciences: Enzymes- Streptokinase, Streptodornase, L-asperginase and clinical dextrin; Immobilization procedures for pharmaceutical applications (liposomes); Biosensors in pharmaceuticals.

UNIT IV:

Production of immunological products and their quality control: Vaccines - DNA vaccines, synthetic peptide vaccines, multivalent vaccines; Vaccine clinical trials; Immunodiagnosics - immuno sera and immunoglobulin; Quality control in Pharmaceutical: In – Process and Final Product Control; Sterility tests.

UNIT V:

Quality Assurance and Validation: Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) in pharmaceutical industry; Regulatory aspects of quality control; Quality assurance and quality management in pharmaceuticals – BIS (IS), ISI, ISO, WHO and US certification.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Learn the basics of chemotherapy and action of antibiotics	PO1,PO10
CO2	Carry out the microbiological assay of antibiotics	PO7
CO3	Analyze Microbiological standardization of Pharmaceuticals ,sterility testing of pharmaceutical productsApplysterilization in pharmaceutical industry	PO5,PO8,PO10
CO4	Evaluate the process and develop new strategies for rational drug design	PO9,PO10
CO5	Learn the Regulatory guidelines in pharmaceuticals product.	PO3,PO5

Text Books

1	Chand Pasha Kedernath. (2021). Text book of Pharmaceutical Microbiology. Ramnath Publisher.
2	Hugo WB and Russell AD. (2004).Pharmaceutical Microbiology VII edition. Blackwell Scientific Publication, Oxford.
3	Franklin,DJ. and Snow, GA. (2013). Biochemistry of antimicrobial action.Chapman& Hall.
4	Kuntal Das (2019). Pharmaceutical Microbiology, second edition, NiraliPrakashan.
5	PriyatamaPowar, Shital Nimbargi, VaijayantiSapre (2020). Pharmaceutical Microbiology, I edition, Technical publications.

References Books

1	Handa, S.S. and Kapoor, V.K. (2022) .Pharmacognosy. 4 th Edition.VallabhPrakashanPublishers,New Delhi.
2	Kokate, C.K., Durohit, A.P. and Gokhale, S.R.,(2002). Pharmacognosy. 12 th edition NiraliPrakasham Publishers, Pune.
3	S. P. Vyas & V. K. Dixit.(2003). Pharmaceutical Biotechnology. CBS Publishers & Distributors, New Delhi.
4	Wallis, T.E. (2005). Text book of Pharmacognosy. 5 th edition. CBS publishers and distributors, New Delhi.
5	Garrod, L.P., Lambert, HP. And C'Grady, F. (1973). Antibiotics and Chemotherapy. (eds). Churchill Livingstone.

Web Resources

1	https://www.pharmapproach.com/introduction-to-pharmaceutical-microbiology/
2	https://www.iptsalipur.org/wp-content/uploads/2020/08/BP303T_PMB_UNIT_I.pdf
3	https://www.pharmanotes.org/2021/11/pharmaceutical-microbiology-b-pharma.html
4	https://snscourseware.org/snscphs/notes.php?cw=CW_604b15c6313c5
5	https://www.thermofisher.com

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	M									M	
CO2							M				
CO3					S			M		M	
CO4									L	M	
CO5			L		M						

Course Code	Course Title	L	T	P	C
23116DSE63B	Entrepreneurship and Bio-business	5	0	0	4

Course Objectives:

CO1: Understanding basic concepts in the area of entrepreneurship, the role and importance of entrepreneurship for economic development

CO2: Developing personal creativity and entrepreneurial initiative, adopting the key steps in the elaboration of business ideas.

CO3: Understanding the stages of the entrepreneurial process and the resources needed for the successful development of entrepreneurial ventures.

CO4: Explain the central components of successful business strategies in biotechnology, and create a business plan.

CO5: Explain the Project Management, Technology Management and Startup Schemes

Course Content:

UNIT I:

Bio Entrepreneurship: Introduction to bio-business, SWOT analysis of bio-business. Ownership, Development of Entrepreneurship; Stages in entrepreneurial process; Government schemes and funding. Small scale industries: Definition; Characteristics; Need and rationale.

UNIT II:

Entrepreneurship Opportunity in Agricultural Biotechnology: Business opportunity, Essential requirement, marketing, strategies, schemes, challenges and scope-with case study on Plant cell and tissue culture technique, polyhouse culture. Herbal bulk drug production, Nutraceuticals, value added herbal products. Bioethanol production using Agricultural waste, Algal source. Integration of system biology for agricultural applications. Biosensor development in Agriculture management.

UNIT III:

Entrepreneurship Opportunity in Industrial Biotechnology: Business opportunity, Essential requirement, marketing strategies, schemes, challenges, and scope- Pollution monitoring and Bioremediation for Industrial pollutants. Integrated compost production- microbe enriched compost. Bio pesticide/ insecticide production. Biofertilizer. Single cell protein.

UNIT IV:

Therapeutic and Fermented products: Stem cell production, stem cell bank, production of monoclonal/polyclonal antibodies, secondary metabolite production – antibiotics, probiotic and prebiotics.

UNIT V:

Project Management, Technology Management and Startup Schemes: Building Biotech business challenges in Indian context-biotech partners (BIRAC, DBT, Incubation centers. etc.), operational biotech parks in India. Indian Company act for Bio business-schemes and subsidies. Project proposal preparation, Successful start-ups-case study.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Describe and apply several entrepreneurial ideas and business theories in a practical framework.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12, PO13, PO14
CO2	Analyse the business environment in order to identify business opportunities, identify the elements of success of entrepreneurial ventures, evaluate the effectiveness of different entrepreneurial strategies and interpret their own business plan.	PO2, PO5, PO7, PO8, PO10, PO12, PO14
CO3	Express the mass production of microbial inoculants used as Biofertilizers and Bioinsecticides in response with field application and crop response.	PO4, PO6, PO9, PO11
CO4	Analyze the application and commercial production of Monoclonal antibodies, Cytokines. TPH and teaching kits.	PO5, PO6, PO9, PO11
CO5	Integrate and apply knowledge of the regulation of biotechnology industries, utilize effective team work skills within an effective management team with a common objective, and gain effective team work skills, with an awareness of cultural diversity and social inclusiveness.	PO2, PO7, PO8

Text Books

1.	Craig Shimasaki. (2014). Biotechnology Entrepreneurship: Starting, Managing, and Leading Biotech Companies. Academic Press.
2.	Ashton Acton, O. (2012). Biological Pigments– Advances in Research and Application Scholarly Editions: Atlanta, Georgia.
3.	Jennifer Merritt, Jason Feifer (2018). Start Your Own Business, 7th edition, Entrepreneur Press publisher.
4.	Peter F. Drucker (2006). Innovation and Entrepreneurship. Harper Business publisher.
5.	Leah Cannon (2017). How to Start a Life Science Company: A Comprehensive Guide for First-Time Entrepreneurs. International Kindle paperwhite.

References Books

1	Crueger, W, and Crueger. A.(2000). Biotechnology: A Text Book of Industrialmicrobiology, 2nd Edition, Sinauer Associates: Sunderland.Mass.
2	Paul S Teng. (2008). Bioscience Entrepreneurship in AsiaWorld Scientific Publishing Company.
3	Charles E. Bamford, Garry D. Bruton (2015). ENTREPRENEURSHIP: The Art, Science, and Process for Success, 2 nd Edition, McGraw Hill publisher.
4	Yali Friedman (2014). Building Biotechnology: Biotechnology Business, Regulations, Patents, Law, Policy and Science 4th Edition, Logos press publication.
5	Stephanie A. Wisner (2022). Building Backwards to Biotech: The Power of Entrepreneurship to Drive Cutting-Edge Science to Market, International Kindle paperwhite.

Web Resources

1	https://www.bio-rad.com/webroot/web/pdf/lse/literature/Biobusiness.pdf
2	https://www.crg.eu/biobusiness-entrepreneurship
3	https://www.entrepreneur.com
4	https://www.birac.nic.in
5	https://www.springer.com

Mapping with Programme Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	S	S	S	S	S	S	S	S	S	S	S
C02		S			M		S	S		M	
C03											
C04				S		S			S		S
C05		S					S	S			

Course Code	Course Title	L	T	P	C
23116PRW64	Project & Viva Voice	8	0	0	4

Projects enable students to get hands-on training in microbiological techniques needed for research. Thus the students can share diverse perspectives resulting in pooling of knowledge and skills. Group work may approach tasks and solve problems in novel, interesting ways, thereby converting established theoretical concepts to practical skills. If structured properly, it will promote team work and collaboration. Group projects also will help students to choose a research design, solve real life problems and benefit the society at large. Thus group project facilitates the students to convert ideas to practice thereby creating a research culture among students.

Guidelines for group project:

A research problem needs to be selected based on creative ability and scientific thought.

A brief description of the problem needs to be given.

Hypothesis statements should be framed.

Objectives by which the project work is to be carried out should be clearly stated.

Methodology has to be designed to test the hypothesis.

Results obtained need to be replicable.

Documented report has to be submitted on completion of the project.

Course Code	Course Title	L	T	P	C
231ACSIKWS	Indian Knowledge System	-	-	-	2

Course Objectives:

The course design seeks to address the following issues:

- To introduce to the students the overall organization of IKS
- To develop an appreciation among the students the role and importance of Veda, Vedāṅgas, Upa Vedas and Purāṅas
- To show case the multi-dimensional nature of IKS and their importance in the contemporary society
- To motivate the students to take up a detailed study of some of these topics and explore their application potential

Course Content

Unit I: Introduction to Indian Knowledge System (IKS), Definition, Concept and Scope of IKS (4)

- ❖ Definition, Concept and Scope of IKS
- ❖ IKS based approaches on Knowledge Paradigms
- ❖ IKS in ancient India and in modern India

Unit II: IKS and Indian Scholars, Indian Literature (8)

- ❖ Philosophy and Literature (Maharishi Vyas, Manu, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini)
- ❖ Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhashkaracharya, Varahamihira and Brahmgupta)
- ❖ Medicine and Yoga (Charak, Susruta, Maharishi Patanjali and Dhanwantri)
- ❖ Sahitya (Vedas, Upvedas, Upavedas (Ayurveda, Dhanurveda, Gandharvaveda)
- ❖ Puran and Upnishad) and shad darshan (Vedanta, Nyaya.Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma and Meditation)
- ❖ Shastra (Nyaya, vyakarana, Krishi, Shilp, Vastu, Natya and Sangeet)

Unit III: Indian Traditional/tribal/ethnic communities, their livelihood and local wisdom

- ❖ Geophysical aspects, Resources and Vulnerability
- ❖ Resource availability, utilization pattern and limitations
- ❖ Socio-Cultural linkages with Traditional Knowledge System
- ❖ Tangible and intangible cultural heritage.

Unit IV: Unique Traditional Practices and Applied Traditional Knowledge (8)

- ❖ Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives
- ❖ Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices
- ❖ Indigenous Bio-resource Conservation, Utilization Practices and Food Preservation Methods, Handicrafts, Wood Processing and Carving, -Fiber Extraction and Costumes
- ❖ Vaidya (traditional health care system), Tantra-Mantra, Amchi Medicine System
- ❖ Knowledge of dyeing, chemistry of dyes, pigments and chemicals

Unit V: Protection, preservation, conservation and Management of Indian Knowledge System (4)

- ❖ Documentation and Preservation of IKS
- ❖ Approaches for conservation and Management of nature and bio-resources
- ❖ Approaches and strategies to protection and conservation of IKS

Course Outcomes:

CO1: Explain the historicity of Indian Knowledge System and the broad classification of Indian philosophical systems

CO2: Explain the potential of Sanskrit in natural language processing

- CO3: Explain the features of Indian numeral system and its role in science & technology advancement
- CO4: Illustrate the basic elements of the Indian calendar and the components of Indian Panchanga
- CO5: Outline the science, engineering & technology heritage of ancient and medieval India

□□□□□



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

SCHOOL OF ARTS AND SCIENCE

Department of Microbiology

M.SC., MICROBIOLOGY

SYLLABUS

**FROM THE ACADEMIC YEAR
2023-2024**



Master of Science in Microbiology

Our curriculum is intended to teach our majors in a diversity of significant microbiological disciplines, as well as to inspire, improve, technological skills and capabilities that take persistent value beyond the teaching space.

M. Sc., Graduate Attributes

- Capability and motivation for intellectual development.
- Research, inquiry and analytical thinking abilities.
- Communication in intra and inter disciplinary
- Ethical, social and professional understanding
- Information literacy in respective discipline
- Teamwork, collaborative and management skills in scientific research

M. Sc Programme Educational Objectives-PEO

- **PEO1-** To provide detailed knowledge of Microbiology and their application fields. To understand the beneficial and harmful role of microorganisms in the environment and in the industries.
- **PEO2-** To understand the fundamentals of physiological reactions including metabolic pathways and biochemical reactions in microorganisms. To understand the fundamental concepts of immunology, biochemistry, biotechnology and genetics etc.
- **PEO3-** To develop human resource and entrepreneurs in microbiology with the ability to independently start their own ventures or small biotech units in the field of biotechnology.
- **PEO4-** Understand modern microbiology - practices and approaches with an emphasis in technology application in pharmaceutical, medical, industrial, environmental and agricultural areas.
- **PEO5-** Gain experience with standard molecular tools and approaches utilized: manipulate genes, gene products and organisms. Become familiar with handling of Laboratory animals for the research purpose. Interpret differences in data distributions via visual displays.

M. Sc Programme Specific Outcomes (PSOs)

- **PSO1 – Placement**
 - To prepare the students who will demonstrate respectful engagement with others’ ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.
- **PSO 2 - Entrepreneur**
 - To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
- **PSO3 – Research and Development**
 - Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.
- **PSO4 – Contribution to Business World**
 - To produce employable, ethical and innovative professionals to sustain in the dynamic business world.
- **PSO 5 – Contribution to the Society**
 - To contribute to the development of the society by collaborating with stakeholders for mutual benefit

M. Sc Programme Outcomes (Pos)

- **PO1: Problem Solving Skill**
Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.
- **PO2: Decision Making Skill**
Foster analytical and critical thinking abilities for data-based decision-making.
- **PO3: Ethical Value**
Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.
- **PO4: Communication Skill**
Ability to develop communication, managerial and interpersonal skills.
- **PO5: Individual and Team Leadership Skill**
Capability to lead themselves and the team to achieve organizational goals.
- **PO6: Employability Skill**
Inculcate contemporary business practices to enhance employability skills in the competitive environment.
- **PO7: Entrepreneurial Skill**
Equip with skills and competencies to become an entrepreneur.
- **PO8: Contribution to Society**
Succeed in career endeavors and contribute significantly to society.
- **PO 9 Multicultural competence**
Possess knowledge of the values and beliefs of multiple cultures and a global perspective.
- **PO 10: Moral and ethical awareness/reasoning**
Ability to embrace moral/ethical values in conducting one’s life



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U/s 3 of UGC Act, 1956

**School of Arts and Science
Department of Microbiology**

M. Sc., Syllabus-Regulation 2023

COURSE STRUCTURE

Course Code	Course Title	L	T	P	C
SEMESTER I					
23216AEC11	General Microbiology and Microbial Diversity	5	1	0	4
23216AEC12	Immunology Immunomics and Microbial Genetics	5	1	0	4
23216AEC13	Forensic Science	5	1	0	4
23216AEC14L	General Microbiology, Immunology and Genetics Lab	0	0	4	4
23216DSC15_	Discipline specific Elective Courses-I	5	1	0	3
23216RMC16	Research Methodology	2	-	-	2
Total		22	4	4	21
SEMESTER II					
23216AEC21	Medical Bacteriology and Mycology	4	1	0	4
23216AEC22	Medical Virology and Parasitology	4	1	0	4
23216AEC23	Bioinformatics	4	1	0	4
23216SEC24L	Medical Microbiology Lab	0	0	4	4
23216DSC25_	Discipline specific Elective Courses-II	4	1	0	3
23216GEC26	Vermitechnology	4	0	0	3
23216BRC27	Participation in Bounded research	2	-	-	2
23216SEC28	Internship	-	-	-	2
Total		22	3	4	26
SEMESTER III					
23216AEC31	Soil and Environmental Microbiology	5	1	0	4
23216AEC32	Recombinant DNA Technology and Biotechnology	4	1	0	4
23216AEC33	Fermentation Technology and Pharmaceutical Microbiology	4	1	0	4

23216AEC34L	Environmental Microbiology & rDNA Technology Lab	0	0	4	4
23216DSC35_	Discipline specific Elective Courses-III	4	1	0	3
23216GEC36	Nanobiotechnology	4	1	0	3
23216SEC37	Industrial Visit	-	-	-	2
	Total	21	5	4	24
	SEMESTER IV				
23216AEC41	Food & Dairy Microbiology	4	1	0	4
23216AEC42	Marine Microbiology	4	1	0	4
23216PRW43	Project with Viva Voce	0	0	10	4
23216DSC44_	Discipline specific Elective Courses-IV	4	1	0	3
23216DSC45	Microbial Quality Control and Testing	4	1	0	3
23216SEC46	Industrial Visit	-	-	-	2
	Total	16	4	10	20
	Total Credits for the Program				91

Discipline specific Electives

Semester	Discipline specific Elective Courses-I
I	a) 23216DSC15A- Bioinstrumentation b) 23216DSC15B - Health Hygiene c) 23216DSC15C - Microalgal Technology d) 23216DSC15D- Essentials of Laboratory Management and Biosafety
	Discipline specific Elective Courses-II
II	a) 23216DSC25A-Epidemiology b) 23216 DSC25B - Clinical Diagnostic Microbiology c) 23216 DSC25C - Bioremediation d) 23216 DSC25D - Clinical Research and Clinical Trials
	Discipline specific Elective Courses-III
III	a) 23216DSC35A- Biosafety, Bioethics and IPR b) 23216DSC35B-Toxinology c) 23216DSC35C-Water Conservation and Water Treatment
	Discipline specific Elective Courses-IV
IV	a) 23216DSC44A- Bioenergy b) 23216DSC44B-Herbal Technology and Cosmetic Microbiology c) 23216DSC44C - Life Science for Competitive Examinations

Credit Distribution:

Sem	SEC	DSC	GEC	RSB courses	Others	Total
I	16	3	-	2	-	21
II	16	3	3	2	2	26
III	16	3	3	2	-	24
IV	12	3	-	-	2	20
Total	62	16	3	13	02	91

SEMESTER-I

Course Code	Course Title	L	T	P	C
23216AEC11	General Microbiology and Microbial Diversity	5	1	0	4

Course objective

CO1	Acquire knowledge on the principles of different types of microscopes and their applications.
CO2	Compare and contrast the structure of bacteria and fungi. Illustrate nutritional requirements and growth in bacteria.
CO3	Exemplify, isolate and cultivate microalgae from diverse environmental sources.
CO4	Explain various pure culture techniques and discuss sterilization methods.
CO5	Discuss the importance and conservation of microbial diversity.

Course Detail:

UNIT I:

History and Scope of Microbiology. Microscopy – Principles and applications. Types of Microscopes - Bright field, Dark-field, Phase-contrast, Fluorescence microscope, Transmission electron microscope (TEM) and Scanning electron microscope (SEM). Sample preparation for SEM & TEM. Atomic force, Confocal microscope. Micrometry – Stage, Ocular and its applications.

UNIT II:

Bacterial Structure, properties and biosynthesis of cellular components – Cell wall. Actinomycetes and Fungi - Distribution, morphology, classification, reproduction and economic importance. Sporulation. Growth and nutrition - Nutritional requirements, Growth curve, Kinetics of growth, Batch culture, Synchronous growth, Measurement of growth and factors affecting growth.

UNIT III:

Algae - Distribution, morphology, classification, reproduction and economic importance. Isolation of algae from soil and water. Media and methods used for culturing algae, Strain selection and large-scale cultivation. Life cycle - *Chlamydomonas*, *Volvox pirogyra* (Green algae), *Nostoc* (Cyanobacteria) *Ectocarpus*, *Sargassum* (Brown algae), *Polysiphonia*, *Batrachospermum* (Red algae).

UNIT IV:

Microbial techniques - Safety guidelines in Microbiology Laboratories. Sterilization, Disinfection and its validation. Staining methods – Simple, Differential and Special staining. Automated Microbial identification systems - Pure cultures techniques – Cultivation of Anaerobic organisms. Maintenance and preservation of pure cultures. Culture collection centers - National and International.

UNIT V:

Biodiversity - Introduction to microbial biodiversity – Thermophiles - Classification, Thermophilic Archaeobacteria and its applications. Methanogens - Classification, Habitats, applications. Alkaliphiles and Acidophiles - Classification, discovery basin, its cell wall and membrane. Barophiles - Classification and its applications. Halophiles - Classification, discovery basin, cell walls and membranes– purple membrane, compatible solutes, Osmoadaptation / halotolerance - Applications of halophiles. Conservation of Biodiversity.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Examine various microbes employing the microscopic techniques learnt. Measure and compare the size of microbes.	PO1, PO4, PO11
CO2	Differentiate and appreciate the anatomy of various microbes. Plan the growth of microbes for different environmental conditions.	PO1, PO4
CO3	Identify and cultivate the algae understanding their habitat. Analyze the morphology, classify and propagate depending on its economic importance.	PO7, PO8, PO9
CO4	Create aseptic conditions by following good laboratory practices.	PO3, PO4, PO7
CO5	Categorize and cultivate a variety of extremophiles following standard protocols for industrial applications.	PO5, PO7, PO8, PO9

Text Books	
1.	Kanunga R. (2017). Ananthanarayanan and Panicker's Text book of Microbiology. (10 th Edition). Universities Press (India) Pvt. Ltd.
2.	Chan E.C.S., Pelczar M. J. Jr. and Krieg N. R. (2010). Microbiology. (5 th Edition). Mc.Graw Hill. Inc, New York.
3.	Prescott L. M., Harley J. P. and Klein D. A. (2004). Microbiology. (6 th Edition). McGraw - Hill company, New York.
4.	White D. Drummond J. and Fuqua C. (2011). The Physiology and Biochemistry of Prokaryotes, Oxford University Press, Oxford, New York.
5.	Dubey R.C. and Maheshwari D. K. (2009). Textbook of Microbiology. S. Chand, Limited.

REFERENCES BOOKS	
1.	Tortora G. J., Funke B. R. and Case C. L. (2015). Microbiology: An Introduction (12 th Edition). Pearson, London, United Kingdom
2.	Webster J. and Weber R.W.S. (2007). Introduction to Fungi. (3 rd Edition). Cambridge University Press, Cambridge.
3.	Schaechter M. and Leaderberg J. (2004). The Desk encyclopedia of Microbiology. Elsevier Academic Press, California.
4.	Ingraham, J.L. and Ingraham, C.A. (2000) Introduction to Microbiology. (2 nd Edition). Books / Cole Thomson Learning, UK.

5.	Madigan M. T., Bender K.S., Buckley D. H. Sattley W. M. and Stahl (2018) Brock Biology of Microorganisms. (15 th Edition). Pearson.
Web Resources	
1.	http://sciencenetlinks.com/tools/microbeworWeb ResourcesId
2.	https://www.microbes.info/
3.	https://www.asmscience.org/VisualLibrary
4.	https://open.umn.edu/opentextbooks/BookDetail.aspx?bookId=404
5.	https://www.grsmu.by/files/file/university/cafedry//files/essential_microbiology.pdf

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	M			M							S			
CO2	L			S										
CO3							S	S	M					
CO4			S	S			S							
CO5					S		S	S	S					

Course Code	Course Title	L	T	P	C
23216AEC12	Immunology Immunomics and Microbial Genetics	5	1	0	4

COURSE OBJECTIVE

CO1	Discuss immunity, organs and cells involved in immunity. Compare the types of antigens and their properties.
CO2	Describe immunoglobulin and its types. Categorize MHC and understand its significance.
CO3	Elucidate the mechanisms of different hypersensitivity reactions. List out the Vaccines and discuss their development.
CO4	Acquire knowledge the structure DNA in prokaryotes and eukaryotes
CO5	Explain out gene transfer studies in microbes.

Course Detail:

UNIT I :

Introduction to biology of the immune system – Cells and organs of the Immune System. T and B lymphocytes – Origin, development, differentiation, lymphocyte subpopulation in humans. Innate immunity- Complement, Toll-like receptors and other components. Acquired immunity – Active and Passive immunity. Antigens - features associated with antigenicity and immunogenicity. Basis of antigen specificity. MHC genes and products, Structure of MHC molecules, Genetics of HLA Systems – Antigens and HLA typing. Antigen processing and presentation to T- lymphocytes.

UNIT II:

Immunoglobulins. Theories of antibody production. Class switching and generation of antibody diversity. Monoclonal and polyclonal antibodies. Complement system – mode of activation- Classical, Alternate and Lectin pathways, biological functions. Antigen recognition – TCR, Diversity of TCR, T cell surface alloantigens, lymphocyte activation, clonal proliferation and differentiation. Physiology of acquired immune response – various phases of HI, CMI – Cell mediated cytotoxicity, DTH response.

UNIT III

Hypersensitivity – Types and mechanisms, Autoimmunity, Tumor Immunity and Transplantation immunology. Immunodeficiency-Primary immunodeficiency and Secondary immunodeficiencies. Genetics of Immunohematology – Genetic basis and significance of ABO and other minor blood groups in humans, Bombay blood group, Secretors and Non-secretors, Rh System and genetic basis of D- antigens. Diagnostic Immunology - Precipitation reaction, Immunodiffusion methods - SRID, ODD. Immunoelectrophoresis - Rocket and Counter current electrophoresis. Agglutination - Hemagglutination - Hemagglutination inhibition. Labeled Assay- Immunofluorescence assay, Radio immunoassay, FISH, ELISA. Flow cytometry. Immune regulation mechanisms – immuno-induction, immuno- suppression, immune-tolerance, immuno-potentiation, Immunomodulation. Role of cytokines, lymphokines and chemokines. Introduction to Vaccines and Adjuvants - Types of vaccines. Development of vaccines and antibodies in plants.

Immunomics - Introduction and Applications. Antigen engineering for better immunogenicity and use for vaccine development-multi epitope vaccines. Reverse vaccinology.

UNIT IV:

Structural of prokaryotic and eukaryotic genome. Introduction to prokaryotic genomic structure, Eukaryotic Genome - Structure of chromatin, chromosome, centromere, telomere, nucleosome. Modifications- methylation, acetylation, phosphorylation and its effect on structure and function of chromatin, DNA methylation and gene imprinting, organelle genome.

UNIT V:

Gene Transfer Mechanisms- Conjugation and its uses. Transduction, Generalized and Specialized, Transformation– Natural Competence and Transformation. Transposition and Types of Transposition reactions. Insertion sequences, complex and compound transposons – T10, T5, and Retroposon. Mechanism – Transposons of *E. coli*, Bacteriophage and Yeast. Importance of transposable elements in horizontal transfer of genes and evolution.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Categorize the immune response to a variety of antigens. Identify different immune cells involved in immunity.	PO1, PO4, PO6, PO7, PO9
CO2	Justify the significance of MHC molecules in immune response and antibody production.	PO1, PO4, PO5, PO6, PO9
CO3	Design antibodies and evaluate immunological assays in patient samples.	PO4, PO6, PO7, PO8, PO9, PO10
CO4	Analyze genomic DNA of prokaryotes and eukaryotes.	PO4, PO5, PO6, PO7, PO9, PO10
CO5	Summarize gene transfer mechanisms for experimental study.	PO4, PO5, PO6, PO7, PO9, PO10

Text Books	
1.	Coico R., Sunshine G. and Benjamini E. (2003). Immunology – A Short Course. (5 th Edition). Wiley-Blackwell, New York.
2.	Owen J. A., Punt J., Stranford S. A. and Kuby J. (2013). Immunology, (7 th Edition). W. H. Freeman and Company, New York.
3.	Abbas A. K., Lichtman A. H. and Pillai S. (2021). Cellular and Molecular Immunology. (10 th Edition). Elsevier.
4.	Malacinski G.M. (2008). Freifelder’s Essentials of Molecular Biology. (4 th Edition). Narosa Publishing House, New Delhi.
5.	Gardner E. J. Simmons M. J. and Snusted D.P. (2006). Principles of Genetics. (8 th Edition). Wiley India Pvt. Ltd.

References Books

1.	Travers J. (1997). Immunobiology - The Immune System in Health and Disease. (3 rd Edition). Current Biology Ltd. New York.
2.	Delves P.J., Martin S., Burton D. R. and Roitt I. M. (2006). Roitt's Essential Immunology. (11 th Edition). Wiley-Blackwell.
3.	Hay F. C. and Westwood O. M. R. (2002). Practical Immunology (4 th Edition). Wiley-Blackwell.
4.	Glick B. R. and Patten C.L. (2018). Molecular Biotechnology – Principles and Applications of Recombinant DNA. (5 th Edition). ASM Press.
5.	Russell P.J. (2010). Genetics - A Molecular Approach. (3 rd Edition). Pearson New International Edition.

Web Resources

1.	https://www.ncbi.nlm.nih.gov/books/NBK279395/
2.	https://med.stanford.edu/immunol/phd-program/ebook.html
3.	https://ocw.mit.edu/courses/hst-176-cellular-and-molecular-immunology-fall-2005/pages/lecture-notes/
4.	[PDF] Lehninger Principles of Biochemistry (8 th Edition) By David L. Nelson and Michael M. Cox Book Free Download - StudyMaterialz.in
5.	https://microbenotes.com/gene-cloning-requirements-principle-steps-applications/

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	S			M		M	S		S					
CO2	S			S	M	S			S					
CO3				S		S	S	S	S	M				
CO4				S	M	S	M		S	M				
CO5				S	M	S	M		S	S				

Course Code	Course Title	L	T	P	C
23216AEC13	Forensic Science	5	1	0	4

Course Objectives	
CO1	Understand the Scope, need and learn the tools and techniques in forensic science.
CO2	Comprehend organizational setup of a forensic science laboratory.
CO3	Identify and Examine body fluids for identification.
CO4	Extract DNA from blood samples for investigation.
CO5	Recognize medico legal post mortem procedures and their importance.

Course Detail:

UNIT I:

Forensic Science - Definition, history and development of forensic science. Scope and need of forensic science in the present scenario. Branches of forensic science. Tools and techniques of forensic science. Duties of a forensic scientist.

UNIT II :

Forensic science laboratories - Organizational setup of a forensic science laboratory. Central and State level laboratories in India. Mobile forensic science laboratory and its functions. Forensic microbiology - Types and identification of microbial organisms of forensic significance.

UNIT III:

Forensic serology - Definition, identification and examination of body fluids - Blood, semen, saliva, sweat and urine. Forensic examination and identification of hair and fibre

UNIT IV :

DNA profiling - Introduction, history of DNA typing. Extraction of DNA from blood samples - Organic and Inorganic extraction methods. DNA fingerprinting - RFLP, PCR, STR. DNA testing in disputed paternity.

UNIT V :

Forensic toxicology - Introduction and concept of forensic toxicology. Medico legal post mortem and their examination. Poisons - Types of poisons and their mode of action.

Course Outcomes	On completion of this course, students will;	
CO1	Identify the scope and need of forensic science in the present scenario.	PO1, PO6, PO7, PO8, PO9
CO2	Plan for the organizational setup and functioning of forensic science laboratories.	PO1, PO6, PO7, PO8, PO9
CO3	Analyze the biological samples found at the crime scene.	PO1, PO5, PO7, PO8, PO9
CO4	Perform extraction and identification of DNA obtained from body fluids.	PO1, PO6, PO7, PO8, PO9
CO5	Discuss the concept of forensic toxicology.	PO1, PO6, PO7, PO8, PO9

Text Books

1.	Nanda B. B. and Tewari R. K. (2001) Forensic Science in India: A Vision for the Twenty First Century. Select Publishers, New Delhi. ISBN- 10:8190113526 / ISBN-13:9788190113526.
2.	James S. H. and Nordby, J. J. (2015) Forensic Science: An Introduction to Scientific and Investigative Techniques. (5 th Edition). CRC Press. ISBN-10:9781439853832 / ISBN-13:978-1439853832.
3.	Li R. (2015) Forensic Biology. (2 nd Edition). CRC Press, New York. ISBN-13:978-1-4398-8972-5.
4.	Sharma B.R (2020) Forensic science in criminal investigation and trials. (6 th Edition)Universal Press.
5.	Richard Saferstein (2017). Criminalistics- An introduction to Forensic Science. (12 th Edition).Pearson Press.

Reference books

1.	Nordby J. J. (2000). Dead Reckoning. The Art of Forensic Detection- CRC Press, New York. ISBN:0-8493-8122-3.
2.	Saferstein R. and Hall A. B. (2020). Forensic Science Hand book, Vol. I, (3 rd Edition). CRC Press, New York. ISBN-10:1498720196.
3.	Lincoln, P.J. and Thomson, J. (1998). (2 nd Edition). Forensic DNA Profiling Protocols. Vol. 98. Humana Press. ISBN: 978-0-89603-443-3.
4.	Val McDermid (2014). Forensics. (2 nd Edition). ISBN 9780802125156.
5.	Vincent J. DiMaio., Dominick DiMaio. (2001). Forensic Pathology (2 nd Edition). CRC Press.

Web resources

1.	http://clsjournal.ascls.org/content/25/2/114
2.	https://www.ncbi.nlm.nih.gov/books/NBK234877/
3.	https://www.elsevier.com/books/microbial-forensics/budowle/978-0-12-382006-8
4.	https://www.researchgate.net/publication/289542469_Methods_in_microbial_forensics
5.	https://cisac.fsi.stanford.edu/events/microbial_forensics

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14
CO 1	L					S	M	M	S					
CO 2	M					S	M	M	S					
CO 3	L				S		S	M	S					
CO 4	M					S	S	M	S					
CO 5	M					S	S	M	S					

Course Code	Course Title	L	T	P	C
23216AEC14 L	General Microbiology, Immunology and Genetics Lab	0	0	4	4

Course Objectives	
CO1	Gain knowledge on the fundamentals, handling and applications of microscopy, sterilization methods. Identify microbes by different staining methods.
CO2	Prepare media for bacterial growth. Discuss plating and growth measurement techniques.
CO3	Acquire adequate skills to perform blood grouping and serological reactions.
CO4	Provide fundamental skills in preparation, separation and purification of immunoglobulin.
CO5	Apply the knowledge of molecular biology skills in clinical diagnosis.

Course Detail:

UNIT I :

- ❖ Microscopic Techniques: Light microscopy: Hay infusion broth. Wet mount to show different types of microbes, hanging drop.
- ❖ Dark field microscopy – Motility of Spirochetes. Washing and cleaning of glass wares: Sterilization methods: moist heat, dry heat, and filtration.
- ❖ Quality control check for each method. Staining techniques - Simple staining, Gram's staining, Acid fast staining, Meta chromatic granule staining, Spore, Capsule, Flagella.

UNIT II

- ❖ Media Preparation: Preparation of liquid, solid and semisolid media. Agar deeps, slants, plates.
- ❖ Preparation of basal, enriched, selective and enrichment media. Preparation of Biochemical test media, media to demonstrate enzymatic activities
- ❖ Microbial Physiology: Purification and maintenance of microbes. Streak plate, pour plate, and slide culture technique.
- ❖ Aseptic transfer.
- ❖ Direct counts – Total cell count, Turbidometry. Viable count - pour plate, spread plate. Bacterial growth curve. Effect of physical and chemical factors on growth.
- ❖ Anaerobic culture methods.

UNIT III

- ❖ Hematological reactions - Blood Grouping – forward and reverse, Rh Typing
- ❖ Identification of various immune cells by morphology – Leishman staining, Giemsa staining.
- ❖ Agglutination Reactions- Latex Agglutination reactions- RF, ASO, CRP.
- ❖ Detection of HBs Ag by ELISA.
- ❖ Precipitation reactions in gels– Ouchterlony double immunodiffusion (ODD) and Mancini's single radial immunodiffusion (SRID)
- ❖ Immuno-electrophoresis and staining of precipitin lines- Rocket immuno electrophoresis and counter current immuno electrophoresis.

UNIT IV

- ❖ Preparation of lymphocytes from peripheral blood by density gradient centrifugation.
- ❖ Purification of immunoglobulin– Ammonium Sulphate Precipitation.
- ❖ Separation of IgG by chromatography using DEAE cellulose or Sephadex.

UNIT V

- ❖ Western Blotting – Demonstration.
- ❖ Isolation of genomic DNA from *E. coli* and analysis by agarose gel electrophoresis.
- ❖ Estimation of DNA using colorimeter (Diphenylamine reagent)
- ❖ Separation of proteins by polyacrylamide gel electrophoresis (SDS-PAGE)
- ❖ UV induced mutation and isolation of mutants by replica plating technique.
- ❖ Plasmid DNA isolation from *E.coli*. RNA isolation from yeast.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Apply microscopic techniques and staining methods in the identification and differentiation of microbes.	PO1, PO6, PO7, PO8, PO9, PO11
CO2	Apply the knowledge on the sterilization of glass wares and media by different methods and measurement of cell growth.	PO1, PO6, PO7, PO8, PO9, PO11
CO3	Perform and evaluate immunological reactions to aid diagnosis.	PO5, PO7, PO8, PO9, PO11
CO4	Assess the level of lymphocytes in a blood sample and purify immunoglobulin employing appropriate techniques.	PO6, PO7, PO8, PO9, PO11
CO5	Perform DNA extraction and gene transfer mechanisms, analyze and identify by gel electrophoresis	PO6, PO7, PO8, PO9, PO11

Text Books	
1.	Dubey R.C. and Maheshwari D. K. (2010). Practical Microbiology. S. Chand.
2.	Cappuccino, J. and Sherman, N. (2002). Microbiology: A Laboratory Manual, (6 th Edition). Pearson Education, Publication, New Delhi.
3.	Cullimore D. R. (2010). Practical Atlas for Bacterial Identification. (2 nd Edition). -Taylor & Francis.
4.	Rich R. R., Fleisher T. A., Shearer W. T., Schroeder H, Frew A. J. and Weyand C. M. (2018). Clinical Immunology: Principles and Practice. (5 th Edition). Elsevier.
5.	Glick B. R. and Patten C.L. (2018). Molecular Biotechnology – Principles and Applications of Recombinant DNA. (5 th Edition). ASM Press.
References Books	
1.	Collee J. G., Fraser A.G. Marmion B. P. and Simmons A. (1996). Mackie & McCartney Practical Medical Microbiology. (14 th Edition). Elsevier, New Delhi.
2.	Gupta P. S. (2003). Clinical Immunology. Oxford University Press.

3.	Brown T.A. (2016). Gene Cloning and DNA Analysis. (7 th Edition). John Wiley and Jones, Ltd.
4.	Dale J. W., Schantz M.V. and Plant N. (2012). From Gene to Genomes – Concepts and Applications of DNA Technology. (3 rd Edition). John Wileys and Sons Ltd. 2012.
5.	Maloy S. R., Cronan J.E. Jr. and Freifelder D. (2011). Microbial Genetics. (2 nd Edition). Narosa Publishing Home Pvt Ltd.
Web Resources	
1.	http://textbookofbacteriology.net/
2.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC149666/
3.	https://ocw.mit.edu/courses/hst-176-cellular-and-molecular-immunology-fall-2005/pages/lecture-notes/
4.	[PDF] Lehninger Principles of Biochemistry (8 th Edition) By David L. Nelson and Michael M. Cox Book Free Download - StudyMaterialz.in
5.	https://microbenotes.com/gene-cloning-requirements-principle-steps-applications/

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14
CO 1	M					S	M	M	S		M			
CO 2	M					S	M	M	S		M			
CO 3					S		S	M	S		M			
CO 4						S	S	M	S		S			
CO 5						S	S	M	S		S			

Course Code	Course Title	L	T	P	C
23216DSC15A	Bioinstrumentation	5	1	0	3

Course Objectives	
CO1	Explain the principles and working mechanisms of laboratory instruments.
CO2	Discuss chromatography techniques and molecular biology techniques.
CO3	Illustrate molecular techniques in biological applications.
CO4	Acquire knowledge on spectroscopic techniques
CO5	Demonstrate the use of radioisotopes in various techniques.

Course Detail:

UNIT I :

Basic laboratory Instruments. Aerobic and anaerobic incubator – Biosafety Cabinets - Fume Hood, pH meter, Lyophilizer, Flow cytometry. Centrifugation techniques: Basic principles of centrifugation - Standard sedimentation coefficient - measurement of sedimentation coefficient; Principles, methodology and applications of differential, rate zonal and density gradient centrifugation - Applications in determination of molecular weight.

UNIT II:

General principles of chromatography - Chromatographic Performance parameters; Types- Thin layer chromatography, Paper Chromatography, Liquid chromatography (LPLC &HPLC), Adsorption, ion exchange, Gel filtration, affinity, Gas liquid (GLC). Flash Chromatography and Ultra Performance convergence chromatography. Two dimensional chromatography. Simulated moving bed chromatography (SEC)

UNIT III:

Electrophoresis: General principles - moving boundary electrophoresis - electrophoretic mobility – supportive materials – electroendosmosis – types (horizontal, vertical and two dimensional electrophoresis) - Principle and applications - paper electrophoresis, Serum electrophoresis, starch gel electrophoresis, Disc gel, Agarose gel, SDS – PAGE, Immunoelectrophoresis. Blotting techniques -Southern, northern and western blotting.

UNIT IV:

Spectroscopic techniques: Principle, simple theory of absorption of light by molecules, electromagnetic spectrum, instrumentation and application of UV- visible, Raman, FTIR spectrophotometer, spectrofluorimetry, Atomic Absorption Spectrophotometer, Flame spectrophotometer, NMR, ESR, Emission Flame Photometry and GC-MS. Detection of molecules in living cells - FISH and GISH. Biophysical methods: Analysis of biomolecules by Spectroscopy UV/visible.

UNIT V:

Radioisotopic techniques: Principle and applications of tracer techniques in biology. Radioactive isotopes - radioactive decay; Detection and measurement of radioactivity using ionization chamber, proportional chamber, Geiger- Muller and Scintillation counters,

autoradiography and its applications. Commonly used isotopes in biology, labeling procedures and safety aspects.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Make use of the laboratory instruments- laminar air flow, pH meter, centrifugation methods, biosafety cabinets following SOP.	PO4, PO6, PO7, PO8, P11
CO2	Apply chromatography techniques in the separation of biomolecules.	PO4, PO6, PO7, PO8, P11
CO3	Perform molecular techniques like mutagenesis and their detection.	PO4, PO6, PO7, PO8, P11
CO4	Estimate molecules in biological samples by adopting UV spectroscopic techniques.	PO4, PO6, PO7, PO8, P11
CO5	Cultivate organisms anaerobically.	PO4, PO6, PO7, PO8, P11
Text Books		
1.	Sharma B. K. (2014). Instrumental Method of Chemical Analysis. Krishna Prakashan Media (P) Ltd.	
2.	Chatwal G. R and Anand S. K. (2014.) Instrumental Methods of Chemical Analysis. Himalaya Publishing House.	
3.	Mitchell G. H. (2017). Gel Electrophoresis: Types, Applications and Research. Nova Science Publishers Inc.	
4.	Holme D. Peck H. (1998). Analytical Biochemistry. (3 rd Edition). Prentice Hall.	
5.	Jayaraman J. (2011). Laboratory Manual in Biochemistry. (2 nd Edition). Wiley Eastn Ltd., New Delhi.	
References Books		
1.	Pavia D. L. (2012) Spectroscopy (4 th Edition). Cengage.	
2.	Skoog A. and West M. (2014). Principles of Instrumental Analysis. (14 th Edition). W.B.Saunders Co., Philadelphia.	
3.	Miller J. M. (2007). Chromatography: Concepts and Contrasts (2 nd Edition) Wiley-Blackwell.	
4.	Gurumani N. (2006). Research Methodology for Biological Sciences. (1 st Edition) MJP Publishers.	
5.	Ponmurugan P. and Gangathara P. B. (2012). Biotechniques. (1 st Edition). MJP Publishers.	
Web Resources		
1.	https://norcaloa.com/BMIA	
2.	http://www.biologydiscussion.com/biochemistry/centrifugation/centrifuge-introduction- types-uses-and-other-details-with-diagram/12489	
3.	https://www.watelectrical.com/biosensors-types-its-working-and-applications .	
4.	http://www.wikiscales.com/articles/electronic-analytical-balance/	
5.	https://study.com/academy/lesson/what-is-chromatography-definition-types-uses .	

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1				S		M	M	S			S			
CO2				S		M	M	S			S			
CO3				S		S	S	S			S			
CO4				S		M	S	S			S			
CO5				S		M	S	S			L			

Course Code	Course Title	L	T	P	C
23216DSC15B	Health Hygiene	5	1	0	3

Course Objectives	
CO1	Acquire knowledge on hygiene and live healthy.
CO2	Provide insights on health laws for food safety and hygiene.
CO3	Explain health, physical exercises and their importance.
CO4	Illustrate mental hygiene and be involved in mental hygiene.
CO5	Describe the various health and health education programmes by the government.

Course Details:

UNIT I:

Introduction to hygiene and healthy life. Factors affecting health, health habits and practices. Recognizing positive & negative practices in the community. Scientific principles related to health

UNIT II:

Nutrition and Health – Balanced diet, Food surveillance, food Fortification, adulteration and preventive measures. Health laws for food safety. Environmental and housing hygiene. Ventilation and lighting.

UNIT III:

Physical health, physical exercises and their importance – Walking, jogging, yoga and meditation, stress relief. International control of health, WHO. Personal hygiene, Sun bathing, Colon Hygiene. Health destroying habits and addictions - Pan, supari, ganja, drinking, smoking, tea and coffee.

UNIT IV:

Mental hygiene - factors responsible, developmental tasks, basic needs, emotional stability. Mental hygiene and health in infancy, early childhood, adolescence, adulthood and old age. Mental health occupational hazards.

UNIT V:

Health programme and health education – Malaria control, Tuberculosis control, AIDS control programmes and Immunization Programmes. Family planning, Reproductive and Child health programmes (RCH).

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Identify factors affecting health and health habits.	PO1, PO5, PO10
CO2	Execute the knowledge of ventilation and lighting. Justify Health laws for food safety and hygiene.	PO5, PO10
CO3	Follow personal hygiene to avoid diseases and Prevent people from health-destroying habits and addictions.	PO5, PO10
CO4	Explore Mental hygiene and maintain emotional stability.	PO5, PO10
CO5	Participate in health education programmes	PO1, PO5, PO10

Text Books	
1.	Bamji M. S., Krishnaswamy K. and Brahmam G. N. V. (2019). Textbook of Human Nutrition. (4 th Edition). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
2.	Swaminathan (1995) Food & Nutrition (Vol I) (2 nd Edition). The Bangalore Printing & Publishing Co Ltd., Bangalore.
3.	Paniker J. C. K. and Ananthanarayan R. (2017). Textbook of Microbiology. (10 th Edition). Universities Press (India) Pvt. Ltd
4.	Lindsay Dingwall.(2010). Personal Hygiene Care Print ISBN:9781405163071 Online ISBN:9781444318708 DOI:10.1002/9781444318708
5.	Walter C. C. Pakes(1900). The Science of Hygiene: a Text-book of Laboratory Practice. (London: Methuen and Co.,).

References Books	
1.	Khader V. (2000) Food, Nutrition and Health, Kalyan Publishers, New Delhi.
2.	Srilakshmi, B. (2010) Food Science, (5 th Edition) New Age International Ltd., New Delhi.
3.	Dubey R.C. and Maheshwari D. K. (2010). Practical Microbiology. S. Chand.
4.	Park K. 2007, Park's text book of Preventive and Social Medicine, Banarsidas Bhanot publishers, India.
5.	Srilakshmi, 2002, Dietetics, New Age Publications, India

Web Resources	
1.	Health and Hygiene - Personal Hygiene, Community Hygiene and Diseases (vedantu.com)
2.	Chapter-32.pdf (nios.ac.in)
3.	Menstrual Health and Hygiene Guide Student Health and Counseling Services (ucdavis.edu)
4.	https://nap.nationalacademies.org/read/11756/chapter/13
5.	http://ecoursesonline.iasri.res.in/mod/page/view.php?id=112325

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	L				S					M				
CO2					S					M				
CO3					S					L				
CO4					S					M				
CO5	L				S					M				

Course Code	Course Title	L	T	P	C
23216DSC15C	Microalgal Technology	5	1	0	3

Course Objectives	
CO1	Characterize the different groups of algae.
CO2	Describe the cultivation and harvesting of algae.
CO3	Identify the commercial applications of various algal products.
CO4	Apply microalgae for environmental applications.
CO5	Employ microalgae as alternate fuels.

Course Details:

UNIT I:

Introduction to Algae - General characteristics. Classification of algae according to Fritsch. Salient features of different groups of algae. Distribution - Freshwater, brackish water and marine algae. Identification methods. An overview of applied Phycology. Economically important microalgae.

UNIT II:

Cultivation of freshwater and marine microalgae - Growth media. Isolation and enumeration of microalgae. Laboratory cultivation and maintenance. Outdoor cultivation - Photobioreactors - construction, types and operation; raceway ponds - Heterotrophic and mixotrophic cultivation - Harvesting of microalgae biomass.

UNIT III:

Microalgae in food and nutraceutical applications - Algal single cell proteins. Cultivation of *Spirulina* and *Dunaliella*. Microalgae as aquatic, poultry and cattle feed. Microalgal biofertilizers. Value-added products from microalgae. Pigments - Production of microalgal carotenoids and their uses. Phycobiliproteins - production and commercial applications. Polyunsaturated fatty acids as active nutraceuticals. Microalgal secondary metabolites - Pharmaceutical and cosmetic applications

UNIT IV:

Microalgae in environmental applications. Phycoremediation - Domestic and industrial waste water treatment. High-rate algal ponds and surface-immobilized systems - Treatment of gaseous wastes by microalgae. Sequestration of carbon dioxide. Scavenging of heavy metals by microalgae. Negative effects of algae. Algal blooms, algicides for algal control

UNIT V:

Microalgae as feed stock for production of biofuels - Carbon-neutral fuels. Lipid-rich algal strains - *Botryococcus braunii*. Drop-in fuels from algae - hydrocarbons and biodiesel, bioethanol, biomethane, biohydrogen and syngas from microalgae biomass. Biocrude synthesis from microalgae. Integrated biorefinery concept. Life cycle analysis of algae biofuels

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Acquire knowledge in the field of microalgal technology and their characteristics.	PO1
CO2	Identify the methods of algal cultivation and harvesting.	PO1, PO6
CO3	Recognize and recommend the use of microalgae as food, feed and fodder.	PO7, PO8, PO9
CO4	Promote microalgae in phyco remediation.	PO7, PO9, PO11, PO14
CO5	Compare and critically evaluate recent applied research in these microalgal applications.	PO7, PO8, PO9

Text Books	
1.	Lee R.E. (2008). Phycology. Cambridge University Press.
2.	Sharma O.P. (2011). Algae. Tata McGraw-Hill Education.
3.	Shekh A., Schenk P., Sarada R. (2021). Microalgal Biotechnology. Recent Advances, Market Potential and Sustainability. Royal Society of Chemistry.
4.	Lele. S.S., Jyothi Kishen Kumar (2008). Algal bio process technology. New Age International P(Ltd)
5.	Das., Mihirkumar. Algal Biotechnology. Daya Publishing House, New Delhi.

References Books	
1	Andersen R.A. (2005). Algal culturing techniques. Academic Press, Elsevier.
2	Bux F. (2013). Biotechnological Applications of Microalgae: Biodiesel and Value-added Products. CRC Press.
3	Singh B., Baudhdh K., Bux, F. (2015). Algae and Environmental Sustainability. Springer.
4	Das D. (2015). An algal biorefinery: An integrated approach. Springer.
5	Bux F. and Chisti Y. (2016). Algae Biotechnology: Products and Processes. Springer.

Web Resources	
1	https://www.classcentral.com/course/algae-10442
2	https://onlinecourses.nptel.ac.in/noc19_bt16/preview
3	https://freevidelectures.com/course/4678/nptel-industrial-biotechnology/46
4	https://nptel.ac.in/courses/103103207
5.	https://www.sciencedirect.com/topics/earth-and-planetary-sciences/microalgae

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1	S													
CO2	S					M								
CO3							S	S	S					
CO4							S		S		M			M
CO5							M	S	S					

Course Code	Course Title	L	T	P	C
23216DSC15D	Essentials of Laboratory Management and Biosafety	5	1	0	3

Course Objectives	
CO1	To utilize containment principles to ensure biosafety.
CO2	To enrich the student role and responsibilities of laboratory hazards and their control.
CO3	To know the importance of first aid technique for various common lab accidents.
CO4	To acquire knowledge of biosafety level, risk assessment and maintain proper hygiene in the laboratory.
CO5	To discuss the biosafety regulations and guidelines and implementation of safety programs.

Course Details :

UNIT I:

Introduction to the laboratory and laboratory hazards - General laboratory facilities – Occupational safety- Lab accidents - Fires, chemical burns, slips and falls, Animal bites. Cuts from broken glass. Toxic fume inhalation. General laboratory rules, Good laboratory practice (GLP). Laboratory plan.

UNIT II:

Common hazards in laboratory: Chemical hazards- Safe handling of chemicals and gases, hazard labels and symbols. Material safety datasheet (MSDS), Chemical handling - Fume hood, Storage of chemicals. Chemical Waste Disposal Guideline. Physical hazards - Physical agent data sheets (PADS), Electric hazards- Electrical shock, Electrical explosions, Electrical burns. Safe work practices. Potential ignition sources in the lab. Stages of Fire. Fire Extinguishers. Fire Response.

UNIT III:

Prevention and First aid for laboratory accidents. Personal protective equipment (PPE), Proper attire (Eye/Face Protection, laboratory coats, gloves, respirators. Disposal/Removal of PPE. Emergency equipment safety - Showers/ Eye Washes. Laboratory security and emergency response. First aid for - Injuries caused by broken glass, Acid/Alkali splashes on the skin, swallowing acid/alkali, burns caused by heat, electric shock

UNIT IV:

Biosafety - Historical background. Blood borne pathogens (BBP) and laboratory - acquired infections. Introduction to biological safety cabinets. Primary containment for biohazards. Biosafety levels of specific microorganisms. Recommended biosafety. Levels for infectious agents and infected animals. Risk groups with examples - Risk assessment. Safety levels. Case studies - Safe working, hand hygiene. Laboratory instruments, packing, sending, transport, import and export of biological agents. Hygiene, disinfection, decontamination, sterilization.

UNIT V:

Biosafety regulations and guidelines. Centers for disease control and prevention and the National institutes of health. Occupational safety and health administration. Recombinant DNA advisory committee(RDAC), Institutional biosafety committee(IBSC), Review committee on genetic manipulation(RCGM), Genetic engineering approval committee (GEAC). Implementation of biosafety guidelines

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Employ skills on laboratory safety and avoid laboratory accidents.	PO1, PO2, PO3, PO7, PO11
CO2	Prevent laboratory hazards by practicing safety strategies.	PO2, PO5, PO7, PO11
CO3	Practice various first aid procedures during common laboratory accidents.	PO1, PO2, PO3, PO5, PO10, PO11
CO4	Ensure biosafety strategies in laboratory.	PO2, PO3, PO4, PO7, PO10, PO11
CO5	Recognize the importance of biosafety guidelines.	PO3, PO4, PO5, PO7, PO10, PO11
Text Books		
1.	Sateesh M. K. (2013). Bioethics and Biosafety, IK International Pvt Ltd. ISBN : 8190675702.	
2.	Muthuraj M. and Usharani B. (2019). Biosafety in Microbiological Laboratories. (1st Edition). Notion Press. ISBN 10: 1645878856	
3.	Biosafety in Microbiological and Biomedical Laboratories - U.S. Health Department and Human Services. (2016). (5 th Edition). Lulu.com.	
4.	Kanai. L. Mukherjee. (Medical Laboratory Technology(4 th Edition). CBS Publishers.	
5.	Ramakrishnan (2012). Manual of Medical Laboratory Techniques. JP brothers.	
References Books		
1.	World Health Organization, Biosafety programme management. (2010). (4 th Edition). WHO Publications.	
2.	Rashid N. (2013). Manual of Laboratory Safety (Chemical, Radioactive, and Biosafety with Biocides) (1 st Edition).	
3.	Dayuan X. (2015). Biosafety and Regulation for Genetically Modified Organisms, Alpha Science International Ltd, ISBN-10 1842657917:	
4.	Ochei J. Kolhatkar(2000). A. (Medical Laboratory Science – Theory and Practice. ISBN; 13:978-0074632239.	
5.	Lynne S. Garcia. Clinical Laboratory Management (2 nd Edition). ASM Press	
Web Resources		
1.	https://www.cdc.gov/labs/pdf/CDC-BiosafetymicrobiologicalBiomedicalLaboratories-2009-P.pdf	
2.	https://ucanapplym.s3.ap-south-1.amazonaws.com/RGU/notifications/E_learning/Online_study/PG-SEM-IV-Biosafety%20regulation.pdf	
3.	https://consteril.com/biosafety-levels-difference/	
4.	https://www.cdc.gov/labs/pdf/CDC-BiosafetymicrobiologicalBiomedicalLaboratories-2009-P.pdf	
5.	https://www.who.int/publications/i/item/9789240011311	

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	S	S	S				S				S			
CO2		S			S		S				S			
CO3	S	S	S		S					S	S			
CO4		S	S	M			S			S	S			
CO5			S	S	S		S			S	S			

Course Code	Course Title	L	T	P	C
23216SEC16	Research Methonology	2	-	-	2

Course Objectives	
CO1	To get the employ skills on laboratory safety and avoid laboratory accidents.
CO2	To know about the prevent laboratory hazards by practicing safety strategies.
CO3	To practice various first aid procedures during common laboratory accidents.
CO4	To know about ensure biosafety strategies in the laboratory.
CO5	To get the knowledge of recognize the importance of biosafety guidelines.

Course Details:

UNIT I :

Introduction to the laboratory and laboratory hazards - General laboratory facilities – Occupational safety- Lab accidents - Fires, chemical burns, slips and falls, Animal bites. Cuts from broken glass. Toxic fume inhalation. General laboratory rules, Good laboratory practice (GLP). Laboratory plan.

UNIT II:

Common hazards in laboratory: Chemical hazards- Safe handling of chemicals and gases, hazard labels and symbols. Material safety data sheet (MSDS), Chemical handling - Fume hood, Storage of chemicals. Chemical Waste Disposal Guideline. Physical hazards - Physical agent data sheets (PADS), Electric hazards- Electrical shock, Electrical explosions, Electrical burns. Safe work practices. Potential ignition sources in the lab. Stages of Fire. Fire Extinguishers. Fire Response.

UNIT III:

Prevention and First aid for laboratory accidents. Personal protective equipment (PPE), Proper attire (Eye/Face Protection, laboratory coats, gloves, respirators. Disposal/Removal of PPE. Emergency equipment safety - Showers/ Eye Washes. Laboratory security and emergency response. First aid for - Injuries caused by broken glass, Acid/Alkali splashes on the skin, swallowing acid/alkali, burns caused by heat, electric shock.

UNIT IV:

Biosafety - Historical background. Blood borne pathogens (BBP) and laboratory - acquired infections. Introduction to biological safety cabinets. Primary containment for biohazards. Biosafety levels of specific microorganisms. Recommended biosafety. Levels for infectious agents and infected animals. Risk groups with examples - Risk assessment. Safety levels. Case studies - Safe working, hand hygiene. Laboratory instruments, packing, sending, transport, import and export of biological agents. Hygiene, disinfection, decontamination, sterilization.

UNIT V:

Biosafety regulations and guidelines. Centers for disease control and prevention and the National institutes of health. Occupational safety and health administration. Recombinant DNA advisory committee(RDAC), Institutional biosafety committee(IBSC), Review committee on genetic manipulation(RCGM), Genetic engineering approval committee (GEAC). Implementation of biosafety guidelines.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Employ skills on laboratory safety and avoid laboratory accidents.	PO1, PO2, PO3, PO7, PO11
CO2	Prevent laboratory hazards by practicing safety strategies.	PO2, PO5, PO7, PO11
CO3	Practice various first aid procedures during common laboratory accidents.	PO1, PO2, PO3, PO5, PO10, PO11
CO4	Ensure biosafety strategies in the laboratory.	PO2, PO3, PO4, PO7, PO10, PO11
CO5	Recognize the importance of biosafety guidelines.	PO3, PO4, PO5, PO7, PO10, PO11
Text Books		
1.	Sateesh M. K. (2013). Bioethics and Biosafety, IK International Pvt Ltd. ISBN : 8190675702.	
2.	Muthuraj M. and Usharani B. (2019). Biosafety in Microbiological Laboratories. (1st Edition). Notion Press. ISBN 10: 1645878856	
3.	Biosafety in Microbiological and Biomedical Laboratories - U.S. Health Department and Human Services. (2016). (5 th Edition). Lulu.com.	
4.	Kanai. L. Mukherjee. (Medical Laboratory Technology(4 th Edition). CBS Publishers.	
5.	Ramakrishnan (2012). Manual of Medical Laboratory Techniques. JP brothers.	
References Books		
1.	World Health Organization, Biosafety programme management. (2010). (4 th Edition). WHO Publications.	
2.	Rashid N. (2013). Manual of Laboratory Safety (Chemical, Radioactive, and Biosafety with Biocides) (1 st Edition).	
3.	Dayuan X. (2015). Biosafety and Regulation for Genetically Modified Organisms, Alpha Science International Ltd, ISBN-10 1842657917:	
4.	Ochei J. Kolhatkar(2000). A. (Medical Laboratory Science – Theory and Practice. ISBN; 13:978-0074632239.	
5.	Lynne S. Garcia. Clinical Laboratory Management (2 nd Edition). ASM Press	
Web Resources		
1.	https://www.cdc.gov/labs/pdf/CDC-BiosafetymicrobiologicalBiomedicalLaboratories-2009-P.pdf	
2.	https://ucanapplym.s3.ap-south-1.amazonaws.com/RGU/notifications/E_learning/Online_study/PG-SEM-IV-Biosafety%20regulation.pdf	
3.	https://consteril.com/biosafety-levels-difference/	
4.	https://www.cdc.gov/labs/pdf/CDC-BiosafetymicrobiologicalBiomedicalLaboratories-2009-P.pdf	
5.	https://www.who.int/publications/i/item/9789240011311	

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	S	S	S				S				S			
CO2		S			S		S				S			
CO3	S	S	S		S					S	S			
CO4		S	S	M			S			S	S			
CO5			S	S	S		S			S	S			

SEMESTER II

Course Code	Course Title	L	T	P	C
23216AEC21	Medical Bacteriology and Mycology	4	1	0	4

Course Objectives	
CO1	Acquire Knowledge on collection, transportation and processing of various kinds of clinical specimens.
CO2	Explain morphology, characteristics and pathogenesis of bacteria.
CO3	Discuss various factors leading to pathogenesis of bacteria.
CO4	Acquire knowledge on antifungal agents and their importance.
CO5	Describe various diagnostic methods available for fungal disease diagnosis.

Course Details:

UNIT I :

Classification of medically important bacteria, Normal flora of human body, Collection, transport, storage and processing of clinical specimens, Microbiological examination of clinical specimens, antimicrobial susceptibility testing. Handling and maintenance of laboratory animals – Rabbits, guinea pigs and mice.

UNIT II :

Morphology, classification, characteristics, pathogenesis, laboratory diagnosis and treatment of diseases caused by species of *Staphylococci*, *Streptococci*, *Pneumococci*, *Neisseriae.*, *Bacillus*, *Corynebacteria*, *Mycobacteria* and *Clostridium*.

UNIT III :

Morphology, classification, characteristics, pathogenesis, laboratory diagnosis and treatment of diseases caused by Enterobacteriaceae members, *Yersinia*, *Pseudomonas*, *Vibrio*, *Mycoplasma*, *Helicobacter*, *Rickettsiae*, *Chlamydiae*, *Bordetella*, *Francisella.*, *Spirochaetes- Leptospira*, *Treponema* and *Borrelia*. Nosocomial, zoonotic and opportunistic infections -prevention and control.

UNIT IV :

Morphology, taxonomy and classification of fungi. Detection and recovery of fungi from clinical specimens. Dermatophytes and agents of superficial mycoses. *Trichophyton*, *Epidermophyton* & *Microsporum*. Yeasts of medical importance – *Candida*, *Cryptococcus*. Mycotoxins. Antifungal agents, testing methods and quality control.

UNIT V :

Dimorphic fungi causing Systemic mycoses, *Histoplasma*, *Coccidioides*, *Sporothrix*, *Blastomyces*. Fungi causing Eumycotic Mycetoma, Opportunistic fungi- Fungi causing secondary infections in immunocompromised patients. Immunodiagnostic methods in mycology- Recent advancements in diagnosis. Antifungal agents.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Collect, transport and process various kinds of clinical specimens.	PO1,PO5,PO9
CO2	Analyze various bacteria based on morphology and pathogenesis.	PO1,PO5,PO9
CO3	Discuss various treatment methods for bacterial disease.	PO1,PO5,PO9
CO4	Employ various methods to detect fungi in clinical samples and apply knowledge on antifungal agents..	PO5,PO9

CO5	Apply various immunodiagnostic methods to detect fungal infections.	PO5,PO9
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Text Books	
1.	Kanunga R. (2017). Ananthanarayanan and Panicker's Text book of Microbiology. (2017).Orient Longman, Hyderabad.
2.	Greenwood, D., Slack, R. B. and Peutherer, J. F. (2012) Medical Microbiology, (18 th Edition). Churchill Livingstone, London.
3.	Finegold, S. M. (2000) Diagnostic Microbiology, (10 th Edition). C.V. Mosby Company, St. Louis.
4.	Alexopoulos C. J., Mims C. W. and Blackwell M. (2007). Introductory Mycology, (4 th Edition). Wiley Publishers.
5.	Chander J. (2018). Textbook of Medical Mycology. (4 th Edition). Jaypee brothers Medical Publishers.

Web Resources	
1.	http://textbookofbacteriology.net/nd
2.	https://microbiologysociety.org/members-outreach-resources/links.html
3.	https://www.pathelective.com/micro-resources
4.	http://mycology.cornell.edu/fteach.html
5.	https://www.adelaide.edu.au/mycology/

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4
CO1	M				S				M					
CO2	M				S				M					
CO3	M				S				M					
CO4					S				M					
CO5					S				M					

Course Code	Course Title	L	T	P	C
23216AEC22	Medical Virology and Parasitology	4	1	0	4

Course Objectives

CO1: Describe the replication strategy and cultivation methods of viruses.

CO2: Acquire knowledge about oncogenic viruses and human viral infections.

CO3: Develop diagnostic skills in the identification of virus infections.

CO4: Impart knowledge about parasitic infections.

CO5: Develop diagnostic skills in the identification of parasitic infections.

Course Details:

UNIT I:

General properties of viruses - Structure and Classification - viroids, prions, satellite RNAs and virusoids. Cultivation of viruses - embryonated eggs, experimental animals and cell cultures. Purification and Assay of viruses – Physical and Chemical methods (Electron Microscopy, Protein and Nucleic acids studies.) Infectivity Assays (Plaque and end-point).

UNIT II:

Virus Entry, Host Defenses Against Viral Infections, Epidemiology, pathogenic mechanisms, Pathogenesis, laboratory diagnosis, treatment for the following viruses: DNA Viruses- Pox , Herpes , Adeno , Papova and Hepadna , RNA Viruses- Picorna, Orthomyxo, Paramyxo, Rhabdo, Rota, HIV and other Hepatitis viruses, Arbo – Dengue virus, Ebola virus, Emerging and reemerging viral infections

UNIT III:

Bacterial viruses - Φ X 174, M13, MU, T4, lambda, Pi; Structural organization, life cycle and phage production. Lysogenic cycle-typing and application in bacterial genetics. Diagnosis of viral infections –conventional serological and molecular methods. Antiviral agents and viral vaccines.

UNIT IV:

Introduction to Medical Parasitology – Classification, host-parasite relationships. Epidemiology, life cycle, pathogenic mechanisms, laboratory diagnosis, treatment for the following: Protozoa causing human infections – *Entamoeba*, Aerobic and Anaerobic amoebae, *Giardia*, *Trichomonas*, *Balantidium*, *Toxoplasma*, *Cryptosporidium*, *Leishmania*, and *Trypanasoma*.

UNIT V:

Classification, life cycle, pathogenicity, laboratory diagnosis and treatment for parasites – Helminthes - Cestodes – *Taenia Solium*, *T. Saginata*, *T. Echinococcus*. Trematodes – *Fasciola Hepatica*, *Fasciolopsis Buski*, *Paragonimus*, *Schistosomes*. Nematodes - *Ascaris*, *Ankylostoma*, *Trichuris*, *Trichinella*, *Enterobius*, *Strongyloides* and *Wuchereria*. Other parasites causing infections in immune compromised hosts and AIDS. Cultivation of parasites. Diagnosis of parasitic infections – Serological and molecular diagnosis. Anti-protozoan drugs.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Cultivate viruses by different methods and aid in diagnosis. Perform purification and viral assay.	PO5, PO7, PO8, PO10
CO2	Investigate the symptoms of viral infections and presumptively identify the viral disease.	PO5, PO7, PO8, PO10
CO3	Diagnose various viral diseases by different methods.(serological, conventional and molecular)	PO5, PO7, PO8, PO10
CO4	Educate the public about the spread, control and prevention of parasitic diseases.	PO5, PO7, PO8, PO10
CO5	Identify the protozoans and helminths present in stool and blood specimens. Perform serological and molecular diagnosis of parasitic infections.	PO5, PO7, PO8, PO10

Text Books

1.	Kanunga R. (2017). Ananthanarayanan and Panicker's Text book of Microbiology. (10 th Edition). Universities Press (India) Pvt. Ltd.
2.	Dubey, R.C. and Maheshwari D.K. (2010). A Text Book of Microbiology. S. Chand & Co.
3.	Rajan S. (2007). Medical Microbiology. MJP publisher.
4.	Paniker J. (2006). Text Book of Parasitology. Jay Pee Brothers, New Delhi.
5.	Arora, D. R. and Arora B. B. (2020). Medical Parasitology. (5 th Edition). CBS Publishers & Distributors Pvt. Ltd. New Delhi.

Reference Books

1.	Carter J. (2001). Virology: Principles and Applications (1 st Edition). Wiley Publications.
2..	Willey J., Sandman K. and Wood D. Prescott's Microbiology. (11 th Edition). McGraw Hill Book.
3.	Jawetz E., Melnick J. L. and Adelberg E. A. (2000). Review of Medical Microbiology. (19 th Edition). Lange Medical Publications, U.S.A.
4.	Finegold S.M. (2000). Diagnostic Microbiology. (10 th Edition). C.V. Mosby Company, St. Louis.
5.	Levanthal R. and Cheadle R. S. (2012). Medical Parasitology. (6 th Edition). S.A. Davies Co. Philadelphia.

Web Resources

1.	https://en.wikipedia.org/wiki/Virology
2.	https://academic.oup.com/femsre/article/30/3/321/546048
3.	https://www.sciencedirect.com/science/article/pii/S0042682215000859
4.	https://nptel.ac.in/courses/102/103/102103039/
5.	https://www.healthline.com/health/viral-diseases#contagiousness

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1					M		L	L		M				
CO2					M		L	L		M				
CO3					M		L	L		M				
CO4					M		L	L		M				
CO5					M		L	L		M				

Course Code	Course Title	L	T	P	C
23216AEC23	Bioinformatics	4	1	0	4

Course Objectives

CO1: Discuss about various biological data mining concepts, tools.

CO2: Elucidate the principles and applications of sequence alignment methods and tools.

CO3: Demonstrate different phylogenetic tree construction methods and its uses in phylogenetic analysis.

CO4: Acquainted with various approaches in predicting 3D and 2D structure of proteins.

CO5: Describe various tools and techniques used in molecular docking, immunoinformatics and subtractive genomics.

Course Details:

UNIT I:

Biological Data Mining – Exploration of Data Mining Tools. Cluster Analysis Methods. Data Visualization. Biological Data Management. Biological Algorithms – Biological Primary and Derived Databases. Concept of Alignment, Pairwise Sequence Alignment (PSA), Multiple Sequence Alignment (MSA), BLAST, CLUSTALW, Scoring Matrices, Percent Accepted Mutation (PAM), Blocks of Amino Acid Substitution Matrix (BLOSUM).

UNIT II:

Phylogenetic Tree Construction - Concept of Dendrograms. Evolutionary Trees - Distance Based Tree Reconstruction - Ultrametric trees and Ultrametric distances – Reconstructing Trees from Additive Matrices - Evolutionary Trees and Hierarchical Clustering - Character Based Tree Reconstruction - Maximum Parsimony Method, Maximum likelihood method - Reliability of Trees – Substitution matrices – Evolutionary models.

UNIT III:

Computational Protein Structure prediction – Secondary structure – Homology modelling- Fold recognition and ab initio 3D structure prediction – Structure comparison and alignment – Prediction of function from structure. Geometrical parameters – Potential energy surfaces – Hardware and Software requirements- Molecular graphics – Molecular file formats- Molecular visualization tools.

UNIT IV:

Prediction of Properties of Ligand Compounds – 3D Autocorrelation -3D Morse Code- Conformation Dependent and Independent Chirality Codes –Comparative Molecular Field Analysis – 4 D QSAR –HYBOT Descriptors – Structure Descriptors – Applications – Linear Free Energy Relationships – Quantity Structure - Property Relationships –Prediction of the Toxicity of Compounds

UNIT V:

Molecular Docking- Flexible - Rigid docking- Target- Ligand preparation- Solvent accessibility- Surface volume calculation, Active site prediction- Docking algorithms- Genetic, Lamarckian - Docking analyses- Molecular interactions, bonded and nonbonded - Molecular Docking Software and Working Methods. Genome to drug discovery – Subtractive Genomics – Principles of Immunoinformatics and Vaccine Development.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Access to databases that provides information on nucleic acids and proteins.	PO1, PO4, PO6, PO7, PO9, PO10, PO13
CO2	Invent algorithms for sequence alignment.	PO7, PO9, PO10, PO13
CO3	Construct phylogenetic tree.	PO6, PO9, PO10
CO4	Predict the structure of proteins.	PO4, PO6, PO7, PO9, PO13
CO5	Design drugs by predicting drug ligand interactions and molecular docking.	PO4, PO5, PO6, PO7, PO9, PO10, PO13

Text Books	
1.	Lesk A. M. (2002). Introduction to Bioinformatics. (4 th Edition). Oxford University Press.
2.	Lengauer T. (2008). Bioinformatics- from Genomes to Therapies (Vol-1).Wiley- VCH.
3.	Rastogi S. C., Mendiratta N. and Rastogi P. (2014). Bioinformatics - Methods and Applications (Genomics, Proteomics and Drug Discovery) (4 th Edition). Prentice-Hall of India Pvt.Ltd.
4.	Attwood, T.K. and Parry-Smith, D.J. (1999). Introduction to Bioinformatics. Addison Wesley Longman Limited, England.
5.	Mount D.W., (2013).Bioinformatics sequence and genome analysis, 2 nd edn.CBS Publishers, New Delhi.

References Books	
1.	Baxevanis A. D. and Ouellette F. (2004). Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins. (2 nd Edition). John Wiley and Sons.
2.	Bosu O. and Kaur S. (2007). Bioinformatics - Database, Tools, and Algorithms. Oxford University Press.
3.	David W. M. (2001). Bioinformatics Sequence and Genome Analysis (2 nd Edition). CBS Publishers and Distributors(Pvt.)Ltd.
4.	Xiong J, (2011). <u>Essential bioinformatics</u> , First south Indian Edition, Cambridge University Press.
5.	Harshawardhan P.Bal, (2006). <u>Bioinformatics Principles and Applications</u> , Tata McGraw-Hill Publishing Company Limited.

Web Resources

1.	https://www.hsls.pitt.edu/obrc/
2.	https://www.hsls.pitt.edu/obrc/index.php?page=dna
3.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1669712/
4.	https://www.ebi.ac.uk/
5.	https://www.kegg.jp/kegg/kegg2.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1	M			M		M			M	M			M	
CO2							S		S	S			S	
CO3						S			S	S				
CO4				S		S	S		S				S	
CO5				S	S	S	S		S	S			S	

Course Code	Course Title	L	T	P	C
23216SEC24L	Medical Microbiology Lab	0	0	4	4

Course Objectives

CO1:Develop skills in the diagnosis of bacterial infections and antimicrobial sensitivity.

CO2:Impart knowledge on fungal infections and its diagnosis.

CO3:Diagnose parasitic

CO4:To gain knowledge about industrially important microbes.

CO5:Screen and utilize microorganisms for effective industrial production of metabolites.

Course Details:

UNIT I:

- ❖ Staining of clinical specimens - Wet mount, Differential and Special staining methods.
- ❖ Isolation and identification of bacterial pathogens from clinical specimens - cultivation in basal, differential, enriched, selective and special media – Biochemical identification tests.
- ❖ Enumeration of bacteria in urine to detect significant bacteriuria.
- ❖ Antimicrobial sensitivity testing - Kirby Bauer method and Stokes method.
- ❖ Minimum inhibitory concentration (MIC) test.
- ❖ Minimum bactericidal concentration (MBC) test

UNIT II:

- ❖ Identification and Classification of common fungi. Mounting and staining of VAM spores.
- ❖ Examination of different fungi by Lactophenol cotton blue staining.
- ❖ Examination of different fungi by KOH staining.
- ❖ Cultivation of fungi and their identification - *Mucor*, *Rhizopus*, *Aspergillus*, *Penicillium*.
- ❖ Microscopic observation of different asexual fungal spores.
- ❖ Microscopic observation of fungal fruiting bodies.
- ❖ Identification of Dermatophytes.
- ❖ Isolation and characterization of bacteriophage from natural sources by phage titration.
- ❖ Cultivation of viruses –Egg Inoculation methods.
- ❖ Diagnosis of Viral Infections –ELISA –HIA.
- ❖ Spotters of viral inclusions and CPE-stained smears.

UNIT III:

- ❖ Examination of parasites in clinical specimens - Ova/cysts in faeces.
- ❖ Concentration: methods – Flootation methods-simple Saturated salt solution method – Zinc sulphate methods - Sedimentation methods- Formal ether method.
- ❖ Blood smear examination for malarial parasites. Thin smear by Leishman's stain – Thick smear by J.B. stain.
- ❖ Identification of common arthropods of medical importance - spotters of *Anopheles*, *Glossina*, *Phlebotomus*, *Aedes*, Ticks and mites.

UNIT IV:

- ❖ Good Laboratory Practices in Industrial Microbiology laboratory.
- ❖ Study of Bioreactor and its essential parts.
- ❖ Culturing and Characterization of microorganisms used in Dairy and Pharmaceutical industry.
- ❖ Screening for Enzyme producers (amylase /protease).
- ❖ Optimization of parameters for Amylase production.

- ❖ Screening for Organic acid producers (acetic acid/lactic acid).
- ❖ Screening for Antibiotic producers.

UNIT V:

- ❖ Immobilization of microbial cells and enzyme and its assessment.
- ❖ Microbiological assays of fermentation products – MIC- MBC.
- ❖ Microbiological assay of antibiotics by cup plate method and other methods.
- ❖ Sterility testing of pharmaceuticals.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Collection of different clinical samples, transport, culture and examination.	PO7, PO8, PO9
CO2	Identify medically important bacteria, fungus and parasites from the clinical samples by staining and biochemical tests.	PO7, PO8, PO9
CO3	Promote diagnostic skills; interpret laboratory tests in the diagnosis of infectious diseases.	PO7, PO8, PO9, PO10
CO4	Perform antibiotic sensitivity tests and compare with the standard tests.	PO7, PO8, PO9, PO10
CO5	Screening of industrially important microbes for metabolite production.	PO7, PO8, PO9

Text Books	
1.	Cullimore D. R. (2010). Practical Atlas for Bacterial Identification, 2 nd Edition. Publisher-Taylor and Francis.
2.	Abbott A.C. (2010). The Principles of Bacteriology. Nabu Press.
3.	Parija S. C. (2012). Textbook of Practical Microbiology. Ahuja Publishing House.
4.	Cappuccino, J. and Sherman, N. (2002) Microbiology: A Laboratory Manual, (6 th Edition). Pearson Education, Publication, New Delhi.
5.	Morag C. and Timbury M.C. (1994). _Medical Virology. 4 th edn. Blackwell Scientific Publishers.

References Books	
1.	Collee J. G., Fraser A.G. Marmion B. P. and Simmons A. (1996). Mackie & McCartney Practical Medical Microbiology. (14 th Edition). Elsevier, New Delhi.
2.	Chart H. (2018). Practical Laboratory Bacteriology. CRC Press.
3.	Moore V. A. (2017). Laboratory Directions for Beginners in Bacteriology. Triste Publishing Ltd.
4.	.Cheesbrough M. (2006). District Laboratory Practice in Tropical countries.- Part 22 nd Edition.Cambridge University Press.
5.	Murray P.R., Rosenthal K.S. and Michael A. (2013). Medical Microbiology. Pfaller. 7 th Edition. Elsevier, Mosby Saunders

Mapping with Programme Outcomes

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4
CO1							M	M	M					
CO2							M	M	M					
CO3							M	M	L	L				
CO4							M	M	M	L				
CO5							M	M	M					

Course Code	Course Title	L	T	P	C
23216DSC25A	Epidemiology	4	1	0	3

Course Objectives

CO1: Describe the role of epidemiology in public health.

CO2: Explain about epidemiology tools and disease surveillance methods.

CO3: Analyze various communicable and non-communicable diseases in India.

CO4: Discuss on mechanism of antimicrobial resistance.

CO5: Outline on National health programmes that have been designed to address the issues.

Course Details:

UNIT I:

Fundamentals of epidemiology - Definitions of epidemiology – Epidemiology of infectious diseases in Public Health. Natural history of disease - Historical aspects of epidemiology. Common risk factors - Epidemiologic Triad - Agent factors, host factors and environmental factors. Transmission basics - Chain of infection, portal of entry. Modes of transmission -Direct and indirect. Stages of infectious diseases. Agents and vectors of communicable diseases of public health importance and dynamics of disease transmission. Epidemiology of Zoonosis - Factors, routes of transmission of bacterial, viral, parasitic and fungal zoonotic agents. Control of zoonosis.

UNIT II:

Tools of Epidemiology - Measures of Disease - Prevalence, incidence. Index case. Risk rates. Descriptive Epidemiology - Cohort studies, measuring infectivity, survey methodology including census procedures. Surveillance strategies - Disease surveillance, geographical indication system, outbreak investigation in public health and contact investigation

UNIT III:

Epidemiological aspects of diseases of national importance - Background to communicable and non-communicable diseases. Vector borne diseases in India. Diarrhoeal diseases. Zoonoses. Viral haemorrhagic fevers. Mycobacterial infections. Sexually transmitted diseases. Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS). Emerging disease threats - Severe Acute Respiratory Syndrome (SARS), Covid-19, Ebola, MDR-TB, Malaria, Mucor mycosis, Avian flu. Dengue, Swine Flu, Chikungunya. Epidemiology, prevention, and control of non-communicable diseases - Asthma, Coronary heart disease, Malignancy, diabetes mellitus, respiratory diseases, eye diseases, Dental disorders. Emerging and Re-emerging Diseases.

UNIT IV:

Mechanisms of Antimicrobial resistance - Multidrug Efflux pumps, Extended Spectrum β -lactamases (ESBL). Hospital acquired infections - Factors, infection sites, mechanisms, Role of Multidrug resistant pathogens. Role of *Pseudomonas*, *Acinetobacter*, *Clostridium difficile*, HBV, HCV, Rotavirus, *Cryptosporidium* and *Aspergillus* in Nosocomial infections. Prevention and management of nosocomial infections.

UNIT V:

National Programmes related to Communicable and Non-Communicable diseases - National Malaria Eradication Programme, Revised National Tuberculosis Control Programme, Vector Borne Disease Control Programme, National AIDS Control Programme, National Cancer Control Programme and National Diabetes Control Programme. Biochemical and immunological tools in epidemiology - Biotyping, Serotyping, Phage typing, FAME (Fatty acid methyl ester

analysis), Curie Point PyMS (Pyrolysis Mass spectrometry), Protein profiling, Molecular typing methods.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Apply the knowledge acquired on concepts of epidemiology to clinical and public health environment.	PO1
CO2	Plan various strategies to trace the epidemiology.	PO4, PO5, PO6
CO3	Plan the control of communicable and non-communicable diseases.	PO1, PO5,
CO4	Analyze the implications of drug resistance in the society and design the control of antimicrobial resistance and its management.	PO5,
CO5	Employ National control programs related to Communicable and Non-Communicable diseases with the public.	PO4, PO5,

Text Books	
1.	Dicker R., Coronado F., Koo. D. and Parrish. R. G. (2012). Principles of Epidemiology in Public Health Practice., (3 rd Edition). CDC.
2.	Gerstman B. (2013). Epidemiology Kept Simple: An Introduction to Classic and Modern Epidemiology. (3 rd Edition). Wiley Blackwell.
3.	Greenwood, D., Slack, R. B. and Peutherer, J. F. (2012) Medical Microbiology, (18 th Edition). Churchill Livingstone, London.
4.	Jawetz E., Melnick J. L. and Adelberg E. A. (2000). Review of Medical Microbiology. (19 th Edition). Lange Medical Publications, U.S.A.
5.	Dimmok N. J. and Primrose S. B. (1994). <u>Introduction to Modern Virology</u> .5 th edn. Blackwell Scientific Publishers.

References Books	
1.	Bhopal R. S. (2016). Concepts of Epidemiology - An Integrated Introduction to the Ideas, Theories, Principles and Methods of Epidemiology. (3 rd Edition). Oxford University Press, New York.
2.	Celentano D. D. and Szklo M. (2018). Gordis Epidemiology. (6 th Edition). Elseiver, USA.
3.	Cheesbrough, M. (2004). District Laboratory Practice in Tropical Countries - Part 2, (2 nd Edition). Cambridge University Press.
4.	Ryan K. J. and Ray C. G. (2004). Sherris Medical Microbiology. (4 th Edition), McGraw Hill, New York.
5.	Topley W.W. C., Wilson, G. S., Parker M. T. and Collier L. H. (1998). Principles of Bacteriology. (9 th Edition). Edward Arnold, London.

Course Code	Course Title	L	T	P	C
23216DSC25B	Clinical Diagnostic Microbiology	4	1	0	3

Course Objectives

CO1: Describe appropriate safety protocol and laboratory techniques for handling specimens and biomedical waste management.

CO2: Develop working knowledge of techniques used to identify infectious agents in the clinical microbiology lab.

CO3: Elucidate various diagnostic procedures in microbiology.

CO4: Acquire knowledge on different methods employed to check antibiotic sensitivity.

CO5: Gain knowledge on hospital acquired infections and their control measures.

Course Details:

UNIT I:

Microbiology Laboratory Safety Practices -General Safety Guidelines, Handling of Biological Hazards, Infectious health care waste disposal - Biomedical waste management, Emerging and Re-emerging infections.

UNIT II:

Diagnostic procedures - General concept of Clinical specimen collection, transport, storage and general processing in Microbiology laboratory - Specimen acceptance and rejection criteria.

UNIT III:

Diagnosis of microbial diseases - Clinical, differential, Microbiological, immunological and molecular diagnosis of microbial diseases. Modern and novel microbial diagnostic methods. Automation in Microbial diagnosis.

UNIT IV:

Antibiotic sensitivity tests - Disc diffusion - Stokes and Kirby Bauer methods, E test - Dilution - Agar dilution & broth dilution - MBC/MIC - Quality control for antibiotics and standard strains.

UNIT V:

Nosocomial infections – common types, sources, reservoir and mode of transmission, pathogenesis and control measures. Hospital Infection Control Committee (HICC) – Functions.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Apply Laboratory safety procedures and hospital waste disposal strategies.	PO5, PO6, PO7
CO2	Collect various clinical specimens, handle, preserve and process safely.	PO6, PO7
CO3	Identify the causative agents of diseases by conventional and molecular methods following standard protocols.	PO6, PO7, PO9, PO11
CO4	Assess the antimicrobial susceptibility pattern of pathogens.	PO7, PO9
CO5	Trace the sources of nosocomial infection and recommend control measures.	PO5, PO7

TEXT BOOKS

1.	Collee J. G., Fraser A.G. Marmion B. P. and Simmons A. (1996). Mackie & McCartney Practical Medical Microbiology. (14 th Edition). Elsevier, New Delhi. ISBN-10:0443047219 / ISBN-13-978-0443047213.
2.	Tille P. M. (2021). Bailey and Scott's Diagnostic Microbiology. (15 th Edition). Elsevier. ISBN:9780323681056.
3.	Jawetz E., Melnick J. L. and Adelberg E. A. (2000). Review of Medical Microbiology. (19 th Edition). Lange Medical Publications, U.S.A.
4.	Mukherjee K.L. (2000). Medical Laboratory Technology.Vol. 1-3. (2 nd Edition). Tata McGraw-Hill Education. ISBN-10:0074632604.
5.	Sood R. (2009). Medical Laboratory Technology – Methods and Interpretations. (6 th Edition). Jaypee Brothers Medical Publishers (P) Ltd. New Delhi. ISBN:9788184484496.

References Books

1.	Murray P. R., Baron E. J., Jorgenson J. H., Tenover F. C. and Tenover F. C. (2003). Manual of Clinical Microbiology. (8 th Edition). American Society for Microbiology, Washington, DC. ISBN:1-555810255-4.
2.	Bennett J. E., Dolin R. and Blaser M. J. (2019). Principles and Practice of Infectious Diseases. (9 th Edition). Elsevier. EBook ISBN:9780323550277. Hardcover ISBN:9780323482554.
3.	Ridgway G. L., Stokes E. J. and Wren M. W. D. (1987). Clinical Microbiology 7 th Edition. Hodder Arnold Publication. ISBN-10:0340554231 / ISBN-13:9780340554234.
4.	Koneman E.W., Allen S. D., Schreckenber P. C. and Winn W. C. (2020). Koneman's Color Atlas and Textbook of Diagnostic Microbiology. (7 th Edition). Jones & Bartlett Learning. ISBN:1284322378 9781284322378.
5.	Cheesbrough, M. (2004). District Laboratory Practice in Tropical Countries - Part 2, (2 nd Edition). Cambridge University Press. ISBN-13:978-0-521-67631-1 / ISBN-10:0-521-67631-2.

Web Resources

1.	https://www.ncbi.nlm.nih.gov/books/NBK20370/
2.	https://www.msmanuals.com/en-in/home/infections/diagnosis-of-infectious3disease/diagnosis-of-infectious-disease
3.	https://journals.asm.org/doi/10.1128/JCM.02592-20
4.	https://www.sciencedirect.com/science/article/pii/S2221169116309509
5.	http://www.textbookofbacteriology.net/normalflora_3.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1					S	M	M							
CO2						M	S							
CO3						M	S		M		S			
CO4							S		M					
CO5					S		M							

Course Code	Course Title	L	T	P	C
23216DSC25C	Bioremediation	4	1	0	3

Course Objectives

CO1: Describe the nature and importance of bioremediation and use in real world applications.

CO2: Describe the typical composition of wastewater and application of efficient technologies for water treatment.

CO3: Explain the fundamentals of treatment technologies and the considerations for its design and implementation in treatment plants.

CO4: Explain the potential of microbes in ore extraction and acquaint students with methods of reducing health risks caused by xenobiotics.

CO5: Familiarize the role of plants and their associated microbes in remediation and management of environmental pollution.

Course Details:

UNIT I:

Bioremediation - process and organisms involved. Bioaugmentation - Ex-situ and in-situ processes; Intrinsic and engineered bioremediation. Major pollutants and associated risks; organic pollutant degradation. Microbial aspects and metabolic aspects. Factors affecting the process. Recent developments and significance.

UNIT II:

Microbes involved in aerobic and anaerobic processes in nature. Water treatment - BOD, COD, dissolved gases, removal of heavy metals, total organic carbon removal. Secondary waste water treatments - use of membrane bioreactor. Aquaculture effluent treatment. Aerobic sludge and landfill leachate process. Aerobic digestion.

UNIT III:

Composting of solid wastes, anaerobic digestion - methane production and important factors involved, Pros and cons of anaerobic process, sulphur, iron and nitrate reduction, hydrocarbon degradation, degradation of nitroaromatic compounds. Bioremediation of dyes, bioremediation in paper and pulp industries. Aerobic and anaerobic digesters – design. Various types of digester for bioremediation of industrial effluents.

UNIT IV:

Microbial leaching of ores - process, microorganisms involved and metal recovery with special reference to copper and iron. Biotransformation of heavy metals and xenobiotics. Petroleum biodegradation - reductive and oxidative. Dechlorination. Biodegradable plastics and superbugs.

UNIT V:

Phytoremediation of heavy metals in soil - Basic principles of phytoremediation - Uptake and transport, Accumulation and sequestration. Phytoextraction. Phytodegradation. Phytovolatilization. Rhizodegradation. Phytostabilization – Organic and synthetic amendments in multi metal contaminated mine sites. Role of Arbuscular mycorrhizal fungi and plant growth promoting rhizobacteria in phytoremediation.

Course Outcomes		
Course Outcomes		
CO1	Differentiate Ex-situ bioremediation and In-situ bioremediation. Assess the roles of organisms in bioremediation.	PO1, PO2, PO4, PO5
CO2	Distinguish microbial processes necessary for the design and optimization of biological processing unit operations.	PO1, PO4, PO5, PO11
CO3	Identify, formulate and design engineered solutions to environmental problems.	PO5, PO7, PO8, PO11
CO4	Explore microbes in degradation of toxic wastes and playing role on biological mechanisms.	PO5, PO6, PO7, PO8, PO9
CO5	Establish the mechanisms of Arbuscular mycorrhizal fungi and Plant growth promoting <i>Rhizobacteria</i> in phytoremediation.	PO1, PO5, PO6, PO7, PO8

Text Books	
1.	Bhatia H.S. (2018). A Text book on Environmental Pollution and Control. (2 nd Edition). Galgotia Publications.
2.	Chatterjee A. K. (2011). Introduction to Environmental Biotechnology. (3 rd Edition). Printice-Hall, India.
3.	Pichtel, J. (2014). Waste Management Practices: Municipal, Hazardous, and Industrial, 2 nd edition, CRC Press.
4.	Liu, D.H.F and Liptak, B.G (2005). Hazardous Wastes and Solid Wastes, Lewis Publishers..
5.	Rajendran, P. & Gunasekaran, P. (2006). Microbial Bioremediation. 1 st edition. MJP Publishers

References Books	
1.	Sangeetha J., Thangadurai D., David M. and Abdullah M.A. (2016). Environmental Biotechnology: Biodegradation, Bioremediation, and Bioconversion of Xenobiotics for Sustainable Development. (1 st Edition). Apple Academic Press.
2.	Singh A. and Ward O. P. (2004). Biodegradation and Bioremediation. Soil Biology. Springer.
3.	Singh A., Kuhad R. C., and Ward O. P. (2009). Advances in Applied Bioremediation (1 st Edition). Springer-Verlag Berlin Heidelberg, Germany.
4.	Atlas, R.M & Bartha, R. (2000). Microbial Ecology. Addison Wesley Longman Inc.
5.	Rathoure, A.K. (Ed.). (2017). Bioremediation: Current Research and Applications. 1 st edition. I.K. International Publishing House Pvt. Ltd.

Web Resources

1.	Bioremediation- Objective, Principle, Categories, Types, Methods, Applications (microbenotes.com)
2.	https://agris.fao.org > agris-search
3.	https://www.sciencedirect.com/topics/earth-and-planetary-sciences/bioremediation
4.	https://www.intechopen.com/chapters/70661
5.	https://microbiologysociety.org/blog/bioremediation-the-pollution-solution.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4
CO1	S	M		M	S									
CO2	S			M	S						S			
CO3					S		S	S			S			
CO4					S	S	S	S	S					
CO5	M				S	M	S	S						

Course Code	Course Title	L	T	P	C
23216AEC23	Clinical Research and Clinical Trials	4	1	0	4

Course Objectives

CO1: Provide an overview of history and methods involved in conducting clinical research

CO2: Design the principles involved in ethical, legal, and regulatory issues in clinical research on human subjects.

CO3: Describe principles and issues involved in monitoring patient-oriented research.

CO4: Formulate a well- defined quality assurance and quality control plans.

CO5: Acquire business development skills in the area of clinical research.

Course Details:

UNIT I:

Introduction to Clinical Research: Clinical Research: An Overview, Different types of Clinical Research. Clinical Pharmacology: Pharmacokinetics, Pharmacodynamics, Pharmacoepidemiology, Bioavailability, Bioequivalence, Terminologies and definition in Clinical Research. Drug Development Process: Drug Discovery Pipeline, Drug Discovery Process. Preclinical trail, Human Pharmacology (Phase-I), Therapeutic Exploratory trail (Phase-II), Therapeutic Confirmatory Trail (Phase-III) and Post marketing surveillance (Phase-IV).

UNIT II:

Ethical Considerations and Guideline in Clinical Research: Historical guidelines in Clinical Research-Nuremberg code, Declaration of Helsinki, Belmont report. International Conference on Harmonization (ICH)-Brief history of ICH, Structure of ICH & ICH Harmonization Process, Guidelines for Good Clinical Practice. Regulation in Clinical Research-Drug and cosmetic act, FDA, Schedule-Y- Ethics Committee and their responsibilities. Clinical Research Regulatory Submission & approval Process- IND, NDA and ANDA submission Procedure. DCGI submission procedure. Other Regulatory authorities- EMEA, MHRA, PhRMA

UNIT III:

Clinical Trial Management: Key Stakeholders in Clinical Research, Ethics Committees and Institutional Review Board, Responsibilities of Sponsor. Responsibilities of Investigator, Protocol in Clinical Research Clinical Trial Design, Project Planning Project Managements - Informed Consent, Investigator's Brochure (IB), Selection of an Investigator and Site, Patient screening, Inclusion and exclusion criteria, Randomization, Blinding. Essential Documents in clinical research -IB, ICF, PIS, TMF, ISF, CDA & CTA.

UNIT IV:

Quality Assurance, Quality Control & Clinical Monitoring: Defining the terminology- Quality, Quality system, Quality Assurance & Quality Control-QA audit plan. 21 CFR Part 11, Site Auditing, Sponsor Compliance and Auditing, SOP For Clinical Research-CRF Review & Source Data Verification, Drug Safety Reporting Corrective and preventative action process.

UNIT V:

Business Development in the Clinical Research Industry: Introduction & Stages of Business Development-Start-up Phase, Growth Phase, Maturity Phase, Decline Phase. Outsourcing in Clinical Research, Reasons for outsourcing to contract research organizations, The India Advantage, Scope and Future of CRO, List of Clinical Research Organizations in India, List of IT companies offering services in Clinical Research. Role of business development manager.

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Apprehend the Drug Development process and different phases of clinical trials.	PO1, PO2, PO3, PO5
CO2	Recognize the ethics and regulatory perspectives on clinical research trials activities.	PO3, PO5, PO6, PO9
CO3	Accentuate about clinical trials management concepts and documentation process.	PO2, PO4, PO6, PO9
CO4	Accomplish quality assurance and quality control to ensure the protection of human subjects and the reliability of clinical trial results.	PO2, PO4, PO6, PO7, PO9
CO5	To nurture skills recitation to commercial start up and industriousness.	PO4, PO8, PO9, PO11, PO13

Text Books

1.	Gallin J. I., Ognibene F. P. and Johnson L. L. (2007). Principles and Practice of Clinical Research. (4 th Edition). Elsevier, 2007. ISBN-10: 0128499052
2.	Friedman L. M., Furberg C. D. and Demets D. (1998). Fundamentals of Clinical Trials, Vol: XVIII. (3 rd Edition). Springer Science & Business Media.
3.	Hulley S. B., Cummings S. R., Browner W. S., Grady D. G. and Newman T. B. (2013). Designing Clinical Research. (4 th Edition). Jaypee Medical. ISBN-13: 978-1608318049.
4.	Reed, G. (2004). Prescott and Dunn's Industrial Microbiology, 4 th edn, CBS publication and distributors.
5.	Himanshu B. Text book of Clinical Research, Pee Vee books.

References Books

1.	Friedman L.M., Fuberge C.D., DeMets D. and Reboussen, D.M. (2015). Fundamentals of Clinical Trials, Springer.
2.	Browner W. S., (2012). Publishing and Presenting Clinical Research. (3 rd Edition). Lippincott Williams and Wilkins.
3.	Rondel R. K., Varley S. A. and Webb C. F. (2008). Clinical Data Management. (2 nd Edition). Wiley.
4.	Pepler, H.J. and Pearl Man, D. (1979). Fermentation Technology, Vol 1 & 2, 2 nd Edition Academic Press, London.
5.	E1-Mansi, E.M.T., Bryce, C.F.A., Demain, A.L. and Allman, A.R. (2007). Fermentation Microbiology and Biotechnology. 2 nd Edition, CRC press, Taylor and Francis Group.

Web Resources

1	https://www.hzu.edu.in/uploads/2020/10/Textbook-of-Clinical-Trials-Wiley-(2004).pdf
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2	https://www.routledge.com/A-Practical-Guide-to-Managing-Clinical-Trials/Pfeiffer-Wells/p/book/9780367497828
3	https://www.auctoresonline.org/journals/clinical-research-and-clinical-trials
4	https://www.who.int/health-topics/clinical-trials#tab=tab_1
5	https://www.cancerresearchuk.org/about-cancer/find-a-clinical-trial/what-clinical-trials-are/types-of-clinical-trials

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	S	S	S		S									
CO2			S		S	S			S					
CO3		S		S		S			S					
CO4		S		S		S	S		S					
CO5				S				S	S		S		M	

Course Code	Course Title	L	T	P	C
23216GEC26	Vermitechnology	4	0	0	3

Course Objectives

CO1: Introduce the concepts of vermicomposting.

CO2: Explain the physiology, anatomy and biology of earthworms.

CO3: Acquire the knowledge of the vermicomposting process.

CO4: Explain the trouble shooting, harvesting and packaging of vermin composts.

CO5: Gain knowledge on applications of vermin composts and their value added products.

Course Details:

UNIT I:

Introduction to Vermiculture - Definition, classification, history, economic importance- In sustainable agriculture, organic farming, earthworm activities, soil fertility & texture, soil aeration, water impercolation, decomposition & moisture, bait & food and their value in maintenance of soil structure. Its role in the bio transformation of the residues generated by human activity and production of organic fertilizers. Choosing the right worm. Useful species of earthworms. Local species of earthworms. Exotic species of earthworms. Factors affecting distribution of earthworms in soil.

UNIT II:

Earthworm Biology and Rearing - Key to identify the species of earthworms. Biology of *Eisenia fetida*. a) Taxonomy Anatomy, physiology and reproduction of Lumbricidae. b) Vital cycle of *Eisenia fetida*: alimentation, fecundity, annual reproducer potential and limiting factors (gases, diet, humidity, temperature, PH, light, and climatic factors). Biology of *Eudrilus eugeniae*. c) Taxonomy Anatomy, physiology and reproduction of Eudrilidae. d) Vital cycle of *Eudrilus eugeniae*: alimentation, fecundity, annual reproducer potential and limit factors (gases, diet, humidity, temperature, PH, light, and climatic factors)

UNIT III:

Vermicomposting Process - Feeds for Vermitech systems- Animal manures- Kitchen Waste and Urban waste- Paper pulp and card board solids- Compost and waste products- Industrial Wastes. Vermicomposting Basic process- Initial pre-composting phase- Mesophilic phase- Maturing and stabilization phase- Mechanism of Earthworm action. Methods of vermicomposting- a) windrows system; b) wedge system; c) container system-pits, tanks & cement rings; commercial model; beds or bins-top fed type, stacked type, d) Continuous flow system.

UNIT IV:

Vermicomposting - Trouble Shooting-Temperature-Aeration- Acidity- Pests and Diseases- Ants, rodents, Birds, Centipedes, sour crop, Mite pests. Odour problems. Separation techniques- Light Separation-Sideways Separation-Vertical Separation-Gradual transfer. Harvesting Earthworms- manual method- migration method. Packing & Nutritional analysis of vermicompost.

UNIT V:

Applications of Vermiculture - Vermiculture Bio-technology, use of vermi castings in organic farming/horticulture, as feed/bait for capture/culture fisheries; forest regeneration. Application quantity of vermicompost in Agricultural fields- crops, fruits, vegetables & flowers. By-products and value-added products- Verm wash- vermicompost tea-vermi meal-enriched vermicompost-pelleted vermicompost.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Compare and contrast the uses of vermicompost to the soil.	PO1, PO4, PO5, PO9,
CO2	Recommend different species of earthworms after acquiring knowledge on its biology.	PO1, PO4, PO6, PO9
CO3	Design the vermicomposting process.	PO1, PO4, PO6, PO7, PO8
CO4	Assess the Best Practices of Vermicomposting	PO6,PO7, PO8,PO9,
CO5	Recommend the applications of vermicompost to different soils and for different crops.	PO1, PO4, PO5,PO6, PO7

Text Books	
1	Ismail S. A. (2005). The Earthworm Book, Second Revised Edition. Other India Press, Goa, India.
2	Rathoure A. K., Bharati P. K. and Ray J. (2020). Vermitechnology, Farm and Fertilizer. Vermitechnology, Farm and Fertilizer Discovery Publishing House Pvt Ltd.
3	Christy M. V. 2008. Vermitechnology, (1 st Edition), MJP Publishers.
4	The complete technology book on Vermiculture and Vermicompost with manufacturing Process, machinery equipment details and Plant Layout. AB Press.
5	Keshav Singh (2014). A Textbook of vermicompost: Vermiwash and Biopesticide.

References Books	
1	Roy D. (2018). Handbook of Vermitechnology. Lambert Academic Publishing.
2	Kumar A. (2005). Verms and Vermitechnology, A.P.H. Publishing Corporation, New Delhi.
3	Lekshmy M. S., Santhi R. (2012). Vermitechnology, Sara Publications, New Delhi, India.
4	<u>Edwards CA, Arancon NQ ShermanRL. (2011) Vermiculture Technology: Earthworms, Organic Wastes, and Environmental Management 1st edn.CRC Press.</u>
5	<u>Ismail, S.A. (1997). Vermicology-The Biology of Earthworm.1st edn. Orient longman.</u>

Web Resources	
1.	https://en.wikipedia.org/wiki/Vermicompost
2.	http://stjosephs.edu.in/upload/papers/9567411a78c63d4ccfbbe85e6aa22840.pdf
3.	https://www.kngac.ac.in/elearning-portal/ec/admin/contents/4_18K4ZEL02_2021012803204629.pdf
4.	https://composting.ces.ncsu.edu/vermicomposting-2/

5.

<https://rodaleinstitute.org/science/articles/vermicomposting-for-beginners/>**Mapping with Programme Outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	S			M	S				S					
CO2	S			M		S			S					
CO3	S			S		S	S	S						
CO4						S	S	S	S					
CO5	S			M	S	M	S							

SEMESTER III

Course Code	Course Title	L	T	P	C
23216AEC31	Soil and Environmental Microbiology	5	1	0	4

Course Objectives

CO1: Explain the role of microorganisms in soil fertility.

CO2: Discuss the benefits of interactions among soil microbes and acquire awareness about microbes as biofertilizers and biocontrol agents

CO3: Create awareness. about components of the environment, environmental pollution, and detection methods.

CO4: Acquire in depth knowledge about solid and liquid waste treatments.

CO5: Develop knowledge about organic matter degradation, bioremediation, and the environment risk assessment.

Course Details:

UNIT I:

Soil Microbiology– Soil as Microbial Habitat, Soil profile and properties, Soil formation, Diversity, and distribution of major group of microorganisms in soil. Quantification of soil microflora, role of microorganism in soil fertility. Mineralization of Organic & Inorganic Matter in Soil. Biological Nitrogen fixation- Chemistry and Genetics of BNF. Phytopathology and Disease cycle of Plant pathogens - Tikka and Citrus canker, Types of disease symptoms, Structural and Inducible biochemical defenses - Systemic Acquired Resistance (SAR), pathogenesis related (PR) proteins, Plantibodies, Phenolics, Phytoalexins

UNIT II:

Microbial Interactions - Mutualism, Commensalism, Amensalism, Synergism, Competition, Rhizosphere- Rhizosphere effect, Mycorrhizae – Types, Endophytes, PGPR- Plant growth promoting bacteria– symbiotic (*Bradyrhizobium*, *Rhizobium*, *Frankia*), Non-Symbiotic (*Azospirillum*, *Azotobacter*, Mycorrhizae, MHBs, Phosphate solubilizers, algae), Novel combination of microbes as biofertilizers, PGPRs. Biofertilizers and Biocontrol agents – Types, benefits and application. Advantages, social and environmental aspects - Bt crops, golden rice.

UNIT III:

Components of Environment: Hydrosphere, lithosphere, atmosphere, and biosphere – definitions with examples; Energy flow in the ecosystem- Carbon, Nitrogen, Sulfur and Phosphorous cycles. Physical factors affecting distribution of microorganisms in various environments. Predisposing factors for Environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases. Treatment and safety of drinking (potable) water, methods to detect potability of water samples. Space microbiology - Microbiological research in space environment.

UNIT IV:

Waste management – Solid waste - Types - management - Factors affecting solid waste generation rates. Industrial effluent treatment, primary, secondary, tertiary, and advanced treatment process. Quality assessment of decontaminated matters and other biological effluents. Biological reference standards. Utilization of Solid Waste as Food, Feed and Fuel- Composting, Vermicomposting, Bio manure and Biogas production. E waste management

UNIT V:

Degradation of organic matter - lignin, cellulose, hemicellulose, pectin, common pesticides- herbicides (2,4-D) and pesticides (DDT), heavy metals. Biodegradation of Xenobiotics

- Recalcitrant Halocarbons, Recalcitrant TNTs, PCBs and Synthetic polymers. Biodegradation of Hydrocarbons. Biodeterioration of Textiles and Leather. Pollution Control Bodies and Environmental laws in India. Environmental impact assessment, EIA guidelines, US Environment protection Agency norms

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Depict diversity and significance of soil microbes and predict the role of microbes in biological nitrogen fixation.	PO1
CO2	Utilize the knowledge of microbial interactions, with beneficial application of biofertilizers for sustainable agriculture and benefits of biopesticides.	PO1, PO7, PO8
CO3	Explain the different types of microorganisms in water. Identify the causes of water pollution and the methods for quality assessment of water and control of water borne diseases.	PO1, PO5, PO6, PO7, PO8
CO4	Apply knowledge about waste treatments and microbial decomposition and bio-remediation process in environmental cleanup.	PO1, PO5
CO5	Plan a clear approach on environmental issues. Control pollution and explain protection laws to public.	PO1, PO5

Text Books	
1.	Subba Rao. N. S. (2017). Soil Microbiology. (5 th Edition). MedTech Publishers.
2.	Daniel. C. J. (2006). Environmental Aspects of Microbiology. (2 nd Edition). Bright Sun Publications.
3.	Rangaswami. G. and Mahadevan. A. (2006). Diseases of Crop Plants in India. (4 th Edition). Prentice–Hall of India Pvt. Ltd.
4.	Sharma P. D. (2010). Microbiology and Plant pathology. (2 nd Edition). Rastogi Publications.
5.	Subba Rao. N.S. (2005). Soil microorganisms and Plant Growth. (4 th Edition). Oxford and IBH Publishing Pvt. Ltd.

References Books	
1.	Pepper I. L., Gerba C. P. and Gentry T. J. (2014). Environmental Microbiology (1 st Edition). Academic Press, Elsevier.
2.	Bitton, G. (2011). Wastewater Microbiology. (4 th Edition). Wiley-Blackwell.
3.	Bridgewater L. (2012). Standard Methods for the Examination of Water and Wastewater. American Public Health Association.
4.	Shrivastava A.K. (2003). Environment Auditing. A. P. H. Publishing Corporation.
5.	Tinsley, S. and Pillai, I. (2012). Environmental Management Systems – Understanding Organizational Drivers and Barriers. Earthscan.

Course Code	Course Title	L	T	P	C
23216AEC32	Recombinant DNA Technology and Biotechnology	4	1	0	4

Course Objectives

CO1: Provide knowledge on the structure, replication and repair mechanisms of DNA. Illustrate the structure, functions and significance of RNA.

CO2: Discuss the gene regulatory mechanisms in prokaryotes and eukaryotes and importance of mutations.

CO3: Provide in depth knowledge about artificial gene transfer mechanisms and selection of Recombinants.

CO4: Impart knowledge on various molecular techniques and their importance in biotechnology.

CO5: Explain the applications of genetic engineering in various fields.

Course Details:

UNIT I:

DNA replication – modes and enzymes involved. Detailed mechanism of semi-conservative replication. Prokaryotic and eukaryotic transcription. Structure and processing of mRNA, r-RNA and t-RNA. Ribosomes. Genetic Code and Wobble hypothesis, Translation in prokaryotes and eukaryotes, post translational modifications.

UNIT II:

Gene regulation and expression – Lac operon, arabinose and tryptophan operons. Gene regulation in eukaryotic systems - repetitive DNA, gene rearrangement, promoters, enhancer elements. Molecular basis of gene mutation - Types of mutations - base substitutions, frame shift, deletion insertion, duplication, inversion. Silent, conditional and lethal mutation. Chemical mutagenesis. Repair of DNA damage. Photoreactivation. SOS repair mechanism. Base excision repair. Nucleotide excision repair. Detection and analysis of mutations (Replica plating, Antibiotic enrichment, Ames test).

UNIT III:

Tools and methods in gene cloning. Restriction endonucleases – nomenclature, classification and characteristics - DNA methylases, DNA polymerases, Ligases. Adapters, linkers and homopolymer tailing. Artificial gene transfer techniques - electroporation, microinjection, protoplast fusion and microparticle bombardment. Screening for recombinants. Gene cloning vectors for prokaryotes and eukaryotes - cloning properties and types of plasmids vectors (pBR322 and derivatives, pUC vectors and pGEM3Z) - Phage Vectors(M13 and Lambda), cosmids, phasmids, phagemids and BACs - Eukaryotic vectors - Yeast vectors – Animal and plant vectors – expression vectors. Shuttle vectors - Expression of foreign genes in bacteria, animal, plant, algae and fungi – merits and demerits.

UNIT IV:

Genomic DNA and cDNA library - Construction and Screening. Substrative hybridization for tissue specific DNA libraries. Techniques in genetic engineering Characterization of cloned DNA: Hybrid arrested translation (HAT) - Restriction mapping - restriction fragment length polymorphism (RFLP) - Polymerase chain reaction (PCR) – Principles, types and their applications. DNA sequencing - Primer walking, Sanger's method and automated sequencing methods. Pyrosequencing – DNA chips and micro array. Protein engineering and techniques Site directed mutagenesis – methods - Design and construction of novel proteins and enzymes, Basic

concepts in enzyme engineering, engineering for kinetic properties of enzymes. protein folding, protein sequencing, protein crystallization. Applications of protein engineering.

UNIT V:

Plant biotechnology - constituents and concepts of sterilization - preparation, isolation and selection of explant. Suspension cell culture, callus culture, protoplast isolation, culture & fusion. Anther and pollen culture for production. Animal biotechnology – equipment and media used for animal cell culture technology. Primary and established cell line culture and culture media. Applications of animal cell cultures. Serum protein media viability and cytotoxicity. Applications of Genetic Engineering - transgenic animals, Recombinant Cytokines and their use in the treatment of animal infections. Monoclonal Antibodies in Therapy- Vaccines and their Applications in Animal Infections - Human Gene Therapy - Germline and Somatic Cell Therapy - Ex-vivo Gene Therapy. In-vivo Gene Therapy. Vectors in Gene Therapy-Viral and Non-Viral Vectors. Transgenic Plants.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Analyze, demonstrate and appreciate DNA replication and protein synthesis.	PO4, PO6, PO9
CO2	Investigate the types of mutation and its impact on microbes. Illustrate various strategies on gene cloning.	PO4, PO6, PO9
CO3	Analyze, modify and characterize DNA modifying enzymes.	PO4, PO6, PO9
CO4	Illustratively assess the molecular techniques for DNA and protein analysis.	PO4, PO6, PO9
CO5	Adopt the applications of Genetic Engineering in the field of agriculture and medicine towards scientific research.	PO1, PO3, PO4, PO5, PO6, PO7, PO8, PO9

Text Books	
1.	Malacinski G.M. (2008). Freifelder’s Essentials of Molecular Biology. (4 th Edition). Narosa Publishing House, New Delhi.
2.	Snusted D.P. and Simmons M. J. (2019). Principles of Genetics. (7 th Edition). John Wiley and Soms, Inc.
3.	Dale J. W., Schantz M.V. and Plant N. (2012). From Gene to Genomes – Concepts and Applications of DNA Technology. (3 rd Edition). John Wileys and Sons Ltd.
4.	Primrose S.B. and Twyman R. M. (2006). Principles of Gene Manipulation and Genomics. (7 th Edition). Blackwell Publishing.
5.	Maloy S. R. Cronan J.E. Jr. and Freifelder D. (2011). Microbial Genetics. (2 nd Edition). Narosa Publishing House Pvt. Ltd.

References Books	
1.	Brown T. A. (2016). Gene Cloning and DNA Analysis- An Introduction. (7 th Edition). John Wiley and Sons, Ltd.
2.	Glick B. R. and Patten C.L. (2018). Molecular Biotechnology – Principles and Applications of Recombinant DNA. (5 th Edition). ASM Press.
3.	Russell P.J. (2010). Genetics - A Molecular Approach. (3 rd Edition). Pearson New International Edition.
4.	Synder L., Peters J. E., Henkin T.M. and Champness W. (2013). Molecular Genetics of Bacteria. (4th Edition). ASM Press Washington-D.C. ASM Press.
5.	Dale J. W., Schantz M.V. and Plant N. (2012). From Gene to Genomes – Concepts and Applications of DNA Technology. (3 rd Edition). John Wileys and Sons Ltd.

Web Resources	
1.	https://microbenotes.com/gene-cloning-requirements-principle-steps-applications/
2.	https://geneticeducation.co.in/what-is-transcriptomics
3.	https://www.molbiotools.com/usefullinks.html
4.	https://geneticeducation.co.in/what-is-transcriptomics
5.	https://courses.lumenlearning.com/boundless-biology/chapter/dna-replication/

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1				S	M	S	L	L	S	L	L			
CO2				S	M	S	L	L	S	L	M			
CO3				S	M	S	L	L	S	L	M			
CO4				S	M	S	L	L	S	L	L			
CO5	S		S	S	S	S	S	S	S	M	L			

Course Code	Course Title	L	T	P	C
23216AEC33	Fermentation Technology and Pharmaceutical Microbiology	4	1	0	4

Course Objectives

CO1: Discuss about fermentation and its types, sensitize on methods of strain development for improved yield.

CO2: Impart knowledge on the fermenter design and types.

CO3: Acquire knowledge on the effective recovery and purification of the products.

CO4: Explain the importance of pharmaceutical microbiology.

CO5: Illustrate methods for production products using microorganisms and their quality control.

Course Details:

UNIT I:

Bioprocesses - concepts and design. Industrially important microorganisms – Isolation, primary and secondary screening, preservation and improvement of industrially important strains. Upstream processing - Development of inoculums for fermentation process. Media for industrial fermentation - Formulation, optimization. Sterilization. Stages of upstream - Growth of inoculums, fermenter pre-culture and production fermentation. Types of fermentation - Batch, continuous, dual or multiple, surface, submerged, aerobic and anaerobic.

UNIT II:

Fermenter – Design, types and construction, Instrumentation and control. Productivity. Yield coefficients. Heat production. Aeration and agitation. Gas exchange and mass transfer. Computer Applications in fermentation technology. Fermentation Economics.

UNIT III:

Downstream Processing - Recovery and purification of intracellular and extracellular products. Biomass separation by centrifugation, filtration, flocculation and other recent developments. Cell disintegration - Physical, chemical and enzymatic methods. Extraction - Solvent, two phase, liquid extraction, whole broth, aqueous multiphase extraction. Purification by different methods. Concentration by precipitation, ultra-filtration, reverse osmosis. Drying and crystallization.

UNIT IV:

Overview of pharmaceutical microbiology - Ecology of microorganisms - Atmosphere, water, skin, respiratory flora of workers, raw materials, packaging, building equipment and their control measures. Design and layout of sterile manufacturing unit. Contamination and Spoilage of Pharmaceutical products - sterile injectable and non-injectable, ophthalmologic preparation, implants.

UNIT V:

Production of pharmaceutical products and quality assurance – Vaccines, immunodiagnosics, immuno-sera, immunoglobulin. Antibiotics - Penicillin, Griseofulvin, Metronidazole. Enzymes - Streptokinase, Streptodornase. Quality assurance and quality

management in pharmaceuticals – In-Process, Final-Product Control and sterility tests. Regulatory aspects - BIS (IS), ISI, ISO, WHO and US certification.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Develop microbial strains, carry out fermentation and recover the products of the process.	PO6, PO7, PO8, PO9
CO2	Design fermenters according to needs for various products.	PO6, PO7, PO8, PO9
CO3	Recover the end products of the fermentation process economically.	PO4, PO6, PO7, PO8, PO9
CO4	Utilize the knowledge on pharmaceutical microbiology for industrial production of products.	PO6, PO7, PO8
CO5	Produce therapeutic products from microbes employing technology and analyze the quality the products.	PO6, PO7, PO8

Text Books	
1.	Patel A. H. (2016). Industrial Microbiology. (2 nd Edition). Laxmi Publications, New Delhi.
2.	Casida L. E. J. R. (2019). Industrial Microbiology. New Age International Publishers.
3.	Sathyanarayana U. (2005). Biotechnology. (1 st Edition). Books and Allied (P) Ltd.
4.	Reed G. (2004). Prescott and Dunn's Industrial Microbiology. (4 th Edition). CBS Publishers & Distributors.
5.	Waites M. J., Morgan N. L., Rockey J. S. and Higton G. (2013). Industrial Microbiology: An Introduction. Wiley Blackwell Publishers.

References Books	
1.	Stanbury P. T. and Whitaker. (2016). Principles of Fermentation Technology. (3 rd Edition). Pergamon Press. NY.
2.	Handa S. S. and Kapoor V. K. (2022). Pharamcognosy, (4 th Edition). Vallabh Prakashan Publishers, New Delhi.
3.	Kokate C. K., Durohit A. P. and Gokhale S. R. Pharmacognosy. (2002). (12 th Edition). Nirali Prakasham Publishers, Pune.
4.	Hugo W. B. and Russell A. D. (2004). Pharmaceutical Microbiology. (7 th Edition). Blackwell Scientific Publication, Oxford.
5.	Wallis, T.E. (2005). Text book of Pharmacognosy. (5 th Edition). CBS publishers and distributors, New Delhi.

Web Resources

1.	https://ib.bioninja.com.au/options/untitled/b1-microbiology-organisms/fermenters.html
2.	https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/penicillin.html
3.	https://www.sciencedirect.com/topics/biochemistry-genetics-andmolecular-biology/ethanol-fermentation
4.	https://www.usp.org/sites/default/files/usp/document/harmonization/genmethod/q05b_pf_ira_34_6_2008.pdf
5.	http://www.simbhq.org/

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1						L	L	M	L					
CO2						L	M	L	S					
CO3				M		L	M	M	L					
CO4						L	L	M						
CO5						L	M	L						

Course Code	Course Title	L	T	P	C
23216AEC34L	Environmental Microbiology & rDNA Technology Lab	0	0	4	4

Course Objectives

CO1: Illustrate the significance of artificial transformation and mutations.

CO2: Discuss blotting techniques and PCR

CO3: Analyze and estimate water quality and potability

CO4: Prepare Biofertilizers, vermicompost and test their efficiency

CO5: Familiarize with common plant infections

Course Details:

UNIT I:

- ❖ Artificial Transformation
- ❖ Detection of Antibiotic resistant mutants
- ❖ Identification of mutants by replica plating method

UNIT II:

- ❖ Amplification of DNA by PCR
- ❖ Western blotting - Demonstration
- ❖ Southern blotting – Demonstration

UNIT III:

- ❖ Detection of Water hardness
- ❖ Microbiological analysis of water
- ❖ A) Total Heterotrophic Count
- ❖ B) Test for indicative organisms
- ❖ 1) MPN
- ❖ 2) Membrane Filtration
- ❖ Physical, chemical, assessment of water
- ❖ Physical - Color, pH,
- ❖ Chemical - alkalinity, acidity, DO, BOD, COD
- ❖ Enumeration of bacteria and fungi from air – Air sampler
- ❖ Isolation of free-living nitrogen fixers from soil and *Rhizobium* from root nodules of leguminous plants. Isolation and enumeration of phosphate-solubilizing bacteria from soil

UNIT IV:

- ❖ Preparation of Biofertilizers and testing the efficiency of prepared biofertilizers
- ❖ R:S ratio of soil microbes
- ❖ Estimation of soil enzymes- urease and phosphatase
- ❖ Study of phylloplane microflora by leaf impression method
- ❖ Isolation of cellulose degrading bacteria
- ❖ Preparation of a vermicompost
- ❖ Isolation of VAM fungi from soil
- ❖ Isolation of plant pathogen - *Alternaria* & *Curvulariaspp.*,
- ❖ Cultivation of edible mushroom from solid waste
- ❖ Cultivation of *Azolla*

UNIT V:

- ❖ Visual examination, observation, and identification of some common plant infections.
- ❖ To test Koch postulates using plant pathogens
- ❖ Collection of 5 herbarium specimens of infected leaves.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Utilize various molecular techniques for gene manipulation and detection of mutants.	PO4, PO6, PO7, PO9, PO11
CO2	Undertake novel research with techniques like PCR and blotting analysis.	PO4, PO6, PO7, PO10, PO11
CO3	Assess the microbial quality of water and air and relate the results to standards.	PO1, PO4, PO5, PO7, PO8
CO4	Synthesize biofertilizers and vermicompost. Cultivate mushrooms using solid waste.	PO1, PO4, PO5, PO7, PO8
CO5	Identify various plant pathogens	PO5, PO10

Text Books	
1.	Russell P. J. (2019). Genetics – A Molecular Approach (3 rd Edition). Pearson Education, Inc.
2.	Glick B. R. and Patten C. L. (2018). Molecular Biotechnology – Principles and Applications of Recombinant DNA (5 th Edition). ASM Press.
3.	Gunasekaran P. (2007). Laboratory Manual in Microbiology. New Age International.
4.	James G Cappucino. and Natalie Sherman. (2016). Microbiology – A laboratory manual. (5 th Edition). The Benjamin publishing company. New York.
5.	Hurst, C.J., Crawford R.L., Garland J.L., Lipson D.A., Mills A.L. and Stetzenbach L.D. (2007). Manual of Environmental Microbiology. (3 rd Edition). American Society for Microbiology.

References Books	
1.	Sambrook J. and Russell D.W. (2001). Molecular Cloning: A Laboratory Manual. (7 th Edition). Cold Spring Harbor, N.Y: Cold Spring Harbor Laboratory Press.
2.	Brown T.A. (2016). Gene Cloning and DNA Analysis. (7 th Edition). John Wiley and Jones, Ltd.
3.	Dale J. W., Schantz M. V. and Plant N. (2012). From Gene to Genomes – Concepts and Applications of DNA Technology. (3 rd Edition). John Wileys and Sons Ltd.
4.	Pepper I., Gerba C. and Brendecke J. (2004). Environmental Microbiology - A Laboratory Manual. (2 nd Edition). Academic Press, Elsevier.
5.	Yates M.V., Nakatsu C.H., Miller R.V. and Pillai, S.D. (2016). Manual of Environmental Microbiology. (4 th Edition). Wiley.

Web Resources	
1.	https://www.molbiotools.com/usefullinks.html
2.	https://geneticgenie.org3 .
3.	https://currentprotocols.onlinelibrary.wiley.com/doi/pdf/10.1002/cpet.5
4.	https://vlab.amrita.edu/index.php?sub=3&brch=272
5.	https://nptel.ac.in/courses/102105087

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1				S	M	S	S	M	S	M	S			
CO2				S	M	S	S	M	M	S	S			
CO3	M			S	S		S	M						
CO4	M			S	S		S	S						
CO5					M					M				

Course Code	Course Title	L	T	P	C
23216DSC35A	Biosafety, Bioethics and IPR	4	1	0	3

Course Objectives

CO1:Create a research environment. Encourage investigation, analysis and study the bioethical principles, values, concepts, and social and juridical implications in the areas of science, biotechnology and medicine.

CO2:Discuss about various aspects of biosafety regulations, IPR and bioethics concerns arising from the commercialization of biotechnological products.

CO3:Familiarize fundamental aspects of Intellectual property Rights in the development and management of innovative projects in industries.

CO4:Acquire knowledge about bioethics, biodiversity and Genetically modified foods and food crops

CO5:Provide students with an understanding of bioethics in research associated with medicine

Course Details:

UNIT I:

Intellectual Property Rights: Different forms of Intellectual Property Rights – their relevance, importance to industry, Academia. Role of IPR's in Biotechnology, Patent Terminology - Patents, trademarks, copyrights, industrial designs, geographical indications, trade secrets, non-disclosure agreements. Patent life and geographical boundaries. International organizations and IPR - Overview of WTO, TRIPS, WIPO, GATT, International conventions, Trade agreements, Implication of TRIPS for developing countries.

UNIT II:

Process involved in patenting. Patent Search - Procedural steps in patenting, process of filing, PCT application, pre-grant & post-grant opposition, PCT and patent harmonization including Sui-generis system, patent search methods, patent databases and libraries, online tools, Country-wise patent searches (USPTO, EPO, India etc.), patent mapping.

UNIT III:

Patentability of biotechnology inventions - Patentability of biotechnology inventions in India, statutory provisions regarding biotechnological inventions under the current Patent Act 1970 (as Amended 2005). Biotechnological inventions as patentable subject matter, territorial nature of patents - from territorial to global patent regime, interpreting trips in the light of biotechnology inventions, feasibility of a uniform global patent system, merits and demerits of uniform patent law, relevance of the existing international patent, tentative harmonisation efforts, implications of setting up a uniform world patent system.

UNIT IV:

Introduction to bioethics - need of bioethics, applications and issues related to bioethics, social and cultural issues. Bioethics and biodiversity - conserving natural biodiversity, convention on protecting biodiversity, protocols in exchanging biological material across borders. Bioethics & GMO's - issues and concerns pertaining to genetically modified foods and food crops, organisms and their possible health implications and mixing up with the gene-pool.

UNIT V:

Bioethics in medicine - Protocols of ethical concerns related to prenatal diagnosis, gene therapy, organ transplantation, xeno transplantation, ethics in patient care, informed consent. bioethics and cloning - permissions and procedures in animal cloning, human cloning, risks and

hopes. Bioethics in research: stem cell research, human genome project, use of animals in research, human volunteers for clinical research, studies on ethnic races. The Nuremberg code.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Execute the role of IPR, Patent, Trademarks and its importance.	PO1, PO2, PO3, PO5, PO6
CO2	Develop patent procedure, patent filling and its mapping.	PO3, PO4, PO13
CO3	Become Patent attorneys and Patent officers.	PO2, PO3, PO4, PO7, PO9
CO4	Apply bioethics in GMO, food crops and its biodiversity.	PO2, PO3, PO5, PO9
CO5	Analyze the importance of bioethics in research associated with HGP, clinical research, stem cell therapy.	PO1, PO3, PO5, PO6, PO9, PO10

Text Books	
1.	Usharani B., Anbazhagi S. and Vidya C. K. (2019). Biosafety in Microbiological Laboratories. (1 st Edition). Notion Press. ISBN-101645878856
2.	Satheesh M. K. (2009). Bioethics and Biosafety. (1 st Edition). J. K International Publishing House Pvt. Ltd: Delhi. ISBN: 9788190675703
3.	Goel D. and Parashar S. (2013). IPR, Biosafety and Bioethics. (1 st Edition). Pearson education: Chennai. ISBN-13: 978-8131774700
4.	Raj Mohan joshi. Biosafety and Bioethics. Wiley Publications.
5.	Sibi. GIIntellectual, Property Rights, Bioethics, Biosafety and Entrepreneurship in biotechnology. (2021). Wiley Publications.

References Books	
1.	Nithyananda K. V. (2019). Intellectual Property Rights: Protection and Management, India, IN: Cengage Learning India Private Limited.
2.	Neeraj, P. and Khusdeep, D. (2014). Intellectual Property Rights, India, IN: PHI learning Private Limited,
3.	Ahuja, V K. (2017). Law relating to Intellectual Property Rights, India, IN: Lexis Nexis.
4.	Tony Hope (2004). Medical Ethics: A very Short introduction,. Oxford Publication
5.	Goel Parashar. IPR, Biosafety and Bioethics (2013). Pearson Publications.

Web Resources

1.	http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf .
2.	https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf .
3.	https://www.cdc.gov/training/quicklearns/biosafety/
4.	https://bioethics.msu.edu/what-is-bioethics
5.	https://www.wto.org/english/tratop_e/trips_e/intell_e.htm

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	S	S	S		S	S								
CO2			S	S									M	
CO3		S	S	S			S		S					
CO4		S	S		S				S					
CO5	S		S		S	S			S	M				

Course Code	Course Title	L	T	P	C
23216DSC35B	Toxinology	4	1	0	3

Course Objectives

CO1:Recognize the various categories of environmental toxins and their hazardous consequence

CO2:Enhance the knowledge of underlying etiology of diseases

CO3:Strengthen the evidence for a causal link between the exposure of hazardous agent and the development of diseases

CO4:Illustrate various techniques to isolate and characterize the toxin

CO5:Examine, interpret and discuss the certainty of toxic substances, proposing the deep understanding of medicinal and industrial applications

Course Details:

UNIT I:

General Introduction - Definition of toxins, different categories of toxins and venoms, recent trends in venom and toxin research.

UNIT II:

Bacterial toxins - Bacterial toxins Bacterial toxinogenesis, endotoxins, exotoxins, exotoxins, bacterial protein toxins with special reference to cholera, diphtheria and tetanus toxins, molecular mechanism of action of endotoxins, exotoxins, enterotoxins, neurotoxins and mycotoxins.

UNIT III:

Plant toxins & Toxins from snake venom - Natural toxins in plants, Plant toxic proteins, impact of plant toxin on human, natural toxins in food, plants, allelopathy. Toxins from snake venom Snakes and Biological significance of their venoms, composition of snake venom, evolution of venom, 3D structure of some important venom constituents and their mechanism of action (phospholipase A2, cardiotoxin, neurotoxin) three-finger toxins, anti-venom and medicinal plants in treatment of snakebite patients.

UNIT IV:

Tools for isolation and characterization of toxins - Multidimensional chromatographic techniques (gel-filtration, ion-exchange reverse-phase HPLC, SDS-PAGE, 2-dimensional gel electrophoresis), toxin mass fingerprinting, N-terminal peptide sequencing, analysis of protein data by using proteomics software.

UNIT V:

Medicinal and industrial applications of venoms and toxins. Use of toxins in neurobiology and muscular research, anticancer drugs, diagnosis of haemostatic disorders, antibacterial agents, bioinsecticides and other industrial applications.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Perceive the adverse effects of toxin and its potential role in research.	PO1, PO2, PO9
CO2	Assess the toxicity, properties and mode of actions of microbial toxins.	PO2, PO4, PO6, PO10

CO3	Explicate the mode of actions and their biological significance.	PO1, PO2, PO4
CO4	Evaluate the toxicity level with the help of advanced techniques.	PO6, PO7, PO9, PO11
CO5	Elucidate the various natures of application of toxic substances.	PO4, PO5, PO6, PO8, PO9

Text Books

1.	Holst O. (2008). Bacterial Toxin –Methods & Protocols. Humana Press. ISBN 9781592590520.
2.	Shier W. T. (1990). Handbook of Toxinology. CRC Press. ISBN 9780824783747.
3.	Wilson K. and Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology. (7 th Edition). Cambridge University Press India Pvt.Ltd. ISBN 1-4051-3544-1.
4.	Pholtan Rajeev S.R. (2021) Pictorial handbook for toxinology. Rudra Publications.
5.	Cora Lancaster. (2015). Molecular Toxinology Handbook. Callisto Reference

References Books

1.	Reilly M. J. (2018). Bioinstrumentation. CBS Publishers and Distributors Pvt Ltd. ISBN 13 978-8123928395.
2.	Greenberg M., Hamilton R., Phillips S. and McCluskey G. J. (2003). Occupational, Industrial and Environmental Toxicology. St Louis: C.V. Mosby.
3.	Wiley-Vch. (2005). Ullmann's Industrial Toxicology. New York: John Wiley & Sons.
4.	Winder C. and Stacey N.H. and Boca Raton F. L. (2004). Occupational Toxicology. (2 nd Edition). CRC Press.
5.	Gopalakrishnakone (2015). Biological Toxins and Bioterrorism. Springer.

Web Resources

1.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5869414/
2.	https://www.researchgate.net/publication/269037373_TOXIN_AS_A_MEDICINE
3.	https://www.toxinology.org/
4.	https://www.mdpi.com/journal/toxins/special_issues/snakebite_clinical_toxinology
5.	https://pubmed.ncbi.nlm.nih.gov/12807310

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	S	S							S					
CO2		S		S		S				S				
CO3	S	S		S										
CO4						S	S		S		S			
CO5				S	S	S		S	S					

Course Code	Course Title	L	T	P	C
23216DSC35B	Water Conservation and Water Treatment Technologies	4	1	0	3

Course Objectives

CO1: Explain how societal and climatic changes will distress water supply and water demand in future

CO2: Ascertain promising elucidations to the global water crisis and assess the pros and cons

CO3: Acquire knowledge to identify the quality of water by standard method

CO4: Illustrate the methods of water treatment technologies and assessing the impact of HWTS

CO5: Describe the application and uses of various emerging water treatment technologies

Course Details:

UNIT I:

Water Scarcity; Major Causes of Water Scarcity, Types of Water Scarcity, Water Footprint- Effects of Water Scarcity Across the Globe-, Water Scarcity in India; Effects of Water Scarcity in India - Social and Political Effects and Economic Risks of Water Scarcity in India.

UNIT II:

Multi-pronged approach to Prevent Water Scarcity; Aquifer Recharging, Water reuse and Zero-Liquid Discharge Technology, Coastal Reservoir, Desalination Plants-Measures for Preventing Water Scarcity in India - Jal Shakti Abhiyan Campaign, Atal Bhujal Yojana, Adoption of Composite Water Management Index (CWMI), Water conservation resource management, Rain Water Harvesting.

UNIT III:

Water Quality and Pollution; Impurities in the water, Characteristics of different water sources Vulnerability of the water sources to contamination, Water quality criteria - Quality of surface waters, flowing waters, impounded waters, Groundwater, Water quality standards, Microbiological quality of drinking Water, Chemical quality of drinking water.

UNIT IV:

Water Treatment Technologies; Sedimentation, Filtration, Coagulation and flocculation, Water softening and adsorption processes, Membrane filtration, Microfiltration, Ultrafiltration and Nanofiltration, Water disinfection, Activated carbon filtration, Household Water Treatment and Safe Storage (HWTS). Methods for household water treatment Safe water storage, Household water treatment and safe storage decision tree, Assessing the impact of HWTS, Government policies for HWTS.

UNIT V:

New and Emerging Drinking Water Treatment Technologies; Nanotechnology, Acoustic nanotube technology, Photocatalytic water purification technology, Aquaporin Inside™ technology, Automatic Variable Filtration (AVF) technology, Sun Spring System, Desalination.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Appraise issues of water scarcity, stress, and conflict on global population.	PO1, PO2, PO4, PO5, PO10

CO2	Apprehend the multiple approaches against water scarcity and to understand various government schemes for water conservation.	PO1, PO2, PO5, PO10, PO14
CO3	Relate the connection between water quality and public health.	PO4, PO6, PO10
CO4	Design and execute standard strategy for successful HWTS implementation.	PO4, PO5, PO6, PO9
CO5	Cogitate the purpose, principles, operation, and limitation of various modern water treatment technologies.	PO5, PO7, PO8, PO9, PO10, PO11

Text Books

1.	Vasileios A., Tzanakakis N. Paranychianakis V. and Angelakis A. N. (2020). Water Supply and Water Scarcity. MDPI, ISBN 978-3-03943-306-3 (Hbk). ISBN 978-3-03943-3070.
2.	Pannirselvam M., Shu Li, Griffin G., Philip L., Natarajan A. and Hussain S. (2019). Water Scarcity and Ways to Reduce the Impact. ISBN: 978-3-319-75199-3.
3.	Tiwari A., Kumar A., Singh A., Singh T.N., Suozzi E., Matta G. and Russo S. (2022). Water Scarcity, Contamination and Management. Elsevier. ISBN: 9780323853781.
4.	Daniel, C.J. (1996). Environmental Aspects of Microbiology, 1 st edn. Bright Sun Publications.
5.	Maier RM, Pepper IL, Gerba CP (2008). Environmental Microbiology, 2 nd edn. Academic Press

References Books

1.	Fujita K. and Mizushima T. (2021). Sustainable Development in India -Groundwater Irrigation, Energy Use, and Food Production. ISBN 9780367460976.
2.	Gupta R. (2008). Water Crisis in India. Atlantic Publishers. ISBN: 9788126909582, 9788126909582.
3.	Ahuja S. (2013). Monitoring Water Quality-Pollution Assessment, Analysis, and Remediation. Elsevier. Book ISBN: 9780444594044. Hardcover ISBN: 9780444593955.
4.	Saeid Eslamian ., Faezeh Eslamian ., (2021) Water harvesting and conservation – Basic Concepts and fundamentals, Wiley Publications.
5.	Buckley RG. (2016) Environmental Microbiology 1 st edn. CBS Publishing.

Web Resources

1.	https://link.springer.com/book/10.1007/978-1-59745-278-6
2.	https://apps.who.int/iris/handle/10665/206916?show=full

3.	https://www.acs.org/content/acs/en/policy/publicpolicies/sustainability/water-statement.html
4.	https://www.toftigers.org/best-practice/water-conservation-and-treatment/
5.	https://doh.wa.gov/community-and-environment/wastewater-management/site-sewage-systems-oss

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	S	S		S	S					S				
CO2	S	S			S					S				S
CO3				S		S				S				
CO4				S	S	S			S					
CO5					S		M	S	S	S	S			

Course Code	Course Title	L	T	P	C
23216GEC36	Nanobiotechnology	4	1	0	3

Course Objectives

CO1:Analyze nanomaterials based on the understanding of nanobiotechnology.

CO2:Discuss the methods of fabrication of nanomaterials.

CO3:Gain Knowledge on characterization of nanomaterials.

CO4:Discover nanomaterials for targeted drug delivery.

CO5:Explain nanomaterials in nanomedicine and environmental pollution.

Course Details:

UNIT I:

Introduction to nanobiotechnology, Nano size-changing phenomena at nano scale, Classification of nanomaterials based on their dimensions (0D, 1D, 2D and 3D materials) and based on realization of their applications (The First, second, third and fourth generation materials), Class of nanomaterials and their applications. Need for nanomaterials and the risks associated with the materials.

UNIT II:

Fabrication of Nanomaterials-Top-down and Bottom-up approaches, Solid phase synthesis-milling, Liquid phase synthesis-Sol-gel synthesis, colloidal synthesis, micro emulsion method, hydrothermal synthesis and solvo thermal synthesis, Vapour/Gas phase synthesis-Inert gas condensation, flame pyrolysis, Laser ablation and plasma synthesis techniques. Microbial synthesis of nanoparticles

UNIT III:

Characterization of nanoparticles – Based on particle size/morphology- Dynamic light scattering (DLS), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Atomic force microscopy (AFM), Based on surface charge-zeta potential, Based on structure – X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Energy dispersive X-ray analysis (EDX), Based on optical properties- UV – Spectrophotometer, Based on magnetic properties- Vibrating sample magnetometer (VSM).

UNIT IV:

Nanomaterial based Drug delivery and therapeutics-surface modified nano particles, MEMS/NEMS based devices, peptide/DNA coupled nanoparticles, lipid and inorganic nano particles for drug delivery, Metal/metaloxide nano particles as antibacterial, antifungal and antiviral agents. Toxicity of nanoparticles and Toxicity Evaluation.

UNIT V:

Nanomaterials in diagnosis-Imaging, nanosensors in detection of pathogens. Treatment of surface water, ground water and waste water contaminated by toxic metal ions, organic and inorganic solutes and microorganisms.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Employ knowledge in the field of nanobiotechnology for development.	PO1, PO9

CO2	Identify various applications of nanomaterials in the field of medicine and environment.	PO1, PO9
CO3	Examine the prospects and significance of nanobiotechnology.	PO1, PO6, PO11
CO4	Identify recent advances in this area and create a career or pursue research in the field.	PO1, PO5, PO7, PO9
CO5	Design non-toxic nanoparticles for targeted drug delivery.	PO1, PO5, PO7, PO9, PO11

Text Books

1.	Brydson R. M., Hammond, C. (2005). Generic Methodologies for Nanotechnology: Characterization. In Nanoscale Science and Technology. John Wiley & Sons, Ltd.
2.	Leggett G. J., Jones R. A. L. (2005). Bionanotechnology. In Nanoscale Science and Technology. John Wiley & Sons, Ltd.
3.	Mohan Kumar G. (2016). Nanotechnology: Nanomaterials and nanodevices. Narosa Publishing House.
4.	Goodsell D. S. (2004). Bionanotechnology. John Wiley & Sons, Inc.
5.	Pradeep T. (2007). Nano: The Essentials-Understanding nanoscience and nanotechnology. Tata McGraw-Hill.

References Books

1.	Nouailhat A. (2008). An Introduction to Nanoscience and Nanotechnology, Wiley.
2.	Sharon M. and Maheshwar (2012). Bio-Nanotechnology: Concepts and Applications. New Delhi. Ane books Pvt Ltd.
3.	Niemeyer C.M. and Mirkin C. A. (2005). Nanobiotechnology. Wiley Interscience.
4.	Rehm, B. (2006). Microbial Bionanotechnology: Biological Self-Assembly Systems and Biopolymer-Based Nanostructures. Horizon Scientific Press.
5..	Reisner, D.E. (2009). Bionanotechnology: Global Prospects. CRC Press

Web Resources

1.	https://www.gale.com/nanotechnology
2.	https://www.understandingnano.com/resources.html
3.	http://dbtnanobiotech.com/index2.php
4.	http://www.istl.org/11-winter/internet1.html
5.	https://www.cdc.gov/niosh/topics/nanotech/default.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1	S			M					M					
CO2	S								S					
CO3	S					M					S			
CO4	S				S		M		S					
CO5	S				S		M		S		S			

SEMESTER -IV

Course Code	Course Title	L	T	P	C
23216AEC41	Food & Dairy Microbiology	4	1	0	4

Course Objectives

CO1: Discuss microorganisms involved in food spoilage.

CO2: Illustrate bacterial and nonbacterial food borne infections important in public health.

CO3: Familiarize various national and international aspects of food safety and quality assurance.

CO4: Elaborate on microbiology of milk, preservation techniques and production of dairy products.

CO5: Explain Dairy plant hygiene, quality control and waste disposal.

Course Details:

UNIT I:

Microorganisms of food- Scope of food Microbiology. Contamination and spoilage of food –vegetables, fruits, poultry, fish, eggs, meat, meat products and canned foods. Food Preservation - Temperature (low and high), drying, radiation and chemicals.

UNIT II:

Food microbiology and public health. Food hazards. Food infections - *Bacillus cereus*, *Vibrio parahaemolyticus*, *Escherichia coli*, *Salmonella*, *Shigella*, *Yersinia enterocolitica*, *Listeria monocytogenes* and *Campylobacter jejuni*. Nonbacterial food borne illness - Helminthes, nematodes, protozoa, toxigenic fungi and food borne virus

UNIT III:

.Quality assurance of food - International aspects of Quality and safety assessment of foods. Microbiological quality standards for food. Government regulatory practices and policies - FDA, HACCP, BIS (IS), FSSAI-2014. Food adulteration and common food additives.

UNIT IV:

Introduction to Dairy microbiology – Milk production and hygiene. Microorganisms associated with milk. Microbial metabolites and their role in spoilages- souring, curdling, gassiness, ropiness, proteolysis, lipolysis, abnormal flavour and colour. Antimicrobial systems in raw milk. Microbiological grading of raw milk. Milk borne diseases and their control. Bacteriological aspects of milk processing – Thermization, pasteurization, boiling, sterilization, UHT, bactofugation, and membrane filtration..

UNIT V:

Composition and chemistry of cream, butter, ghee, ice-cream, cheese, kefir, koumiss, rennin, condensed and dried milks, infant food. Spoilage of ghee and use of antioxidants. Chemistry of milk fermentation. Chemistry of rennin coagulation of milk and changes occurring during ripening of cheese, physico-chemical changes in the manufacture and storage of milk powder, lactose, crystallization and its significance. Dairy plant hygiene and sanitation. Disposal of dairy waste. Microbiological standards for Milk and Milk products- PFA BIS, Codex/ ISO standards.

Course Outcomes		
Course Outcomes		
CO1	Utilize the knowledge on process of food contamination and spoilage to preserve food.	PO7, PO8, PO9
CO2	Use the knowledge on food borne disease to protect public health.	PO5, PO7, PO8, PO9
CO3	Familiarize various national and international aspects of food safety and quality assurance.	PO4, PO7, PO8
CO4	Prepare dairy products and perform quality checks.	PO7, PO8
CO5	Apply microbiological standards to milk and milk products.	PO7, PO8

Text Books	
1.	Adams M. R. and Moss M. O. (1996). Food Microbiology, New Age International (P) Limited Publishers, New Delhi.
2.	Frazier W.C., Westhoff. D. C. and Vanitha K.N. (2013). Food Microbiology. (6 th Edition). McGraw Hill Education.
3.	Jay J. M., Loessner M. J. and Golden D.A. (2006). Modern Food Microbiology. (7 th Edition). Springer.
4.	Doyle M. P., Buchanan R. L. (2012). Food Microbiology: Fundamentals and Frontiers. (4 th Edition). American Society for Microbiology Press.
5.	Ray B. and Bhunia A. (2013). Fundamentals of Food Microbiology. (5 th Edition). CRC Press.

References Books	
1.	Robinson R. K. (2000). Dairy Microbiology 3 rd edn, Elsevier Applied Science, London.
2.	Adams M.R, and Moss M.D, (2005). Food Microbiology 4 th edn, New Age International Pvt. Ltd., Publishers. First edition.
3.	Banwarst. G.J. (2003). Basic Food Microbiology 2 nd edn, CBS Publishers and distributors.
4.	Hobbs, B.C. and Roberts, D, (1968), Food Poisoning and Food Hygiene 7 th edn. Edward Arnold: London.
5.	Vijaya R K, (2004). Food Microbiology 1 st edn. MJP Publishers, Chennai.

Web Resources	
1.	https://www.fssai.gov.in
2.	https://www.who.int/news-room/fact-sheets/detail/food-safety
3.	https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles-application-guidelines

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1							S	M	M					
CO2					S		M	M	M					
CO3				S			M	M						
CO4							M	M						
CO5							M	M						

Course Code	Course Title	L	T	P	C
23216DEC42	Marine Microbiology	4	1	0	3

Course Objectives

CO1: Gain fundamental knowledge of marine environment and the microbial communities inhabiting the oceans.

CO2: Discuss the metabolic diversity of marine microorganisms and their interrelationships.

CO3: Explain the survival of microorganisms in extreme environments.

CO4: Illustrate pathogens and contaminants in sea foods.

CO5: Describe the applications of marine biotechnological products and their future role in a rapidly changing planet.

Course Details:

UNIT I:

Marine microbial environment - Benthic & littoral zone, salt pan, mangroves and estuarine microbes, microbial loop. Marine microbial communities – Bacteria, fungi, protozoa. Microbial interactions – Endosymbionts and Ectosymbionts.

UNIT II:

Dynamics of Marine Microbes - Carbon cycle: Phototrophic microbes, the oceanic carbonate system and global warming – Nitrogen cycle: Nitrogen fixers – Iron limitation – ocean fertilization – phosphorus cycle. Decomposition of organic matter. Bioleaching and biodeterioration of natural and synthetic materials.

UNIT III:

Marine extremophiles: Mechanism of survival at extreme environments – Adaptive mechanisms in thermophilic, alkalophilic, osmophilic, barophilic, psychrophilic hyperthermophilic and halophilic microorganisms – Importance in biotechnology

UNIT IV:

Marine Microbial Diseases: Aqua culture pathogens & Water borne pathogens - *Aeromonas*, *Vibrio*, *Salmonella*, *Pseudomonas*, *Leptospira*, *Corynebacteria* and viral diseases. Rapid diagnosis of contamination in sea foods and aquaculture products.

UNIT V:

Applications of Marine Microbial Biotechnology: Production and applications of marine microbial products – Enzymes, Antibiotics, Organic acids, Toxins, Biosurfactants and Pigments. Sea food preservation methods. Probiotic bacteria and their importance in aquaculture.

Course Outcomes		
Course Outcomes	On completion of this course, students will	
CO1	Apply the knowledge on marine microbial communities and their interactions.	PO1, PO9
CO2	Illustrate the role of marine microorganisms in biogeochemical cycles.	PO5, PO7
CO3	Categorize the extreme environments in the oceans and the survival mechanisms adapted by the microorganisms living in these environments.	PO7, PO9
CO4	Identify the diseases affecting marine organisms and its diagnosis.	PO5, PO7

CO5	Evaluate the marine microorganisms as a resource for novel microbial products.	PO7, PO8, PO9
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Text Books		
1.	Munn C. B. (2019). Marine Microbiology: Ecology and Applications. (3 rd Edition). CRC Press. ISBN:9780367183561.	
2.	Bhakuni, D.S. and Rawat D. S. (2005). Bioactive Marine Natural Products. Anamaya Publishers, New Delhi. ISBN:1-4020-3472-5.	
3.	Brock T. D. (2011). Thermophilic Microorganisms and Life at High Temperatures. Springer. ISBN-13:978-1461262862 / ISBN-10:1461262860.	
4.	Nybakken, J.W. (2001). Marine Biology. (5 th Edition). Benjamin Cummings. ISBN:0321030761 9780321030764.	
5.	Veena. (Understanding marine biology. Discovery Publishing.	

References Books		
1.	Maier R. M., Pepper I. L. and Gerba C. P. (2006). Environmental Microbiology. (2 nd Edition). Academic Press. ISBN:978-0-12-370519-8.	
2.	Belkin S. and Colwell R. R. (2005). Oceans and Health: Pathogens in the Marine Environment. Springer. ISBN:978-0-387-23708-4.	
3.	Scheper T. (2009). Advances in Biochemical Engineering/Biotechnology-Marine Biotechnology. Springer. ISBN:978-3-540-69356-7. E-ISBN:978-3-540-69357-4.	
4.	Gasol J. M. and Kirchman D. L. (Eds.). (2018). Microbial Ecology of the Oceans. (3 rd Edition). Wiley-Blackwell. ISBN:978-1-119-10718-7.	
5.	Kim S. K. (2019). Essentials of Marine Biotechnology. Springer.	

Web Resources		
1.	https://link.springer.com/content/pdf/bfm%3A978-0-387-23709-1%2F1	
2.	https://www.researchgate.net/publication/285931262_Bioactive_Marine_Natural_Products	
3.	http://link.springer.com/content/pdf/bfm%3A978-3-642-03470-1%2F1.pdf	
4.	https://link.springer.com/book/10.1007/b102184	
5.	https://www.wiley.com/en-bs/Microbial+Ecology+of+the+Oceans%2C+3rd+Edition-p-9781119107187	

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	M								M					
CO2					M		S							
CO3							M		S					
CO4					M		S							
CO5							S	S	M					

Course Code	Course Title	L	T	P	C
23216PRW43	Project with Viva Voce	0	0	10	4

OBJECTIVES OF THE COURSE

To impart advanced practical knowledge to conduct a research project. To plan and design statistically, retrieve relevant literature, organize and conduct, process the data, photograph relevant observations, evaluate by statistical programmes. Present the project in any regional/national conference/seminar during the second year of the course and submit for final semester examinations. The work has to be conducted in department under the guidance of the project supervisor. Interdisciplinary collaborations from external departments / institutions can be organized only for essential areas of the project. Industrial visit has been included along with the project work as a report (minimum of 10 pages) possibly with geo-tagged photographs. The method of valuation of the project and Industrial visit report submitted by the candidate is outlined as follows:

Course Code	Course Title	L	T	P	C
23216DEC44A	Bioenergy	4	1	0	3

Course Objectives

CO1: Acquire knowledge on bioenergy utilizing organic wastes for energy recovery.

CO2: Discuss methods and strategies of exploiting microbes for the production technology of biodiesel.

CO3: Describe resources and techniques for the production and estimation of eco-friendly biofuels and the extent of their use potentially.

CO4: Gain knowledge for executing biogas plant in communities.

CO5: Explain possibility of using microbes for the production of bio-hydrogen as a source of future fuel.

Course Details:

UNIT I:

Bioenergy – Biomass Energy Resources. Biomass conversion methods. Microbes as bioresources for bioenergy products (Bacteria, fungi, yeast and microalgae) - Bioprospecting of microbial strains for biofuel production.

UNIT II:

Biodiesel – Microbes and Biodiesel. Production and feed stock. Techniques of lipid extraction and conversion to biodiesel. Biodiesel quality and its assessment. Strategies of genetic engineering of organisms for biodiesel production. Biodiesel production from single cell organisms (*Cryptococcus*, *Cunninghamella*, *Mortierella*).

UNIT III:

Alcoholic Fuels from microorganisms: Biochemical conversion to ethanol: Biomass pre-treatment, Starch to sucrose conversion and Sucrose to ethanol fermentation. Role of enzymes and their applications in ethanol production. Distillation and Quantification of ethanol. Production and Estimation of biobutanol, biomethanol, biopropanol and bioglycerol.

UNIT IV:

Biogas - Microbes and Biogas production, Biogas plants – types – design – construction– Biogas Bottling Technology and Development in India, Biogas appliances – burner, luminaries and power generation – effect on engine performance. Application of Biogas slurry in agriculture.

UNIT V:

Biohydrogen– Production from bacteria and algae. Commercialized microalgae (*Spirulina*, *Dunaliella*, *Hematococcus* and *Chlorella*) and their production. Economics of microalgae production. Cultivation of seaweeds. Microbial fuel cells.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Evaluate the various aspects of biomass production and their implementation.	PO1, PO5, PO6

CO2	Design and construct a biodiesel plant.	PO5, PO7, PO8, PO11,
CO3	Carry out the process of fermentation for bio – alcohol fuels.	PO1, PO4, PO5, PO7,
CO4	Identify the nature of biogas as a biofuel and their technologies and applications.	PO5, PO7, PO8, PO11.
CO5	Design, execute and extract biohydrogen from algae.	PO4, PO5, PO7, PO8.

Text Books

1.	Dahiya A. (2014). Bioenergy- Biomass to Biofuel. (1 st Edition). Academic Press Editor.
2.	Brown R. C. (2003). Biorenewable Resources: Engineering New Products from Agriculture. (1 st Edition). Wiley Blackwell Publishing.
3.	Jawaid M., Hakeem K. R. and Rashid U. (2014). Biomass and Bioenergy: Processing and Properties. (1 st Edition). Springer Cham.
4.	Caye M. Drapcho, Tery H. Walker (Biofuels Engineering Process Technology. McGraw Hill.
5.	Teri. Bio energy Powering the Future. Pearson Longman Publications.

References Books

1.	Konur O. (2018). Bioenergy and Biofuels. (1 st Edition). CRC Press.
2.	Lee J. W.(2012). Advanced Biofuels and Bioproducts. (13 th Edition), Springer.
3.	Khanal S. (2008). Anaerobic Biotechnology for Bioenergy Production: Principles and Applications. (8 th Edition). Wiley-Blackwell Publishing.
4.	Pradeep Chaturvedi.(1995). Bioenergy Resources. Concept Publishing Company.
5.	Lee S. (2018). Biofuel and Bioenergy. Taylor and Francis

Web Resources

1.	https://www.elsevier.com Biofuels and Bioenergy
2.	https://www.sciencedirect.com > book > bioenergy
3.	https://www.un.org/en/climatechange/what-is-renewable-energy?gclid=EAIaIQobChMIqriN2Nao-wIV2HwrCh2pfA5mEAAYASAAEgI-p_D_BwE
4.	https://www.energy.gov/eere/bioenergy/bioenergy-basics
5.	https://www.iea.org/fuels-and-technologies/bioenergy

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	M				S	S								
CO2					S		S	S			S			
CO3	M			S	S		S							
CO4					S		S	S			S			
CO5				S	S		S	S						

Course Code	Course Title	L	T	P	C
23216DSC44B	Herbal Technology and Cosmetic Microbiology	5	1	0	3

Course Objectives	
CO1	Impart knowledge of Indian Medicinal Plants and their applications in microbiology.
CO2	Promote the technical skills involved in preparation of different types of plant extracts.
CO3	Explain methods to analyze the antimicrobial activity of medicinal plants.
CO4	Acquire knowledge on cosmetic microbiology and role of microorganisms in cosmetics.
CO5	Gain insight into pharmacopeial microbial assays and biosafety.

Course Details:

UNIT I:

Herbs, Herbal medicine - Indian medicinal plants: Scope and Applications of Indian medicinal plants in treating bacterial, fungal and viral diseases. Basic principles involved in Ayurvedha, Sidha, Unani and Homeopathy.

UNIT II:

Collection and authentication of selected Indian medicinal plants: *Emblica officinalis*, *Withania somnifera*, *Phyllanthus amarus*, *Tinospora cordifolia*, *Andrographis paniculata*, *Piper longum*, *Ocimum sanctum*, *Azardirchata indica*, *Terminalia chebula*, *Allium sativum*. Preparation of extracts- Hot and cold methods. Preparation of stock solutions

UNIT III:

Antimicrobial activity of selected Indian medicinal Plants: - In vitro determination of antibacterial and fungal activity of selected whole medicinal plants/ parts – well-diffusion methods. MIC - Macro and micro dilution techniques. Antiviral activity- cell lines- cytotoxicity, cytopathic and non-cytopathic effect

UNIT IV:

History of Cosmetic Microbiology – Need for cosmetic microbiology, Scope of cosmetic microbiology, - Role of microbes in cosmetic preparation. Preservation of cosmetics. Antimicrobial properties of natural cosmetic products – Garlic, neem, turmeric, aloe vera and tulsi. Sanitary practices in cosmetic manufacturing - HACCP protocols in cosmetic microbiology.

UNIT V:

Cosmetic microbiology test methods - Antimicrobial preservative efficacy, microbial content testing and biological toxicological testing. Validation methods - bioburden and Pharmacopeial microbial assays. Preservatives of cosmetics - Global regulatory and toxicological aspects of cosmetic preservatives.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Identify the applications of Indian medicinal plants in treating diseases.	PO1, PO5
CO2	Identify and authenticate herbal plants.	PO6, PO7
CO3	Evaluate the antimicrobial activity of medicinal plants.	PO4, PO6, PO9
CO4	Describe the role of microorganisms and their metabolites in the preparation of cosmetics.	PO1, PO5, PO7
CO5	Validate procedures and biosafety measures in the mass production of cosmetics.	PO6, PO7

Text Books	
1.	Lee R.E. (2008). Phycology. Cambridge University Press.
2.	Sharma O.P. (2011). Algae. Tata McGraw-Hill Education.
3.	Shekh A., Schenk P., Sarada R. (2021). Microalgal Biotechnology. Recent Advances, Market Potential and Sustainability. Royal Society of Chemistry.
4.	Lele. S.S., Jyothi Kishen Kumar (2008). Algal bio process technology. New Age International P(Ltd)
5.	Das., Mihirkumar. Algal Biotechnology. Daya Publishing House, New Delhi.

References Books	
1	Indian Herbal Pharmacopoeia (2002). Vol. I &II Indian Drug Manufacturers Association, Mumbai.
2	British Herbal Pharmacopoeia.(1990).Vol.I. British Herbal Medicine Association.ISBN: 0903032090.
3	Verpoorte R. and Mukherjee, P. K. (2010). GMP for Botanicals: Regulatory and Quality issues on Phytomedicines. In GMP for botanicals: regulatory and quality issues on phytomedicines. (2 nd edition). Saujanya Books, Delhi.ISBN-10:81-900788-5-2/8190078852. ISBN-13:978-81-900788-5-6/9788190078856.
4	Turner R. (2013). Screening methods in Pharmacology. Elsevier. ISBN:9781483264233.
5	Cupp M. J. (2010). Toxicology and Clinical Pharmacology of Herbal Products (pp. 85-93). M. J. Cupp. Humana Press.Totowa, NJ, USA. ISBN-10:1617371904.

Web Resources

1	https://www.academia.edu/50236711/Modern_Extraction_Methods_for_Preparation_of_Bioactive_Plant_Extracts
2	https://www.nhp.gov.in/introduction-and-importance-of-medicinal-plants-and-herbs_mtl
3	https://pubmed.ncbi.nlm.nih.gov/17004305/
4	https://www.fda.gov/cosmetics/potential-contaminants-cosmetics/microbiological-safety-and-cosmetics
5	https://pubmed.ncbi.nlm.nih.gov/15156038/

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4
CO 1	M				S									
CO 2						S	M							
CO 3				S		S			M					
CO 4	M				S		S							
CO 5						M	S							

Course Code	Course Title	L	T	P	C
23216DEC44B	Life Science for Competitive Examinations	4	1	0	3

Course Objectives

CO1:Impart knowledge on structure, metabolism and function of biomolecules.

CO2:Understand the importance of inheritance biology.

CO3:Discuss in-depth about the different types of ecosystems and their importance.

CO4:Outline the major drivers in biodiversity and various conservation approaches

CO5:Introduce basic concepts of evolution and biological clock.

Course Details:

UNIT I:

Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins). Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA). Metabolism of carbohydrates, lipids, amino acids, nucleotides and vitamins. Structure of atoms, molecules and chemical bonds. Stabilizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.). Bioenergetics.

UNIT II:

Cellular Organisation, Cell division and cell cycle, Membrane structure and function, Organization of genes and chromosomes, Structural organization and function of intracellular organelles, DNA replication, repair and recombination, Protein synthesis and processing.

UNIT III:

Inheritance Biology, Mendelian principles- Dominance, segregation, independent assortment, Linkage and Gene mapping, Karyotyping, Extrachromosomal inheritance - Inheritance of Mitochondrial and chloroplast genes, maternal inheritance. Human genetics- Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.

UNIT IV:

Ecology- Habitat and Niche, biotic and abiotic interactions, Biome- biogeographical zones of India. Ecological Succession, Population Ecology- Characteristics of a population; population growth curves, Environmental pollution-global environmental change, Biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches. Biodiversity Management approaches. Indian case studies on Conservation/Management strategy (Project Tiger, Biosphere Reserves).

UNIT V:

Evolution and Behaviour- Evolution - Theories- Darwin's, Lamarck's, Oparin Haldane. Paleontological, Embryological and Molecular evidences. Hardy Weinberg's Law. Speciation; Allopatricity and Sympatricity. Adaptive radiation and Convergent evolution; Sexual selection; Co-evolution. Altruism, Biological clocks, Migration and Parental care. Molecular Evolution- Concepts of neutral evolution, molecular divergence and molecular clocks; Molecular tools in phylogeny.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Define, classify and assess the structure, biological functions and interactions of Biomolecules.	PO4, PO6, PO9
CO2	Validate the knowledge of collective and progressive notions of cellular organization.	PO4, PO6, PO9
CO3	Assess and describe the importance of inheritance biology.	PO4, PO6, PO9
CO4	Establish acquaintance and understanding of ecology & Biodiversity in a broader sense.	PO4, PO6, PO9
CO5	Understand the processes of evolution, relate with natural selection, adaptation and speciation.	PO4, PO6, PO9

Text Books	
1.	Nelson D. L. and Cox M. M. (2008). Lehningers Principles of Biochemistry. (5 th Edition). W.H. Freeman and Company.
2.	Chapman J. L. (1998). Ecology: Principles and Applications. (2 nd Edition). Cambridge University Press.
3.	Krishnamurthy V. K. (2003). Textbook of Biodiversity. Science Publishers.
4.	Rogers A. L. (2011). Evidence of Evolution. University of Chicago Press. Chicago.
5.	Stites D.P., Abba I. Terr, Parslow T.G. (1997). <u>Medical Immunology</u> . 9 th Edn, Prentice-Hall Inc.

References Books	
1.	Pontarotti P. (2018). Origin and Evolution of biodiversity. (1 st Edition). Springer.
2.	Verma P. S. and Agarwal V. K. (2004). Cell biology, Genetics, Molecular Biology, Evolution and Ecology. (2 nd Edition). S Chand publication.
3.	Lewin R. and Foley R. (2004). Principles of Human Evolution. (2 nd Edition). Blackwell Publishing Company.
4.	Boyer R.F. (2002) <u>Modern Experimental Biochemistry</u> 3 rd Edition. Pearson Education.
5.	Wilson K., Walker J., Clokie S and Hofmann A. (2018) <u>Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology</u> 8 th Edition Cambridge University Press.

Web Resources

1.	https://bio.libretexts.org/Bookshelves/Human_Biology/Book%3A_Human_Biology_
2.	https://www.livescience.com/474-controversy-evolution-works.html .
3.	https://www.examrace.com/Study-Material/Life-Sciences/
4.	https://www.kopykitab.com/Methods-In-Biology-Life-Science-Study-Material-For-CSIR-NET-Exam-by-Panel-Of-Experts
5	https://www.erforum.net/2017/01/life-science-biology-handwritten-notes-for-competitive-exams.html

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	L			S	L	S			S	M				
CO2	L			S	L	S			S	M				
CO3	L			S	L	S			S	M				
CO4	L			S	L	S			S	M				
CO5	L			S	L	S			S	M				

Course Code	Course Title	L	T	P	C
2321DSC45	Microbial Quality Control and Testing	-	-	-	2

Course Objectives

CO1: Explain various microbiological quality standards for food, water and air regulatory practices and policies.

CO2: Discuss collection, processing and preservation of water samples from industries in different areas.

CO3: Enumeration and isolation of microorganisms from the water samples.

CO4: Enumeration and isolation of microorganisms from the air samples.

CO5: Gain knowledge on sterility testing of different components in industries and quality control techniques.

Course Details:

UNIT I:

Concepts of quality control techniques - quality assurance, Total Quality Management (TQM) Continuous Quality Improvement (CQI) Quality Assurance (QA) pre analytical and post analytical techniques, ATCC, MTCC, microbial based assay.

UNIT II:

Wastewater microbiology – types and sources of contamination, prevention of water borne diseases. Water management, water harvesting, water recycling. Characteristics of waste water from industries - Sugar factory, Pulp & Paper mill, Distillery, Textile, Engineering, Food Industry, Domestic waste. Waste water treatment plant types and quality control. Water pollution causes and remedies.

UNIT III:

.Microflora of water. Microbiological analysis of water sample. Microbiological analysis of water sample collection, drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive/MPN tests, confirmed and completed tests for faecal coliforms (b) Membrane filter technique and (c) Presence/absence tests Control of microbes in water: Water borne pathogens, water borne diseases. Control of water borne pathogens - Precipitation, chemical disinfection, filtration, high temperature, UV light.

UNIT IV:

.Microflora of air - Bioaerosols, Air borne microorganisms (bacteria, Viruses, fungi) and their impact on human health and environment, significance in food and pharma industries and operation theatres. Collection of air samples and analysis. Bioaerosol sampling, air samplers, methods of analysis, CFU, culture media for bacteria and fungi, isolation and Identification. Control Measures of Bioaerosols - UV light, HEPA filters, desiccation, Incineration.

UNIT V:

Quality control in food - Food X ray inspection, PPE Equipment, IoT sensors, preventive quality control and reality quality control. Quality control of pharma products. Quality assurance framework, assessment of pharmaceutical quality, determinants of pharmaceutical quality, practical approaches to quality assurance.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Apply knowledge in quality analysis techniques suitable for industries.	PO4, PO5, PO7, PO8
CO2	Perform water managements, water harvesting and treat sewage, water pollutions and remedies.	PO4, PO5, PO7, PO8
CO3	Detect portability of water. Test water quality.	PO4, PO5, PO7, PO8
CO4	Impart knowledge on bioaerosols, impact and prevention	PO4, PO5, PO7, PO8
CO5	Apply quality control techniques for food and pharma products	PO4, PO5, PO7, PO8

Text Books	
1.	Aneja R. P., Mathur B.N., Chandan R. C. and Banerjee, A. K. (2002). Experiments in Microbiology.
2.	Adams M. R. and Moss M. O. (2006). Food Microbiology. (2 nd Edition). Royal Society of Chemistry.
3.	Dubey R.C. and Maheshwari D. K. (2010). Practical Microbiology. S. Chand.
4.	Cappuccino, J. and Sherman, N. (2002). Microbiology: A Laboratory Manual, (6 th Edition). Pearson Education, Publication, New Delhi.
5.	Rosamund M. Baird., Norman A. (2019). Handbook of Microbiological quality control in Pharmaceuticals and Medical Devices. CRC Press.

References Books	
1.	Cullimore D. R. (2010). Practical Atlas for Bacterial Identification. (2 nd Edition). - Taylor & Francis.
2.	Sundararaj T. (2003). Microbiology Laboratory Manual. (2 nd Edition). Published by A. Sundararaj
3.	Hoges N. A., Denyer S P. and Baird R.M. (2003). Handbook of microbiological quality control. Microbial Quality Assurance in Pharmaceutcals, cosmetics & Toiletries. by Sally F. Bloomfield
4.	Amitava Mitra. Fundamentals of Quality control and Improvement. (3 rd Edition). Wiley Publications
5.	David Roesti, Marcel Goverde (2019). Pharmaceutical Microbiological Quality Assurance and control: Practical guide for non- sterile Manufacturing. Wiley Publishers.

Web Resources

1.	https://www.researchgate.net › publication › 320730681
2.	https://www.fssai.gov.in
3.	https://mofpi.nic.in/Schemes/implementation-haccp-iso-22000-iso-9000-ghp-gmp-etc
4.	https://www.who.int/news-room/fact-sheets/detail/food-safety
5.	https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles-application-guidelines

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1				M	L		S	S						
CO2				M	L		M	M						
CO3				S	L		S	S						
CO4				S	L		S	S						
CO5				S	L		M	M						



**BACHELORS OF BUSINESS ADMINISTRATION
Choice Based Credit System
(With effect from the academic year 2023)
REVISED REGULATIONS**

Program Outcomes:

PO1: Problem Solving Skill: Problem analysis: Identify, review, formulate and analyze the problem or reformation to provide conclusions applying analytic thought to body of knowledge.

PO2: Decision Making Skill: Ability to inquire, identifying problems, logical flaws, analyze data from various sources, interpret and draw valid conclusions.

PO3: Ethical Value: Demonstrate moral/ethical values in carrying out his duties in his profession and identify unethical work.

PO4: Communication Skill: Effectively communicate thoughts, ideas or any complex information orally or written using appropriate media clearly and concisely

PO5: Individual and Team Leadership Skill: Demonstrate ability to work effectively individually, within the group and Lead groups.

PO6: Employability Skill: Become empowered individuals to be employed in various positions in industry, academia and research.

PO7: Entrepreneurial Skill: Equipped with skills and competencies to become a global entrepreneur.

PO8: Contribution to Society: Demonstrate moral/ethical values in carrying out his duties in his profession and identify unethical work.

Program Specific Outcomes;

PSO1 – Acquire academic excellence in management education with an aptitude for entrepreneurship/ higher studies.

PSO 2 –Students to build proficiency in key business functional areas.

PSO3 – Learn how to effectively manage people and build strong interpersonal & leadership skills.

PSO 4 – Enhance critical thinking and analytical skills in terms of decision making

PSO 5– Integrate technological advancements in business for sustainable business and contribution to economic growth.

Programme Educational Objectives–PEO

PEO1-Graduates will be expert in the area of leadership, interpersonal skills, entrepreneurship, and marketing.

PEO2-Graduate will be competent in the global competitive world more professionally.

PEO3-Graduate bears responsible citizen and lead the business with moral and ethical value

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
PSO 1	Y	Y	Y	Y	Y	Y	Y	Y
PSO 2	Y	Y	Y	Y	Y	Y	Y	Y
PSO3	Y	Y		Y	Y	Y	Y	
PSO 4	Y	Y	Y	Y	Y	Y	Y	Y
PSO 5	Y	Y	Y	Y	Y	Y	Y	Y

Sem I	Credit	Sem II	Credit	Sem III	Credit	Sem IV	Credit	Sem V	Credit	Sem VI	Credit
1.1. Language	3	2.1. Language	3	3.1. Core Course DSC 05	4	4.1. Core Course DSC 09	4	5.1 Core Course – DSC13	4	6.1 Core Course – DSC 17	4
1.2 English	3	2.2 English	3	3.2 Core Course DSC 06	3	4.2 Core Course DSC 10	4	5.2 Core Course – DSC 14	3	6.2 Core Course – DSC 18	4
1.3 Core Course – DSC 01	4	2.3 Core Course – DSC 03	4	3.3 Core Course – DSC 07	3	4.3 Core Course – DSC11	3	5. 3. Core Course DSC15	4	6.3 Core Course – DSC 19	4
1.4 Core Course – DSC 02	4	2.4 Core Course – DSC 04	4	3.4 Core Course – DSC 08	3	4.4 Core Course – DSC 12	3	5. 3. Core course DSC 16	4	6.4 Elective DSE3A or DSE 3B or DSE 3C	3
1.5 Elective I DGE 01	3	2.5 Elective II DGE 02	3	3.5 Elective III DGE 03	3	4.5 Elective IV DGE 04	3	5.4 Elective DSE 1A or DSE1B or DSE1C	3	6.5 Elective DSE 4A or DSE 4B	3
1.6 Skill Enhancement Course SEC-1 (NME)	2	2.6 Skill Enhancement Course SEC-2 (NME)	2	3.6 Skill Enhancement Course SEC-4,	2	4.6 Skill Enhancement Course SEC-6	2	5. Elective Project with viva-voce DSE 2	3	6.6 Extension Activity	1
		2.7 Skill Enhancement Course –SEC-3	2	3.7 Skill Enhancement Course SEC-5 Entrepreneurial Skill)	1	4.7 Skill Enhancement Course SEC-7	2	5.6 Value Education	2	6.7 Professional Competency Skill	2
1.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-1	2	2.8 Ability Enhancement Compulsory Course (AECC) Soft Skill-2	2	3.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-3	2	4.7 7 Ability Enhancement Compulsory Course (AECC) Soft Skill-4	2	5.5 Summer Internship Second year Vacation internship	2		
1.8 Skill Enhancement -(Foundation Course)	2			3.8 1 year Vacation Industrial Activity	2	4.8 E.V.S	2				
	23		23		23		25		25		21
Total Credit Points											140



BACHELOR OF BUSINESS ADMINISTRATION -2023 REGULATIONS

COURSE STRUCTURE

SEMESTER - I					
Course Code	Course Title	L	T	P	C
23110AEC11 / 23111AEC11 / 23132AEC11 / 23135AEC11	Tamil – I / Advanced English –I / Hindi – I / French – I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23160AEC13	Principles of Management	4	0	0	3
23160AEC14	Accounting for Managers I	4	0	0	3
23160GEC15	Managerial Economics	3	1	0	3
23160GEC16	Marketing Management	3	1	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23160SEC17	Managerial Skill Development	2	0	0	2
23160SEC18	Foundation course	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					
231AECCINC	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	0	0	0	1
	Total	26	2	2	25
SEMESTER - II					
23110AEC21 / 23111AEC21 / 23132AEC21 / 23135AEC21	Tamil – I / Advanced English –I / Hindi – I / French – I	3	0	0	3
23111AEC22	English-I	3	0	0	3
23160AEC23	Business communication	4	0	0	3
23160AEC24	Accounting for Managers II	4	0	0	3
23160GEC25	International Trade	3	1	0	3
23160GEC26	Business Ethics	3	1	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23160SEC27	E-Business	2	0	0	2
23160SEC28	Elements of Insurance	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					

231AECCCMS	Communication Skills	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioural Etiquette	0	0	0	1
	Total	28	0	2	25
SEMESTER - III					
23110AEC31 / 23111AEC31 / 23132AEC31 / 23135AEC31	Tamil – I / Advanced English –I / Hindi – I / French – I	3	0	0	3
23111AEC32	English-I	3	0	0	3
23160AEC33	Business Environment	4	1	0	3
23160AEC34	Organizational Behavior	4	1	0	3
23160GEC35	Business Statistics	3	0	0	3
23160GEC36	Computer Application in Business	3	0	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23160SEC37	Intellectual Property Rights	2	0	0	1
23160SEC38	Tally. ERP 9	1	0	1	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					
23160RMC39	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	0	0	0	1
	Total	27	0	3	24
SEMESTER - IV					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC45	Tamil-IV/Advanced English-IV/Hindi- IV/French-IV	3	0	0	3
23111AEC31	English-IV	3	0	0	3
23160AEC43	Human Resource Management	4	0	0	3
23160AEC44	Business Regulatory Frame Work	4	0	0	3
23160GEC45	Financial Services	4	0	0	3
23160GEC46	Operation Research	4	0	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23160SEC47	Information Technology Concepts	2	0	0	2
23160SEC48	Salesmanship	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC4)					
23161BRC49	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	0	0	2
AUDIT COURSE					
231LCSCLS	Leadership and Management Skills	0	0	0	1

	Total	28	2	0	27
SEMESTER - V					
23160AEC51	Advertising Management and Sales Promotion	5	1	0	4
23160AEC52	Research Methodology	5	1	0	4
23160AEC53	Operations Management	5	1	0	4
23160DSC54-	Financial Management	3	0	0	3
	Disaster Management				
23160DSC55-	Industrial Relations	3	0	1	3
	Management Information system				
SKILL ENHANCEMENT COURSE (SEC)					
23160SEC56-	Summer Internship /Industrial Training	0	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC5)					
231AECCVED	Value Education	2	0	0	2
AUDIT COURSE					
231ACLSPSL	Professional Skills	0	0	0	1
	Total	27	2	1	26
SEMESTER - VI					
23160AEC61	Production and Materials Management	6	2	0	3
23160AEC62	Services Marketing	6	2	0	3
23160AEC63	Business Taxation	6	2	0	3
23160DSC64-	Entrepreneurial Development	4	0	1	3
	Security Analysis and Portfolio Management				
23160PRW65	Project Work	0	0	0	4
SKILL ENHANCEMENT COURSE (SEC)					
23161SEC66	General awareness for Competitive Examinations	2	0	0	1
23161EXACT	Extension activity	0	0	0	1
AUDIT COURSE					
231ACSIKWS	Indian Knowledge System	0	0	0	2
	Total	24	5	1	20
Total Credits - Programme					140
Total Credits - Audit Course					07

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER	COURSE CODE	COURSE TITLE
V	23160DSC54 -	Financial Management
		Disaster Management
V	23160DSC55 -	Industrial Relations
		Management Information system
VI	23160DSC64 -	Entrepreneurial Development
		Security Analysis and Portfolio Management

BBA CREDIT DISTRIBUTION

SEM	AEC	GEC	DSC	SECC	AECC	Audit	Research	Total
I	12	06	-	04	02	01	-	25
II	12	06	-	04	02	01	-	25
III	12	06	-	03	02	01	-	24
IV	12	06	-	04	04	01	-	27
V	15	-	06	02	02	01	-	26
VI	09	-	03	02	-	02	04	20
Total	72	24	09	19	12	07	04	147

	EMPLOYABILITY
	ENTERPRENURSHIP
	SKILL DEVELOPMENT

SEMESTER I

Course Code	Course Title	L	T	P	C
23110AEC11	TAMIL-I	6	0	0	3

இக்கால இலக்கியம்

பாடநோக்கங்கள்

1. இக்கால தமிழ் இலக்கிய வகைகளின் மாதிரிகளை கற்பித்தல்.
2. தமிழின் இனிமையை உணரச் செய்தல்
3. தமிழின் ஈடுபாட்டையும் சுவைக்கும் திறனையும் ஏற்படுத்துதல்.
4. கவிதை எழுதும் திறனை உருவாக்குதல்
5. படைப்பாளர்களாக உருவாக்கும் திறனை ஏற்படுத்துதல்.

பயன்கள்

- மொழி ஆளுமைத் திறன் பெறுதல்.
- சமூக சிந்தனையை வளர்த்துக் கொள்ளுதல்.
- படைப்பாளர்களாக உருவாகும் திறனைப் பெறுதல்.
- இலக்கியங்களின் அறிவை மேம்படுத்துதல்.
- கவிதை எழுதும் முறையை புரிந்துக்கொள்ளுதல்

அலகு -1 மரபுக்கவிதை

1. பாரதியார்--விடுதலை, வந்தே மாதரம் ,காற்று
- 2.பாரதிதாசன் - அழகின் சிரிப்பு ,தமிழனுக்கு வீழ்ச்சி இல்லை
- 3.கவிமணி தேசியவிநாயகம் பிள்ளை-- தொழிலாளியின் முறையீடு
- 4.நாமக்கல் கவிஞர்-- தருணம் இதுவே ,
- 5.கண்ணதாசன்-- அனுபவம்

அலகு -2புதுக்கவிதைகள்

- 1.அப்துல் ரகுமான் -வெற்றி
- 2.அறிவுமதி-நட்புக் காலம்
- 3.வைரமுத்து- ருசி, சிற்பி- ஓடு ஓடு சங்கிலி
- 4.மு.மேத்தா- வெளிச்சம் வெளியே இல்லை

அலகு -3நாட்டுப்புறவியல்

- 1.பழமொழிகள்
2. விடுகதைகள்
3. தொழில் பாடல்

அலகு- 4 சிறுகதை

1. தடயம்- மா. ஜெயபிரகாசம்
2. எதார்த்தம் - சு. தமிழ்ச்செல்வி
- 3.நீதி-- பூமணி

அலகு- 5இலக்கியவரலாறு

1. கவிதை
2. சிறுகதை
3. நாட்டுப்புறவியல்

பொதுக்கட்டுரை – மனித நேயம், வாழ்வியல் அறங்கள்

மனப்பாடப் பகுதி: பாரதியார் கவிதை- வேண்டும்,பாரதிதாசன் கவிதை-செந்தாமரை

பார்வை நூல்கள் :

1. பாரதியார் கவிதைகள் - மணிவாசகர் பதிப்பகம் சென்னை
- 2.பாரதிதாசன் கவிதைகள் - பாரி நிலையம், சென்னை
3. தமிழ் இலக்கிய வரலாறு - மு வரதராஜன் சாகித்திய அகாதெமி,சென்னை
4. நாட்டுப்புறவியல் - முனைவர். ஆறு. ராமநாதன் ,மணிவாசகர் பதிப்பகம், சென்னை
- 5.தமிழ் சிறுகதையும் தோற்றம் வளர்ச்சி - தமிழ் புத்தக நிலையம், சென்னை

இணையதளம் -www.tamilvu.org

www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2

CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
23110AEC11	ADVANCED ENGLISH-I	6	0	0	3

Aim:

- To improve the knowledge of English

Objective:

- To familiarize with the glossary terms, figures of speech
- To improve vocabulary
- To learn how to edit and proof read
- To know the comparison and contrast and cause and effect forms
- To understand the impact of the speeches of famous people

Outcome:

- Develop vocabulary
- Read and comprehend literature

UNIT –I

Glossary of grammar terms

Figures of speech

UNIT – II

Foreign words and phrases
British and American Vocabulary

UNIT – III

Speeches of famous people:
Mahatma Gandhi-Abraham Lincoln-Swami Vivekananda-John F. Kennedy

UNIT – IV

Editing
Proof reading

UNIT – V

Comparison and contrast
Cause and effect

References:

English Grammar	-Wren and Martin
English Grammar and Composition	-Radhakrishna Pillai
Essentials of Business Communication	-Rajendra Pal & J.SKorlahalli Sultan Chand & Sons
English for writers and translators	-Robin Macpherson
Technical Communication	-Meenakshi Sharma & Sangeetha Sharma
The World's Great Speeches	- Sudhir Kumar Sharma Galaxy Publishers
English Work Book-I&II	-Jewelcy Jawahar

Course code	Course Title	L	T	P	C
23111AEC12	ENGLISH-I	4	0	0	3

OBJECTIVE:

- To improve English delightfully through simple poems, essays
- To throw light on fiction
- To read and comprehend literature

OUTCOME:

- Read and comprehend literature

UNIT –I

The Art of Reading - Lin Yutang
An Eco-Feminist Vision -Aruna Gnanadason

UNIT – II

The Merchant of Death
She Spoke for all Nature

-Nanda Kishore Mishra & John Kennet
-Young world 'The Hindu'

UNIT –III

Because I could not Stop for Death
Stopping by Woods on a Snowy Evening

-Emily Dickinson
-Robert Frost

UNIT –IV

Enterprise
Love poem for a wife

-Nissim Ezekiel
-AK Ramanujam

UNIT –V

Oliver Twist

-Charles Dickens

References:-

The Art of Reading/ Experiencing Poetry.

-S.Murugesan and Dr.K.Chellappan
Emerald Publishers

Course Code	Course Title	L	T	P	C
23160 DSC01	PRINCIPLES OF MANAGEMENT	5	0	0	4

AIM: To enhance production and productivity, decrease cost of production and maximize prosperity both for employer and employees having common interests.

LEARNING OBJECTIVES:

- To impart knowledge about evolution of management.
- To provide understanding on planning process and importance of decision making in organization.
- To learn the application of principles in organization.
- To study the process of effective controlling in organization.
- To familiarize students about significance of ethics in business and its implications.

UNIT – I

Management: Importance – Definition – Nature and Scope of Management - Process – Role and Functions of a Manager – Levels of Management – Development of Scientific Management and other Schools of thought and approaches.

UNIT – II

Planning: Nature – Importance – Forms – Types – Steps in Planning – Objectives – Policies – Procedures and Methods – Natures and Types of Policies – Decision –making – Process of Decision – making – Types of Decision.

UNIT – III

Organizing: Types of Organizations – Organization Structure – Span of Control and Committees – Departmentalization – Informal Organization- Authority – Delegation – Decentralization – Difference between Authority and Power – Responsibility.

UNIT – IV

Direction – Nature and Purpose. Co- ordination – Need, Type and Techniques and requisites for excellent Co-

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Reading list

UNIT – V

Definition of Business ethics - Types of Ethical issues -Role and importance of Business Ethics and Values in Business - Ethics internal - Ethics External - Environment Protection - Responsibilities of Business

Course Outcomes:

CO1 - On completion of this course, students will;

CO2 - Describe nature, scope, role, levels, functions and approaches of management

CO3 - Apply planning and decision making in management

CO4 - Identify organization structure and various organizing techniques

CO5 - Understand Direction, Co-ordination & Control mechanisms

1.	JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.
2.	Griffin, T.O., Management, Houghton Mifflin Company, Boston, USA, 2014.
3	.Stephen A. Robbins & David A. Decenzo& Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011
4	Stoner, Freeman, Gilbert Jr. (2014). Management (6th edition), New Delhi: Prentice Hall India
5	Robbins, S., Coulter, M., Sidani, D., and Jamali, D., Management: Arab World Edition, Pearson, 2014.
Reference Books	
1.	P.C. Tripathi& P.N Reddy; Principles of Management, Sultan Chand & Sons,6th Edition, 2017
2.	L.M.Prasad; Principles & Practice of Management, Sultan Chand & Sons, 8 th Edition.
3.	Stephen P. Robbins & Mary Coulter; Management, Pearson Education, 13th Edition, 2017
4.	Dr.C.B.Gupta; Principles of Management, Sultan Chand& Sons, 3 rd Edition.
5.	Harold Koontz, HienzWeihrich, A Ramachandra Aryasri; Principles of Management, McGraw Hill, 2nd edition, 2015
Web Resources	
1	https://www.toolshero.com/management/14-principles-of-management/
2	https://open.umn.edu/opentextbooks/textbooks/693
3	https://open.umn.edu/opentextbooks/textbooks/34
4	https://openstax.org/subjects/business
5	https://blog.hubspot.com/marketing/management-principles

CO6 -
Relate
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**Mappi
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S

-Strong M-Medium L-Low

**CO-PO Mapping with program specific outcomes (Course Articulation Matrix)
Level of Correlation between PSO's and CO's**

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Principles of Management	I	15
	II	15
	III	15

	IV	15
	V	15

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M	S	S	S	S	S	S	S
CO 2	S	S	S	S	M	M	S	S
CO 3	M	S	S	M	S	S	S	S
CO 4	S	M	S	S	S	S	S	S
CO 5	S	S	S	S	S	S	S	S

Course Code	Course Title	L	T	P	C
23160 DSC02	Accounting for Managers I	5	0	0	4

AIM: The Basic purpose of this course is to develop an insight of postulates, principles and techniques of accounting, and utilization of financial accounting information for planning, decision-making and control.

LEARNING OBJECTIVES:

- To impart knowledge about basic concepts of accounting its applications
- To analyze and interpret financial reports of a company
- To understand the gross profit and net profit earned by organization
- To foster knowledge on Depreciation Accounting.
- To understand the procedures of Accounting under Single entry system.

UNIT – I

Meaning and scope of Accounting, Basic Accounting Concepts and Conventions – Objectives of Accounting – Accounting Transactions – Double Entry Book Keeping – Journal, Ledger, Preparation of Trial Balance.

UNIT – II

Subsidiary book – Preparation of cash Book – Bank reconciliation statement – rectification of errors – Suspense account.

UNIT – III

Preparation of Final Accounts – Adjustments – Closing stock, outstanding, prepaid and accrued, depreciation, bad and doubtful debts, provision and discount on debtors and creditors, interest on drawings and capital, Abnormal loss, managerial remuneration.

UNIT – IV

Partnership Accounts- Basic concepts of admission, retirement and death of a partner including treatment of goodwill. Depreciation– Meaning, Causes, Types – Straight Line Method – Written Down Value Method.

UNIT – V

Single Entry – Meaning, Features, Defects, Differences between Single Entry and Double Entry System – Statement of Affairs Method – Conversion Method.

COURSE OUTCOMES:

CO1 Prepare Journal, ledger, trial balance and cash book

CO2 Classify errors and making rectification entries

CO3 Prepare final accounts with adjustments

CO4 Pass depreciation entries and prepare depreciation accounts

CO5 Prepare single and double entry system of accounting.

Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	S	S	S	S	M	S
CO 2	S	S	S	S	S	S	S	S

CO 3	S	S	S	S	S	M	S	S
CO 4	S	S	S	S	S	M	S	S
CO 5	S	S	S	S	S	S	S	S

S-Strong M-Medium L-Low

CO-PO Mapping with program specific outcomes (Course Articulation Matrix)

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Accounting for Managers I	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DGE01	MANAGERIAL ECONOMICS	4	0	0	3

COURSE OBJECTIVES:

- To familiarize students with concepts of economics and its relevant in business scenario
- To understand the applications & implications of economics in decision-making and problem solving.
- To Understand the optimal point of productivity of a firm.

- To describe the pricing strategies that are consistent with evolving marketing needs
- To Provide insights to the various market structures in an economy.

UNIT I

Nature and scope of managerial economics – definition of economics – important concepts of economics – relationship between micro, macro and managerial economics – nature and scope – objectives of firm.

UNIT II

Demand analysis – Theory of consumer behavior – Marginal utility analysis – indifference curve analysis Meaning of demand – Law of demand – Types of demand-Determinants of demand – Elasticity of demand –Demand forecasting.

UNIT III

Production and cost analysis – Production – Factors of production – production function – Concept – Law of variable proportion – Law of return to scale and economics of scale – cost analysis – Different cost concepts – Cost output relationship short run and long run – Revenue curves of firms – Supply analysis.

UNIT IV

Pricing methods and strategies – Objectives – Factors – General consideration of pricing – methods of pricing – Dual pricing – Price discrimination

UNIT V

Market classification – Perfect competition – Monopoly – Monopolistic competition – Duopoly – Oligopoly.

COURSE OUTCOMES:

CO1 Analyze & apply the various economic concepts in individual & business decisions.

CO2 Explain demand concepts, underlying theories and identify demand forecasting techniques.

CO3 Employ production, cost and supply analysis for business decision making

CO4 Identify pricing strategies

CO5 Classify market under competitive scenarios.

Reading List	
1.	Journal of Economic Literature – American Economic Association
2.	Arthashastra Indian Journal of Economics & Research
3.	Mithani D.M. (2016) -Managerial Economics –Himalaya Publishing House – Mumbai

4.	Indian Economic Journal/Sage Publications
5.	Mehta P.L (2016) – Managerial Economics – Sultan Chand & Sons – New Delhi
References Books	
1.	Dr. S. Sankaran; Managerial Economics; Margham Publication, Chennai, 2019
2.	Thomas and Maurice; Managerial Economics: Foundations of Business Analysis and Strategy, McGraw Hill Education, 10 editions, 2017.
3.	D N Dwivedi; Managerial Economics: Vikas Publishing House, 8 th edition, 2015.
4.	H L Ahuja; Managerial Economics, S. Chand, 9th Edition,2017.
5.	Dominick Salvatore; Managerial Economics: Principles and Worldwide Applications, Oxford University Press, Eighth edition, 2016
Web Resources	
	<ol style="list-style-type: none"> https://www.studocu.com/row/document/azerbaycan-dovlet-iqtisad-universiteti/business-and-management/lecture-notes-on-managerial-economics/6061597 http://www.simplynotes.in/e-notes/mbabba/managerial-economics/ https://businessjargons.com/determinants-of-elasticity-of-demand.html http://www.economicdiscussion.net/laws-of-production/laws-of-production-laws-of-returns-to-scale-and-variable-proportions/5134 https://www.intelligenteconomist.com/profit-maximization-rule/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	M	S	S	S	M	M	S
CO2	S	S	S	S	S	M	M	M
CO3	M	M	S	S	S	S	S	S
CO4	M	S	S	S	S	S	M	S
CO5	S	M	S	S	S	S	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PO's	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Title	Unit	Hours Allotment
Managerial Economics	I	12
	II	12
	III	12
	IV	12
	V	12

Course Code	Course Title	L	T	P	C
23160GEC16	Marketing Management	4	0	0	3

LEARNING OBJECTIVES:

To understand the concepts of marketing management To learn about marketing process for

Reading List

different types of products and services To understand the tools used by marketing managers in decision situations To understand the marketing environment

UNIT - I Market and Marketing: Distinction between marketing and selling - Types of market – Concepts– Functions–Marketing management–Objectives–Importance–Marketing Environment- Marketing Information System.

UNIT - II Market Segmentation: Criteria of effective segmentation – Benefits – Bases for Market segmentation–Factors Influencing Consumer Behavior–Buyermotives–Buying process.

UNIT - III Marketing Mix - Product planning and development – Product mix decisions – New product development – Product life cycle and strategies - Pricing – Meaning – Influencing factors –Objectives –Pricing methods.

UNIT - IV Marketing channels -Need and importance – Classification – Types of Intermediaries – Wholesalers – Functions – Retailers – Functions - Physical distribution – Elements of Physical distribution(logistics)

UNIT - V Promotion mix - Personal selling –Process - Advertising – Objectives – Types - Sales promotion–Objectives –Sales promotion methods, publicity and public relations.

Course Outcomes:

- Students will demonstrate strong conceptual knowledge in the functional area of marketing management.
- Students will demonstrate effective understanding of relevant functional areas of marketing management and its application.
- Students will demonstrate analytical skills in identification and resolution of problems pertaining to marketing management.

	1. Ramaswamy and Namakumari, Marketing Management 3/e Revised MacMillan India Ltd

References Books

1.	Philip Kotler, Marketing Management, Prentice Hall of India.
2.	2. Philip Kotler and Armstrong, Marketing Management
3.	3. Saxena, Marketing Management, Tata McGraw Hill Pub
4.	4. Pillai & Bhagavathi, Modern Marketing
5.	5. Sherlekar, Marketing Management

S-Strong

Web Resources

1.	https://ebooks.lpude.in/management/bba/term
2.	https://www.inderscience.com/jhome.php?jcode=ijhem International Journal of Hospitality & Event Management
3.	https://www.emeraldgroupublishing.com/journal/ijefm International Journal of Event and Festival Management
4.	https://www.eventbrite.com/blog/?s=roundup
5.	https://www.eventindustrynews.com/

**M-Medium
L-Low**

**CO-PO
Mapping
with
Programme
Specific
Outcomes**

(Course Articulation Matrix):

Level of Correlation between PSO's and CO's

Course Title	Unit	Hours Allotment
Marketing management	I	6
	II	6
	III	6
	IV	6
	V	6

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted Percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M					S	S	
CO 2					M	S	S	
CO 3		M				S		
CO 4						S	S	
CO 5						S	S	

CourseCode	CourseTitle	L	T	P
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23160AECC1	Indian Constitution	2	-	-
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COURSE OBJECTIVES:

- To make the students understand about the democratic rule and parliamentary administration
- To appreciate the salient features of the Indian constitution
- To know the fundamental rights and constitutional remedies
- To make familiar with powers and positions of the union executive, union parliament and the supreme court
- To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Unit I

The making of Indian constitution - The constitution assembly organization –character -work salient features of the constitution-written and detailed constitution-socialism–secularism-democracy and republic.

Unit II

Fundamental Rights And Fundamental Duties Of The Citizens Right of equality -right of freedom- right against exploitation -right to freedom of religion-cultural and educational rights-right constitutional remedies-fundamental duties.

Unit III

Directive principles of state policy - Socialistic principles-Gandhian principles-liberal and general principles-differences between fundamental rights and directive principles

Unit IV

The union executive, union parliament and Supreme Court - Powers and positions of the president - qualification _method of election of president and vice president -prime minister -Rajya Sabha -Lok Sabha .the supreme court -high court -functions and position of supreme court and high court.

Unit V

State council-elections system and parliamentary democracy in India - State council of ministers-chief minister-elections system in India-main features election commission-features of Indian democracy.

References:

- 1) Palekar.s.a.Indian constitution government and politics, ABD publications, India
- 2) Aiyer, alladi krishnaswami, Constitution and fundamental rights 1955.
- 3) Markandan.k.c.directive Principles in the Indian constitution 1966.
- 4) Kashyap.Subashc,Our parliament ,National book trust,New Delhi 1989

COURSE OUTCOMES:

CO1 Democratic values and citizenship training are regained

CO2 Awareness on fundamental rights are established

CO3 The function of union government and state government are learnt

CO4 The power and function of the judiciary are learnt thoroughly

CO5 Appreciation of democratic parliamentary rule is learnt

CourseCode	CourseTitle	L	T	P	C
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231LSCUV	Universal Human Values	-	-	-	1
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COURSE OBJECTIVES:

The present course deals with meaning, purpose and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials.

Unit I

- Introduction: What is love? Forms of love for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living
- Love and compassion and inter-relatedness
- Love, compassion, empathy, sympathy and non-violence
- Individuals who are remembered in history for practicing compassion and love.
- Narratives and anecdotes from history, literature including local folklore
- Practicing love and compassion: What will learners learn/gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?
- Sharing learner's individual and/or group experience(s) Simulated Situations
- Case studies

Unit II

- Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others)
- Individuals who are remembered in history for practicing this value
- Narratives and anecdotes from history, literature including local folklore
- Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?
- Learners' individual and/or group experience(s)
- Simulated situations
- Case studies

Unit III

- Introduction: What is non-violence? Its need. Love, compassion, empathy, sympathy for others as prerequisites for non-violence
- Ahimsa as non-violence and non-killing
- Individuals and organisations that are known for their commitment to non-violence
- Narratives and anecdotes about non-violence from history, and literature including local folklore
- Practicing non-violence: What will learners learn/gain if they practice non-violence? What will learners lose if they don't practice it?

- Sharing learner's individual and/or group experience(s) about non-violence
- Simulated situations
- Case studies

Unit IV

- Introduction: What is righteousness?
- Righteousness and *dharma*, Righteousness and Propriety
- Individuals who are remembered in history for practicing righteousness
- Narratives and anecdotes from history, literature including local folklore
- Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Case studies

Unit V

- Introduction: What is peace? Its need, relation with harmony and balance
- Individuals and organisations that are known for their commitment to peace
- Narratives and Anecdotes about peace from history, and literature including local folklore
- Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about peace
- Simulated situations
- Case studies

COURSE OUTCOMES:

CO1 Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.

CO2 Learn from case studies of lives of great and successful people who followed and practiced human values and achieved self-actualisation.

CO3 Become conscious practitioners of human values.

CO4 Realize their potential as human beings and conduct themselves properly in the ways of the world.

SEMESTER II

CourseCode	CourseTitle	L	T	P	C
23110AEC21	Tamil-II	6	0	0	3

பக்தி இலக்கியம் பாடநோக்கங்கள்

- காலந்தோறும் பக்தி இலக்கியம் வளர்ந்துள்ள தன்மையைக் கற்பித்தல்.
- நாயன்மார்கள், ஆழ்வார்களின் பக்திச் சிறப்பை அறிய செய்தல்.
- ஆழ்வார்களின் பக்தி உணர்வை ஊட்டுதல்
- பாடல்களில் இசை இன்பம், ஓசை நயம் ஆகியவற்றை உணரச்செய்தல்
- குழந்தைப் பருவத்தின் தன்மையை உணர்த்துதல்

பயன்கள்

- நாயன்மார்கள் பக்திச் சிறப்பை அறிதல்.
- ஆழ்வார்களின் பக்தி நெறியை உணர்தல்.
- பக்தி இலக்கியம் காலம் தோறும் வளர்ந்ததை அறிதல்.
- பாடல்களில் இசை இன்பம், ஓசை நயம் அறிதல்.
- குழந்தைப் பருவத்தின் தன்மையை உணர்தல்.

அலகு- 1 பன்னிரு திருமுறைகள்

1. திருஞானசம்பந்தர்- திருத்தில்லைப் பதிகம்
2. திருநாவுக்கரசர் - திருநீற்றுப் பதிகம்
3. சுந்தரர் - திருவெண்ணைநல்லூர்
4. திருமூலர்- திருமந்திரம்(இளமை நிலையாமை)

அலகு- 2 பன்னிரு ஆழ்வார்கள்

1. ஆண்டாள் - திருப்பாவை
2. பெரியாழ்வார்- மூன்றாம் திருமுறை(பத்து பாடல்கள்)
3. மதுரகவியாழ்வார் - கண்ணின் நுண் சிறு தாம்பு

அலகு- 3 சிற்றிலக்கியங்கள்

1. மீனாட்சியம்மைப் பிள்ளைத்தமிழ்- செங்கீரை பருவம், அம்புலி பருவம்
2. நந்திக்கலம்பகம்
3. குற்றால குறவஞ்சி- குறத்தி நகர்வளம் கூறுதல்
4. காளமேகப்புலவர் பாடல்கள்

அலகு- 4 புதினம்

1. நா .பார்த்தசாரதியின்- குறிஞ்சி மலர்

அலகு-5 தமிழ் இலக்கிய வரலாறு

1. பக்தி இலக்கியங்கள்
2. சைவமும் தமிழும்
3. வைணவ சமயம் போற்றி வளர்த்த தமிழ்
4. சிற்றிலக்கியங்கள்
5. நாவல் இலக்கியம்

பார்வை நூல்கள் :

1. தேவாரம் - மணிவாசகர் பதிப்பகம் சென்னை
2. நாலாயிர திவ்ய பிரபந்தம் - வர்த்தமான பதிப்பகம் சென்னை

3.தமிழ் இலக்கிய வரலாறு - முனைவர் ச சுபாஷ் சந்திர போஸ், இயல் வெளியீடு ,தஞ்சாவூர்

4. தமிழ் நாவல் இலக்கியம் -கா கைலாசபதி- தமிழ் புத்தக,நிலையம், சென்னை
இணையதளம் -www.tamilvu.org , www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

CourseCode	CourseTitle	L	T	P	C
23111AEC21	ADVANCED ENGLISH-II	6	0	0	3

COURSE OBJECTIVE:

- To understand the format of e-mail, fax and memos
- To write itinerary, checklist, invitation, circular, instruction, recommendations
- To understand the impact of the biographies of famous people.

UNIT-I

E-mail

Fax

Memos

UNIT-II

Itinerary

Checklist

UNIT-III

Invitation

Circular

UNIT-IV

Instruction

Recommendation

UNIT-V

Biographies of famous people:

Mother Teresa - Madam Curie - Charles Chaplin - Vikram Sarabhai

REFERENCES:

English Grammar

- Wren and

Martin English Grammar and Composition

- Radhakrishna Pillai

Technical Communication

-

Meenakshi Sharma & Sangeetha Sharma Inspiring Lives

- Maruthi Publishers

English Workbook - I & II

- Jewelcy Jawahar

COURSE OUTCOME:

- Develop writing skill
- Read and comprehend literature

CourseCode	CourseTitle	L	T	P	C
23111AEC22	ENGLISH-II	4	0	0	3

COURSE OBJECTIVE:

- To empower students to acquire language skills through literature
- To enable the students to appreciate literature
- To develop the conversational skills through one act plays

COURSE OUTCOME:

- Readandcomprehendliterature

UNIT-I

Ecology -A.K.Ramanujan
 Gift -AliceWalker
 TheFirstMeeting -SujataBhatt

UNIT-II

Fueled -MarcieHans
 Asleep -Ernst Jandl
 Buyingandselling -KhalilGibran

UNIT-III

TheEnd oflivingand TheBeginning ofSurvival -ChiefSeattleMyWood
 -E.M.Forster
 TheMeetingofRaces -RabindranathTagore

UNIT-IV

TheRefugee -K.A.Abbas
 IHave a Dream -MartinLutherking
 ThosePeopleNextDoor -A.G.Gardiner

UNIT-V

MarriageisaprivateAffair -ChinuaAchebe
 TheFortuneTeller -KarelCapek
 Proposal -AntonChekov

REFERENCES:-

GatheredWisdom -
 GowriSivaramanEmeraldPublishers

Reading List

Course Code	Course Title	L	T	P	C
23160DSC03	BUSINESS COMMUNICATION	5	0	0	4

COURSE OBJECTIVES:

- To educate students role & importance of communication skills
- To build their listening, reading, writing & speaking communication skills.
- To introduce the modern communication for managers.
- To understand the skills required for facing interview
- To facilitate the students to understand the concept of Communication.

UNIT I

Definition – Methods – Types – Principles of effective Communication – Barriers to Communication – Communication etiquette.

UNIT II

Business Letter – Layout- Kinds of Business Letters: application, offer, acceptance/ acknowledgement and promotion letters. Business Development Letters – Enquiry, replies, Order, Sales, circulars, Grievances.

UNIT III

Interviews- Direct, telephonic & Virtual interviews- Group discussion – Presentation skills – body language.

UNIT IV

Communication through Reports – Agenda- Minutes of Meeting - Resume Writing.

UNIT V

Modern Forms of Communication: podcasts, Email, virtual meetings – Websites and their use in Business – social media- Professional Networking sites.

COURSE OUTCOMES:

- CO1** Understand communication process and its barriers.
- CO2** Develop business letters in different scenarios
- CO3** Develop oral communication skills & conducting interviews
- CO4** Use managerial writing for business communication
- CO5** Identify usage of modern communication tools & its significance for managers

1.	Krishan Mohan & Meena Banerji, Developing Communication Skills, Macmillan India Ltd, 2008
2.	Mallika Nawal –Business Communication – CENGAGE
3.	Bovee, Thill, Schatzman, Business Communication Today - Peason Education Private Ltd - New Delhi.
4.	Michael Brown, Making Presentation Happen, Allen & Unwin, Australia, 2008
5.	Sundar K.A, Business communication Vijay Nicole imprints Pvt. Ltd., Chennai.
References Books	
1.	Rajendra Paul & J S Kovalahalli, Essentials of Business Communication, Sultan Chand & Sons, New Delhi, 2017
2.	Dr. C B Gupta, Basic Business Communication, Sultan Chand & Sons, New Delhi, 2017
3.	R C Sharma & Krishan Mohan, Business Correspondance and Report Writing, Mc Graw Hill, India Pvt Ltd., New Delhi, 2006
4.	Kevin Galaagher, Skills Development for Business and Management Students, Oxford University Press, Delhi, 2010
5.	R C Bhatia, Business Communication, Ane Books Pvt Ltd., Delhi, 2015
Web Resources	
1.	https://www.managementstudyguide.com/business_communication.html
2.	https://studiousguy.com/business-communication/
3.	https://www.oercommons.org/curated-collections/469
4.	https://www.scu.edu/mobi/business-courses/starting-a-business/session-8-communication-tools/
5.	https://open.umn.edu/opentextbooks/textbooks/8

Business Communication
Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M	S	S	S	S	S	S	M
CO 2	S	S	S	S	M	S	S	S
CO 3	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	S	M
CO 5	S	S	S	S	S	S	S	M

S-Strong M-Medium L-Low

CO-PO Mapping with program specific outcomes (Course Articulation Matrix)
Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Business Communication	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160 DSC04	ACCOUNTING FOR MANAGERS II	4	0	0	4

COURSE OBJECTIVES:

- To provide basic understanding of cost concepts and classification.
- To develop skills in tools & techniques and critically evaluate decision making in business.
- To understand various ratios and cash flow related to finance
- To recognize the role of budgets and variance as a tool of planning and control.
- To gain insights into the fundamental principles of accounting and use them in day-to-day business scenarios

UNIT I

Cost accounting – Meaning, nature, scope and functions, need, importance and limitations- Cost concepts and classification – cost sheets – Tenders & Quotation

UNIT II

Management accounting – Meaning, nature, scope and functions, need, importance and limitations – Management Accounting vs. Cost Accounting. Management Accounting vs. Financial Accounting. Analysis and Interpretation of financial statements – Nature, objectives, essentials and tools, methods – Comparative Statements, Common Size statement and Trend analysis.

UNIT III

Ratio Analysis – Interpretation, benefits and limitations. Classification of ratios - Liquidity, Profitability, turnover.

UNIT IV

Budgets and budgetary control – Meaning, objectives, merits and demerits – Sales, Production, flexible budgets and cash budget

UNIT V

Marginal Costing – CVP analysis – Break even analysis.

COURSE OUTCOMES:

- CO1** Interpret cost sheet & write comments.
CO2 Compare cost, management & financial accounting
CO3 Analyze the various ratio and compare it with standards to assess deviations
CO4 Estimate budget and use budgetary control
CO5 Evaluate marginal costing and its components

Reading List

1.	Gupta, R.L and M. Radhaswamy.AdvancedAccountancy,Sultan Chand & Sons, 2016.
2.	T. S. and A .Murthy.ManagementAccounting.Chennai: Margham, 2007.
3.	Jain S.P and K.L Narang.Advanced Accountancy (Part II).Kalyani, 2007.
4.	Maheshwari S.N, Advanced Accountancy (Part1I). Vikas, 2007.
5	Man Mohan and S.N. Goyal. Principles of Management Accounting. Agra: SahityaShawan, 2017.

References Books

1.	T. S. Reddy and Hari Prasad Reddy- Management Accounting, Margham Publication, 2016
2.	Antony Atkinson, Rebert S Kalpan, Advance Management Accounting, Pearson Publications, 2015
3.	Homayra Sunderu Stratton, Introduction to Management Accounting, Pearson Education, 2013.
4.	Rajiv Kumar Goel & Jshaan Goel, Concept Building Approach to Management Accounting ,2019
5.	Colin Drury, Management and Cost Accounting (with CourseMate and eBook Access), Cengage, 2015.

Mapping with program outcomes

**S-Strong
M-Medium
L-Low**

CO-PO Mapping with program specific outcomes (Course Articulation Matrix) Level of Correlation between PSO's and CO's

Web Resources

1	https://www.toppr.com/guides/fundamentals-of-accounting/fundamentals-of-cost-accounting/meaning-of-management-accounting/
2	https://efinancemanagement.com/financial-accounting/management-accounting
3	http://www.accountingnotes.net/management-accounting/management-accountingmeaning-limitations-and-scope/5859
4	https://www.wallstreetmojo.com/ratio-analysis/
5	http://www.accountingnotes.net/cost-accounting/variance-analysis/what-is-varianceanalysis-cost-accounting/10656

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Accounting for Managers II	I	12
	II	12
	III	12
	IV	12
	V	12

CourseCode	CourseTitle	L	T	P	C
23160DGE2	International Trade	4	-	-	3

COURSE OBJECTIVES:

- To familiarize students on basics & theories of International Trade.
- To impart knowledge about international trade organization.
- To provide awareness about recent trends in International Trade and its implications.
- To Identify the key areas and terms relating to trade in the global economy
- To gain knowledge on the various modes of entry and the roles played by global institutions in international business.

UNIT I

Difference between Internal and International Trade – Importance of International Trade in the Global context.

UNIT II

Theories of Foreign Trade: - Absolute, Comparative, equal cost differences (Adam Smith, Ricardo, Haberler's Hechsher-Ohlin theories only)

UNIT III

Balance of Trade, Balance of Payment – Concepts – Causes of Disequilibrium, Methods to Correct Disequilibrium – Fixed and Floating Exchange Rates

UNIT IV

International Monetary Fund – IMF – International Liquidity- IBRD- WTO and its implications with special reference to India

UNIT V

International business Overview – globalization – MNC – FDI – Export management – significance to GDP- Export procedure & documentation.

COURSE OUTCOME:

- CO1** Discuss the difference between internal and international trade and its significance
- CO2** Explain international trade theories
- CO3** Outline the balance of trade, balance of payment, exchange rate concept
- CO4** Identify the relevance of international institutions and trading blocs.
- CO5** Understand globalization and its impact on Indian business scenario and export business.

Reading List	
1.	The International trade journal
2.	International Journal of Trade & Global Market
3.	http://ijbr-journal.org/IJBR-JOURNAL/Default.aspx
4.	https://link.springer.com/article/10.1057/s41267-019-00219-7
5.	K. Aswathappa, International Business, Mc Graw Hill, India Pvt Ltd., 2015
References Books	
1.	Dr. S.Sankaran; International Trade, Margham publication, 2019.
2.	Amrita Narlikar; International Trade and Developing Countries: Bargaining Coalitions in the GATT & WTO, Routledge, 2016.
3.	Francis Cherunilam; International Trade & Export Management, Himalaya Publications, 20th edition, 2017.
4.	V.K. Bhalla, International Business, SCHAND publications, First edition, 2013.
5.	Avinash Dexit; Theory of International Trade, Cambridge University Press, 2016.
Web Resources	
	<ol style="list-style-type: none"> 1. chromeextension://efaidnbmninnibpcajpcglclefindmkaj/http://bgc.ac.in/pdf/study-material/International-Trade.pdf 2. https://www.britannica.com/topic/international-trade 3. www.imf.org/external/pubs/ft/fund/basics/trade.html 4. https://www.wto.org 5. https://www.imt.org

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	S	S	S	S	M	M	M
CO2	S	S	S	S	S	M	S	S
CO3	M	M	S	S	S	S	S	S
CO4	S	S	S	S	S	M	M	S
CO5	S	M	M	S	S	S	S	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PO'S	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Title	Unit	Hours Allotment
International Trade	I	12
	II	12
	III	12

	IV	12
	V	12

CourseCode	CourseTitle	L	T	P	C
23160SECC2	Managerial Skill Development	2	-	-	2

COURSE OBJECTIVE:

- To improve the self-confidence, groom the personality and build emotional competence
- To address self-awareness and the assessment of core management skills such as communication, working with teams and creating a positive environment for change.
- To assess the Emotional intelligence
- To induce critical-thinking and analytical skills to investigate complex problems to propose viable solutions
- To improve professional etiquettes.

UNIT I

Self: Core Competency, Understanding of Self, Components of Self— Self-identity, Self-concept, Self - confidence and Self-image. Skill Analysis and finding the right fit. Self-learning styles, attitude towards change and applications of skills.

UNIT II

Self Esteem: Meaning & Importance, Components of self-esteem, High and low self-esteem, measuring our self-esteem and its effectiveness, Personality mapping tests, Appreciative Intelligence.

UNIT III

Building Emotional Competence: Emotional Intelligence — Meaning, Components, Importance and Relevance, Positive and Negative Emotions., Healthy and Unhealthy expression of Emotions, The six-phase model of Creative Thinking: ICEDIP model.

UNIT IV

Thinking skills: The Mind/Brain/Behaviour, thinking skills, Critical Thinking and Learning, Making Predictions and Reasoning, Memory and Critical Thinking, Emotions and Critical Thinking. Creativity: Definition and meaning of creativity, The nature of creative thinking, Convergent and Divergent thinking, Idea generation and evaluation (Brain Storming), Image generation and evaluation.

UNIT V

Communication related to course: How to make oral presentations, conducting meetings, reporting of projects, reporting of case analysis, answering in Viva Voce, Assignment writing

Debates, presentations, role plays and group discussions on current topics.
Audio and Video Recording of the above exercises to improve the non-verbal communication and professional etiquettes.

COURSE OUTCOME:

CO1 Identify the personal qualities that are needed to sustain in the world of work.

CO2 Explore more advanced Management Skills such as conflict resolution, empowerment, working with teams and creating a positive environment for change.

Reading List	
1.	Managerial Skill Articles
2.	The Management Skills of SALL Managers - SiSAL Journal

CO3 Acquire practical management skills that are of immediate use in management or leadership positions.

CO4 Employ critical-thinking and analytical skills to investigate complex business problems to propose viable solutions.

CO5 Make persuasive presentations that reveal strong written and oral communication skills needed in the workplace.

3.	Managerial Skills by Dr. K. Alex S. Chand								
4.	Managerial Skills 2 by Vyathia Meneses Prabhu, Pen to Print Publishing LLP	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
	CO1	M	M				S	S	
5.	Gallagher (2010), Skills Development for Business & Management Students, Oxford University Press. PROF. SANJIV	CO2	M						
	CO3						S	S	
	CO4	S	S						
	CO5				S				
References Books									
1.	Joshi, G. (2015), Campus to Corporate-Your Roadmap to Employability, Sage Publication								
2.	McGrath E. H. (9 Ed. 2011), Basic Managerial Skills, Prentice Hall India Learning Private Limited.								
3.	Whetten D. (e Ed. 2011), Developing Management Skills, Prentice Hall India Learning Private Limited.								
4.	<u>P. Varshney</u> , <u>A. Dutta</u> , Managerial Skill Development, Alfa Publications, 2012								
5.	EQ- soft skills for Corporate Carrer by Dr. Sumeet Suseelan								
Web Resources									
1.	https://www.ipjugaad.com/syllabus/ggsip-university-bba-4th-semester-managerial-skill-development-syllabus/63								
2.	https://www.academia.edu/4358901/managerial_skill_development_pdf								
3.	https://www.academia.edu/4358901/managerial_skill_development_pdf								
4.	https://rccmindore.com/wp-content/uploads/2015/06/Managerial-SkillsAll-Units-AC.pdf								
5.	https://www.aisectuniversityjharkhand.ac.in/PDFDoc/StudyNotes/MBA/SEM%201/MBA-1-MSD(Managerial%20skill%20development).pdf								

S-Strong M-Medium L-Low

**CO-PO Mapping with Programme Specific Outcomes (Course Articulation Matrix):
Level of Correlation between PSO's and CO's**

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted Percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Managerial Skill Development	I	6
	II	6
	III	6
	IV	6
	V	6

CourseCode	CourseTitle	L	T	P	C
23160SEC3	Business etiquette and Corporate grooming	2	-	-	2

Reading List

COURSE OBJECTIVE:

- To impart knowledge

- about basic etiquettes in professional conduct
- To provide understanding about the workplace courtesy and ethical issues involved
- To suggest on guidelines in managing rude and impatient clients
- To familiarize students about significance of cultural sensitivity and the relative business attire
- To stress on the importance of attire.

UNIT I

Introduction to Business Etiquette: Introduction- ABCs of etiquette- meeting and greetings scenarios- principles of exceptional work behavior-role of good manners in business-professional conduct and personal spacing.

UNIT II

Workplace Courtesy and Business Ethics: Workplace Courtesy- Practicing common courtesy and manners in a workplace-Etiquette at formal gatherings- Professional qualities expected from an employer's perspective - Hierarchy and Protocol. Ethical issues - preventing sexual harassment-conflict resolution strategies- Choosing appropriate gift in the business environment-real life workplace scenarios - company policy for business etiquette

UNIT III

Telephone Etiquette, email etiquette and Disability Etiquette Mastering the telephone courtesy, handling rude or impatient clients -internet usage in the workplace, email etiquette, online chat etiquette guidelines -Basic disability Etiquette practices.

UNIT IV

Diversity and Cultural Awareness at Workplace Impact of diversity-Cultural Sensitivity-Taboos and Practices-Inter-Cultural Communication.

UNIT V

Business Attire and Professionalism Business style and professional image-dress code-guidelines for appropriate business attire-grooming for success.

COURSE OUTCOME:

- CO1 Describe basic concepts of business etiquette and corporate grooming.
- CO2 Outline the etiquette and grooming standards followed in business environment and the significance of communication
- CO3 Create cultural awareness and moral practices in real life workplace scenarios
- CO4 Analyze workplace courtesy and resolve ethical issues with respect to etiquette and grooming for success
- CO5 Apply the professionalism in the workplace considering diversity and courtesy

1.	Journal of Computer Mediated Communication By ICA
2.	Business and Professional Communication by Sage Journals
3.	Business Etiquette Made Easy: The Essential Guide to Professional Success by Myka Meier, Skyhorse
4.	Emily Post's The Etiquette Advantage in Business: Personal Skills for Professional Success by Peggy Post and Peter Post, William Morrow
5.	Shital Kakkar Mehra, "Business Etiquette: A guide for the Indian Professional", Harper Collins Publisher (2012)
References Books	
1.	Indian Business Etiquette, Raghu Palat, JAICO Publishers
2.	Nina Kochhar, "At Ease with Etiquette", B. Jain Publisher, 2011
3.	Nimeran Sahukar, Prem P. Bhalla, "The Book of Etiquette and Manners", Pustak Mahi Publishers, 2004
4.	Sarvesh Gulati (2012), Corporate Grooming and Etiquette, Rupa Publications India Pvt. Ltd.
5.	The Essentials of Business Etiquette: How to Greet, Eat, and Tweet Your Way to Success by Barbara Pachter, McGraw Hill Education
Web Resources	
1.	http://osou.ac.in/eresources/DIM-08-BLOCK-3.pdf
2.	https://www.columbustech.edu/skins/userfiles/files/Training%20Manual%20-%20Business%20Etiquette%20(1).pdf
3.	https://www.sbu.edu/docs/default-source/life-at-sbu-documents/professional-wardrobe-nbsp-.pdf
4.	https://www.tutorialspoint.com/business_etiquette/grooming_etiquettes.htm
5.	https://wikieducator.org/Business_etiquette_and_grooming

S-Strong M-Medium L-Low

**h Programme Specific Outcomes (Course Articulation Matrix):
Level of Correlation between PSO's and CO's**

Course Title	Unit	Hours Allotment
Business etiquette and Corporate Grooming	I	6
	II	6
	III	6
	IV	6
	V	6

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1					M	S	S	
CO 2		M		S	S	S	S	
CO 3						M	S	S
CO 4	M		S			M	S	S
CO 5			M			S	S	S

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	-	3	3	3	3
Weightage	12	15	15	15	15
Weighted Percentage of Course Contribution to Pos	2.4	3.0	3.0	3.0	3.0

CourseCode	CourseTitle	L	T	P	C
23160AECC2	Communication Skill	2	-	-	1

COURSE OBJECTIVE:

- Identify common communication problems that may be holding learners back
- Identify what their non-verbal messages are communicating to others
- Understand role of communication in teaching-learning process
- Learning to communicate through the digital media
- Understand the importance of empathetic listening
- Explore communication beyond language.

COURSE OUTCOME:

By the end of this program, participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.

UNIT I

- Techniques of effective listening
- Listening and comprehension
- Probing questions
- Barriers to listening

UNIT II

- Pronunciation
- Enunciation
- Vocabulary
- Fluency
- Common Errors

UNIT III

- Techniques of effective reading
- Gathering ideas and information from a given text
 - i. Identify the main claim of the text
 - ii. Identify the purpose of the text
 - iii. Identify the context of the text
 - iv. Identify the concepts mentioned
- Evaluating these ideas and information
 - i. Identify the arguments employed in the text
 - ii. Identify the theories employed or assumed in the text
- Interpret the text
 - i. To understand what a text says
 - ii. To understand what a text does

iii. To understand what a text means

UNIT IV

- Clearly state the claims
- Avoid ambiguity, vagueness, unwanted generalizations and oversimplification of issues
- Provide background information
- Effectively argue the claim
- Provide evidence for the claims
- Use examples to explain concepts
- Follow convention
- Be properly sequenced
- Use proper signposting techniques
- Be well structured
 - i. Well-knit logical sequence
 - ii. Narrative sequence
 - iii. Category groupings
- Different modes of Writing-
 - i. E-mails
 - ii. Proposal writing for Higher Studies
 - iii. Recording the proceedings of meetings
 - iv. Any other mode of writing relevant for learners

UNIT V

- Role of Digital literacy in professional life
- Trends and opportunities in using digital technology in the workplace
- Internet Basics
- Introduction to MS Office tools
 - i. Paint
 - ii. Office
 - iii. Excel
 - iv. Powerpoint

REFERENCE:

1. Sen Madhuchanda (2010), *An Introduction to Critical Thinking*, Pearson, Delhi
2. Silvia P.J. (2007), *How to Read a Lot*, American Psychological Association, Washington DC

SEMESTER III

CourseCode	CourseTitle	L	T	P	C
23110AEC31	Tamil III	6	0	0	3

காப்பிய இலக்கியம்- 23110AEC31

பாடநோக்கங்கள்

◆ தமிழ்க் காப்பியங்களை அறிமுகப்படுத்துதல்.

- ◆ காப்பியங்கள் கூறும் வாழ்வியல் அறங்களை உணர்த்துதல்.
- ◆ காப்பிய இலக்கியங்களில் இலக்கியச் சுவையை பயிற்றுவித்தல்.
- ◆ நாடக இலக்கியத்தின் தனித்துவத்தைக் கற்பித்தல்.
- ◆ புராணச் செய்திகளை மேம்படுத்திக் கொள்ளச்செய்நல்

பயன்கள்

- ◆ இலக்கியங்களின் சிறப்புகளை அறிவர்
- ◆ காப்பியக் கதைகள் வழி அறச் சிந்தனை பெறுவர்
- ◆ பல்வேறு காப்பிய வடிவங்களை பற்றிய அறிவு பெறுவர்.
- ◆ நாடக படைப்பாக்கத்திற்கான தூண்டுதலைப் பெறுவர்
- ◆ புராணச் செய்திகள் வழி தமிழ் கலாச்சாரத்தை அறிவர்.

அலகு-1 காப்பியங்கள்

1. சிலப்பதிகாரம் - மதுரை காண்டம் (வழக்குரை காதை)]
2. மணிமேகலை - விழாவறை காதை
3. சீவக சிந்தாமணி - குணமாலையார் இலம்பகம்

அலகு-2 காவியங்கள்

1. கம்பராமாயணம்- மந்தரை சூழ்ச்சி படலம்
2. மகாபாரதம் - ஆரண்ய பருவம்

அலகு-3 புராணங்கள்

1. பெரியபுராணம்- இளையான்குடி மாற நாயனார் புராணம்
2. சீறாப்புராணம் - ஈத்தங்குழை வரவழைத்தப் படலம்
3. தேம்பாவணி- பிரிந்த மகனை காண்படலம்

அலகு-4 நாடகம்- சாபம்? விமோசனம்

அலகு-5 இலக்கிய வரலாறு

1. காப்பியங்கள்
2. இரட்டைக் காப்பியங்கள்
3. நாடக இலக்கியம்

பார்வை நூல்கள் :

1. காப்பியத்திறன்- மணிவாசகர் நூலகம், சிதம்பரம்.
2. தமிழ் காப்பியங்கள் - கி. வா .ஜெகன் ஜெகநாதன் , அமுத நிலையம், சென்னை .
3. நவீன நாடக உருவாக்கம் - கோ பழனி , தமிழ் பல்கலைக்கழகம், தஞ்சாவூர்.
4. இணையதளம் - www.tamilvu.org , www.noolulagam.com
5. சாபம்? விமோசனம்

மு.இராமசுவாமி,

செண்பகம் இராமசுவாமி,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

CourseCode	CourseTitle	L	T	P	C
23110AEC31	Advanced English III	6	0	0	3

COURSE OBJECTIVE:

- To familiarize with the organs of speech and the description and classification of speech sounds
- To understand consonant cluster, syllable, word accent and intonation.
- To know how to interpret graphics
- To write slogans and advertisements

COURSE OUTCOME:

- Understand Phonetics
- Develop writing skill

UNIT I

The organs of
speech
Classification of speech sounds
Vowels and Diphthongs

UNIT II

Consonants
Consonants Cluster

UNIT III

Syllable
Word accent
Intonation

UNIT IV

Idiom

Interpretation of Graphics

UNIT V

Slogan writing
Writing Advertisement

REFERENCE:

English Grammar - Wren and
Martin English Grammar and Composition - Radhakrishna Pillai
Technical Communication -
Meenakshi Sharma & Sangeetha Sharma A textbook of Phonetics for Indian Students -
T.B. Balasubramanian

Course Code	Course Title	L	T	P	C
23111AEC32	ENGLISH-III	4	0	0	2

COURSE OBJECTIVE:

- To sensitize students to language use through prescribed text
- To develop the conversational skills through one-act plays

COURSE OUTCOME:

- Read and comprehend literature

UNIT-1

The Doctor's World - R.K. Narayan
The Postmaster - Rabindranath Tagore
Princess September - E. Somerest Maugham

UNIT-II

The Price of Flowers - Prabhat Kumar Mukhopadhyay
The Open Window - Saki
The Model Millionaire - Oscar Wilde

UNIT-III

My Brother My Brother - Norah Burke
Uneasy Home Coming - Will F. Jenkins
Resignation - Premchand

UNIT-IV

The Referee -
W.H. Andrews & Geoffrey Dreamer The Case of the Stolen Diamonds -
Farrell Mitchell

UNIT-V

The Dear Departed -
Stanley Houghton The Princess and the Wood Cutter -
Alan Alexander Milne

REFERENCES:-

NineShortStories
ActplaysofToday

-SteuartH.KingBlackie BooksOne-
-T.Prabhakar EmeraldPublishers

CourseCode	CourseTitle	L	T	P	C
23160DSC05	Business Environment	5	0	0	4

COURSE OBJECTIVE:

- To impart knowledge on the concept of business environment & its significance.
- To know the various environment factors and its impact on business.
- To throw light on importance of the types of Social Organization.
- To discuss on the role of Planning.
- To create awareness of RBI & Stock Exchange.

UNIT I

The concept of Business Environment – Its nature and significance – Brief overview of political – Cultural – Legal – Economic and social environments and their impact on business and strategic decisions

UNIT II

Political Environment – Government and Business relationships in India

UNIT III

Social environment – Cultural heritage- Social attitudes – Castes and communities – Joint family systems – linguistic and religious groups – Types of social organization

UNIT IV

Economic Environment – Economic systems and their impact of business – Role of planning - NITI aayog.

UNIT V

Financial Environment – Financial system – Commercial bank – Financial Institutions – RBI Stock Exchange – IDBI – Non-Banking Financial Companies NBFCs

COURSE OUTCOME:

CO1 To understand the concepts of Business Environment.

CO2 To apply knowledge in the business and strategic decisions.

CO3 To analyze the importance of business.

CO4 To evaluate the types of business environment and its global impact.

CO5 To construct and stimulate environment for real-time business.

Reading List	
1.	Francis Cherunilam, 2002, <i>Business environment</i> , Himalaya Publishing House, 11 th Revised Edition, India.
2.	Dr.S.Sankaran, <i>Business Environment</i> , Margham Publications.
3.	K.Ashwathappa, 1997, <i>Essentials of Business Environment</i> , Himalaya Publishing House, 6 th Edition, India.
4.	Joshi Rosy Kapoor Sangam, <i>Business Environment</i> , Kalyani Publishers, Ludhiana.
5.	C B Gupta, <i>Business Environment</i> , Sultan Chand & Sons,2018.
References Books	
1.	Justin Paul, <i>Business Environment</i> , Tata McGraw Hill, New Delhi, 2006.
2.	John Brinkman, Ilve Navarro Bateman, Donna Harper, Caroline Hodgson, <i>Unlocking the Business Environment</i> , Routledge.
3.	Shaikh Saleem, <i>Business Environment</i> , Pearson Education; Fourth edition (15 July 2020); Pearson Education.
4.	Dr.Amit Kumar, <i>Business Environment</i> , Sahitya Bhawan Publications; 2021st edition (1 January 2019).
5.	Wim Hulleman and Ad Marijs, <i>Economics and Business Environment</i> , Routledge.
Web Resources	
1	https://pestleanalysis.com/political-factors-affecting-business/
2	https://iimm.org/wp-content/uploads/2019/04/IIMM_BE_Book.pdf
3.	https://www.marketingtutor.net/political-factors-affect-business/
4.	https://www.toppr.com/guides/commercial-knowledge/business-environment/macro-political-legal-social-environment/

5.	https://opentext.wsu.edu/cpim/chapter/chapter-4-the-economic-and-political-environment/
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Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	M	S	S	M	S	S
CO 2	S	S	M	S	S	M	S	S
CO 3	S	S	M	M	S	M	S	S
CO 4	S	S	M	S	S	M	S	S
CO 5	S	S	M	S	S	S	S	S

S-Strong M-Medium L-Low

CO-PO Mapping with Programme Specific Outcomes (Course Articulation Matrix):

Level of Correlation between PSO's and CO's

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted Percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Business Environment	I	15
	II	15
	III	15
	IV	15
	V	15

CourseCode	CourseTitle	L	T	P	C
23160DSC06	Organizational Behaviour	5	0	0	4

COURSE OBJECTIVE:

- To have extensive knowledge of OB.
- To create awareness of job satisfaction.
- To enhance the importance of workplace counseling.
- To analyze the importance of coordination.
- To measure the organizational development.

UNIT I

Need and scope of organizational behaviour - Theories of organization - Individual difference Vs Group intelligence tests - Measurement of intelligence - Personality Tests - Nature – Types and uses of perception

UNIT II

Motivation - Financial and non -Financial motivational techniques - Job satisfaction - meaning - Factors - Theories - Measurement -Morale - Importance - Employee attitudes and behavior and their significance to employee productivity.

UNIT III

Work environment - Good house-keeping practices - Design of work place – Fatigue & stress – Causes and prevention and their importance – Work place counseling - Leadership -Types and theories of leadership

UNIT IV

Group dynamics -Cohesiveness - Co-operation - Competition - Resolution - Sociometry - Group norms - Role position status

UNIT V

Organizational culture and climate - Organizational Development

COURSE OUTCOME:

CO1 To define Human behaviour at work place.

CO2 To apply motivation, leadership and learning theories at work place.

CO3 To analyze the complexities and solutions of human behaviour.

CO4 To explain issues relating to individual and group behaviour.

CO5 To create a congenial climate in the organization.

Reading List	
1.	Neharika Vohra Stephen P. Robbins, Timothy A. Judge , <i>Organizational Behaviour</i> , Pearson Education, 18 th Edition, 2022.
2.	Fred Luthans, <i>Organizational Behaviour</i> , Tata Mc Graw Hill, 2017.

S-Strong M-Medium L-Low

**CO-PO Mapping with Programme Specific Outcomes (Course Articulation Matrix):
Level of Correlation between PSO's and CO's**

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted Percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Organizational Behaviour	I	15
	II	15
	III	15
	IV	15
	V	15

CourseCode	CourseTitle	L	T	P	C
23160DGE03	Business statistics	5	0	0	4

COURSE OBJECTIVE:

- Measures of Central Tendency
- Measures of Variation
- Analyze of Time Series
- Understand Index Numbers
- Test Hypothesis

UNIT I

Introduction – Meaning and Definition of Statistics – Collection and Tabulation of Statistical Data – Presentation of Statistical Data – Graphs and Diagrams- Measures of Central Tendency – Arithmetic Mean, Median and Mode – Harmonic Mean and Geometric Mean.

UNIT II

Measures of Variation – Standard Deviation – Mean deviation – Quartile deviation- Skewness and kurtosis – Lorenz Curve – Simple Correlation – Scatter Diagram – Karl Pearson’s Correlation – Rank Correlation – Regression.

UNIT III

Analysis of Time Series – Methods of Measuring Trend and Seasonal Variations

UNIT IV

Index Numbers – Consumer Price Index – And Cost of Living Indices- Statistical quality control

UNIT V

Testing of hypothesis – Chi-Square test, T Test, F Test, ANOVA.

COURSE OUTCOME:

CO1 Measures of Central Tendency

CO2 Measures of Variation

CO3 Analyze of Time Series

CO4 Understand Index Numbers

CO5 Test Hypothesis

Reading List	
1.	Statistics: Vol 56, No 4 (Current issue) (tandfonline.com)
2.	Statistics Journal Journal of Statistics Research Journal of Statistics Statistics science papers-STM Journals
3.	N.Arora,S.Arora; Statistics for Management; S.Chand and Company Ltd.; New Delhi [SEP]2006
4.	https://www.springer.com/statistics/journal/13171 [SEP]
5.	https://www.scimagojr.com/journalsearch.php?q=200147130&tip=sid
References Books	
1.	P.R. Vittal, Business Mathematics and Statistics, Margham Publications, Chennai,2004.
2.	S.P. Gupta, Statistical Methods, Sultan Chand & Sons, NewDelhi,2007.
3.	S.P. Gupta, Elements of Business Statistics, Sultan Chand & Sons, NewDelhi,2007.
4.	J.K. Sharma, Business Statistics, Pearson Education, New Delhi,2007.

5.	Business Statistics & OR - Dr. S. P. Rajagopalan, Tata McGraw-Hill
Web Resources	
	<ol style="list-style-type: none"> https://theintactone.com/2019/09/01/ccsubba-204-business-statistics/ https://ug.its.edu.in/sites/default/files/Business%20Statistics.pdf http://www.statisticshowto.com https://statisticsbyjim.com/basics/measures-central-tendency-mean-median-mode/ https://www.toppr.com/guides/business-mathematics-and-statistics/index-numbers/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	M	S	M	S	M	S	S
CO2	M	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S
CO4	S	M	S	S	S	S	M	S
CO5	S	M	S	S	S	S	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PO's	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
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Business Statistics	I	12
	II	12
	III	12
	IV	12
	V	12

CourseCode	CourseTitle	L	T	P	C
23160SEC4	Computer Application in Business	2	0	0	2

COURSE OBJECTIVE:

- To build skills in Ms-Word
- To build skills in Ms-Excel,
- To build skills in Ms- Power Point
- To understand the basics of tally
- To familiarize students with google forms for students with relevance in business scenario and its applications.

UNIT I

Introduction, Menus, Shortcuts, Document types, working with Documents-Opening, Saving, Closing, Editing Document, Using Toolbars, Rulers, Help, Formatting Documents-Setting font, paragraph, Page Style-Setting foot notes, page break, Line break, creating sections and frames, Inserting clip arts, pictures, Setting document styles, Creating Tables-Settings, borders, alignments, Merging, splitting, sorting rows and columns, Drawing-Inserting, drawing, formatting, grouping, ordering, rotating pictures, Tools-Word completion, Spell check, Macros, Mail merge, Tracking Changes, Security, Printing Documents .

UNIT II

Introduction, Spread sheet application, Menus, Tool bars and icons, Spreadsheet-Opening, saving, closing, printing file, setting margins, Converting file to different formats, spread sheet addressing, Entering And Editing Data- Copy, cut, paste, undo, redo, find, search, replace, filling continuous rows and columns, inserting data cells, columns, rows and sheet, Computation Data-Setting formula, finding total in rows and columns, Functions Types- Mathematical, Group, string, date and time, Formatting Spread Sheet- Alignment, font, border, hiding, locking, cells, Highlighting values, background color, bordering and shading, Working With Sheet-Sorting, filtering, validation, consolidation, subtotals, Charts-Selecting, formatting, labeling, scaling, Tools- Error checking, spell check, formula auditing, tracking changes, customization

UNIT III

Introduction, opening new presentation, Presentation templates, presentation layout, Creating Presentation- Setting presentation style, adding text, Formatting- Adding style, color, gradient fills, arranging objects, adding header and footer, slide background, slide layout, Slide Show, Adding Graphics-Inserting pictures, movies, tables, Adding Effects-Setting animation and transition effects, audio and video, Printing handouts.

UNIT IV

Introduction to Tally - Features of tally, creation of company, Accounts only and accounts with, Get way of Tally, Accounts confiscation, Groups and Ledgers, Voucher entry with Bill wise details Interest computation, order processing. Reports - Profit and Loss A/C, Balance Sheet

UNIT V

Use Google forms to develop & share questionnaire.

COURSE OUTCOME:

- CO1 Demonstrate hands on experience with Ms-word for business activities
- CO2 Demonstrate hands on experience with Ms-Excel for business activities
- CO3 Demonstrate hands on experience with Ms-power point for business activities
- CO4 Demonstrate hands on experience with Tally for business activities
- CO5 Demonstrate hands on experience with Tally for reporting in business

2.	Google Form Made Simple The Perfect Guide to Creating and Modifying Google Forms from Beginners to Expert by Mary Brockman
3.	Bittu Kumar; Mastering Ms-Office, V&S Publishers, 2017.
4.	Lisa A. Bucki, John Walkenbach, FaitheWempen, & Michael Alexander; Microsoft Office 2013 BIBLE, Wiley, 2013.
5.	S.S. Shrivatsava; Ms-Office, First Edition, Laxmi Publications, 2015.
Web Resources	
1.	https://www.microsoft.com/en-us/microsoft-365/blog/
2	https://www.ipjugaad.com/syllabus/ggsip-university-bba-1st-semester-computer-applications-syllabus/18
3	https://byjus.com/govt-exams/microsoft-word/
4	https://edu.gcfglobal.org/en/google-forms/
5	https://www.tutorialkart.com/tally/tally-tutorial/Margham Publications, 2019.

Reading List									
1.	International Journal of Computer Applications in Technology								
2.	International Journal of Computer Applications – IJCA								
3.	P.Rizwan Ahmed; Computer Application in Business, Margham Publications, 2019.								
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
4.	CO 1	S	S						
	Computer Application in Business (Tamil Nadu) by Dr. R. Paramaswaran								
5.	CO 2	S	S						
	Taxmann's Basics of Computer Applications in Business by Hem Chand Jain and H.N. Piwari, Taxmann Publications Private Limited.								
	CO 3	S	M				S	S	
	CO 4	S	S				S	S	
	CO 5	S					S	M	
	References Books								
1.	P.Rizwan Ahmed; Computer Application in Business and Management,								

S-Strong M-Medium L-Low
CO-PO Mapping with Programme Specific Outcomes (Course Articulation Matrix):
Level of Correlation between PSO's and CO's

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	-	3	3
CO 2	3	3	-	3	3
CO 3	3	3	-	3	3
CO 4	3	3	-	3	3
CO 5	3	3	-	3	3
Weightage	15	15	-	15	15
Weighted Percentage of Course Contribution to POs	3.0	3.0	-	3.0	3.0

Course Title	Unit	Hours Allotment
Computer Application in Business	I	6
	II	6
	III	6

	IV	6
	V	6

CourseCode	CourseTitle	L	T	P	C
23160SEC5	Entrepreneurial Skill New Venture Management	1	0	0	1

COURSE OBJECTIVE:

- To learn to generate and evaluate new business ideas
- To learn about a business model that generates money
- To understand how to find, evaluate and buy a business
- To evaluate the feasibility of idea into a Venture
- To understand sources who lend for new ventures

UNIT I

Concept of Entrepreneurship – Evolution - importance – Importance of entrepreneurship, developing creativity and understanding innovation, stimulating creativity; Organisational actions that enhance creativity, Managerial responsibilities, Creative Teams; Sources of Innovation in Business; Managing Organizations for Innovation and Positive Creativity.

UNIT II

Developing Successful Business Ideas: Recognizing Opportunities and Generating Ideas - Entry strategies: New Product –Franchising - Buying an existing firm. –Franchising advantages/disadvantages of franchising - types of franchise arrangements - franchise evaluation checklist.

UNIT III

Feasibility Analysis: Marketing, Technical and Financial Feasibility analysis - Industry and Competitor Analysis- assessing a New Venture’s Financial Strength and Viability - writing a Business Plan - Developing an Effective Business Model

UNIT IV

Moving from an Idea to a New Venture: Preparing the Proper Ethical and Legal Foundation- Building a New-Venture Team – Leadership - Corporate Entrepreneurship, Social Entrepreneurship. Strategic planning for business - Steps in strategic planning. Forms of ownership – advantages/disadvantages.

UNIT V

Financing the New Venture: Financing entrepreneurial ventures - Managing growth; Valuation of a new company - Harvesting and Exit Strategies - Arrangement of funds - Traditional sources of financing - Alternate Source of Funding - Financial schemes offered by various financial institutions - Government Schemes that support Entrepreneurs, Start-ups, MSMEs, any new venture - rules and regulations governing support by these institutions.

COURSE OUTCOME:

CO1 Understand the concept of entrepreneurship and skill sets of an entrepreneur.

CO2 Assess new venture opportunities & analyze strategic choices in relation to new ventures

CO3 Develop a credible business plan for real life situations.

CO4 Coordinate a team to develop and launch and manage the new venture through the effective leadership

CO5 Evaluate different sources for financing new venture

Reading List	
1.	Journal of Business Venturing – Elsevier
2.	Technology, Innovation, Entrepreneurship and Competitive Strategy, Emerald
3.	Entrepreneurship: New Venture Creation (2016) David H. Holt, Pearson Education India,
4.	Entrepreneurship and New Venture Creation; Arun Sahay, V. Sharma; Excel Book (2008)
5.	Entrepreneurship ,11 th Edition , By Robert D. Hisrich, Michael P.Peters, Dean A. Shepherd , Sabyasachi Sinha , Mc Graw Hill
References Books	
1.	New Venture Creation, Kathleen R. Allen, Cengage Publication (2013)
2.	Essentials of Entrepreneurship and Small Business Management. Scarborough, N. M., Cornwall, J. R., &Zimmerer, T. (2016). Boston: Pearson.
3.	Project Appraisal and Management, Agrawal, Rashmi and Mehra, Yogieta S. (2017). New Delhi. Taxmann Publications.
4.	The Manual for Indian Start -ups Tools to Start and Scale – up Your New Venture by Vijaya Kumar Ivaturi and Meena Ganesh , Penguin Enterprise
5.	Entrepreneurship Development , Indian Cases on Change Agents by K. Ramachandran, Mc Graw Hill Publication
Web Resources	
1.	https://www.studocu.com/en-gb/document/university-of-aberdeen/new-venture-development/new-venture-development-lecture-notes/15212217
2.	https://core.ac.uk/download/pdf/98660713.pdf
3.	https://ugcmoocs.inflibnet.ac.in/download/course/curriculum/nptel/noc18-mg36.pdf
4.	https://www.tutorialspoint.com/entrepreneurship_development/starting_a_business.htm

5.	https://www.entrepreneur.com/starting-a-business/10-ventures-young-entrepreneurs-can-start-for-cheap-or-free/300786
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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1							S	
CO 2		S					M	
CO 3	S	S			M		M	
CO 4				M	S			
CO 5		M					S	

Course Title	Unit	Hours Allotment
Entrepreneurial Skill New Venture Management	I	3
	II	3
	III	3
	IV	3
	V	3

CourseCode	CourseTitle	L	T	P	C
23160 AECC 3	Research Methodology	2	0	0	1

COURSE OBJECTIVE:

- To understand the steps in research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-bases

COURSE OUTCOME:

Ability to carry out independent literature survey corresponding to the specific publication type and assess basic computational frameworks used in mathematical researches.

UNIT I

Research in Management: An Introduction – Definition, meaning and nature – Scope and objects of Research. Types of Research

UNIT II

Research Design – Defining Research Problem and Formulation of Hypothesis – Experimental Designs. - Sampling and types of sampling

UNIT III

Research Process – Steps in the process of Research, Data Collection and Measurement: Sources of Secondary data – Methods of Primary data collection – Questionnaire construction.

UNIT IV

Data presentation and Analysis – Data Processing – Methods of Statistical analysis and interpretation of Data – Testing of Hypothesis and theory of inference- correlation and regression analysis,

UNIT V

Report writing and presentation – steps in Report writing - types of reports – Formats of Reports – Presentation of a Report.

REFERENCES:

1. C.R.Kothari: Research Methodology, Wiley Eastern Ltd, New Delhi
2. P.Saravanel, Research Methodology, Kitab Mahal, Allahabad.
3. O.R.Krishnaswami: Methodology of Research in Social Science
4. D.Amarchand: Research Methods in Commerce

Course Code	Course Title	L	T	P	C
231ENSTU-1	Environmental Studies	1	0	0	-

COURSE OBJECTIVE:

CourseCode	CourseTitle	L	T	P	C
231LSCOA	OFFICEAUTOMATION	-	-	-	1

COURSE OBJECTIVE:

To provide an in-depth training in the use of office automation, internet and internet tools. The course also helps the candidate to get acquainted with IT.

COURSE OUTCOME:

After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with the internet.

UNIT I

KnowingthebasicsofComputers

UNIT II

WordProcessing(MSword)

UNIT III

SpreadSheet(MSXL)

UNIT IV

Presentation(MSPower Point)

UNIT V

CommunicatingwithInternet

REFERENCE:

1. Fundamentalsofcomputers-V.Rajaraman-Prentice-HallofIndia
2. Microsoft Office2007Bible-
JohnWalkenbach,HerbTyson,FaithWempen,caryN.Prague,MichaelRgroh,PeterG.Aitken,a
ndLisaa.Bucki-WileyIndiapvt.ltd.
3. IntroductiontoInformationTechnology-AlexisLeon, MathewsLeon, andLeenaLeon,Vijay
NicoleImprintsPvt.Ltd.,2013.
4. Computer Fundamentals-P.K.Sinha Publisher:BPBPublications
5. <https://en.wikipedia.org>
6. <https://wiki.openoffice.org/wiki/Documentation>
7. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

SEMESTER IV

CourseCode	CourseTitle	L	T	P	C
23110AEC41	Tamil IV	6	-	-	3

சங்க இலக்கியம் - 23110AEC41

நான்காம் பருவம்

பாடநோக்கங்கள்

- ◆ இலக்கியங்கள் வாயிலாக சமுதாயக் கருத்தக்களை
- ◆ பழந்தமிழ் இலக்கிய வளத்தை உணர்த்துதல்.
- ◆ சங்க அக, புற பாடல் மரபுகளைப் பயிற்றுவித்தல்
- ◆ வாழ்வியல் அறங்கள் மற்றும் வரலாற்றுச் செய்திகளை .பயிற்றுவித்தல்
- ◆ புற இலக்கியங்கள் காட்டும் வாழ்வியல் அறங்களை ளடுத்துக் கூறுதல்

பயன்கள்

- ◆ பழந்தமிழ் இலக்கிய மரபை அறிவர்.
- ◆ சங்க இலக்கியங்களில் உள்ள அழகியல் கூறுகளை உணர்வர்.
- ◆ வாழ்வியல் அறங்கள் மற்றும் வரலாற்றுச் செய்திகளை அறிவர்.
- ◆ சங்க அக, புற பாடல் மரபுகளைபுரிந்துக்கொள்வர்.
- ◆ புற இலக்கியங்கள் காட்டும் வாழ்வியல் அறங்களை உணர்வர்.

அலகு-1

1. குறுந்தொகை- பாடல் எண்: 28,38

2. நற்றிணை- பாடல் எண்: 1,27,28,167,168

3.ஐங்குறுநூறு- பாடல் எண்: இளவேனில் பத்து

அலகு-2

- 1.கலித்தொகை- பாடல் எண்: 3,7
- 2.அகநானூறு- பாடல் எண்:5,42,100
3. புறநானூறு- பாடல் எண்: 182,204,41,121

அலகு-3

- 1 சிறுபாணாற்றுப்படை முழுவதும்

அலகு-4

1. திருக்குறள்- செய்நன்றி அறிதல், கூடா நட்பு ,நலம்புனைந்துரைத்தல்
2. நாலடியார் - பாடல் எண்: 1,172,215,253

அலகு-5

இலக்கிய வரலாறு

- 1.சங்க இலக்கியம்
- 2.எட்டுத்தொகை, பத்துப்பாட்டு
- 3.பதினெண் கீழ்க்கணக்கு நூல்கள்

பார்வை நூல்கள்

- 1.குறுந்தொகை - கழக வெளியீடு ,சென்னை
- 2.நற்றிணை - கழக வெளியீடு ,சென்னை
- 3.ஐங்குறுநூறு - கழக வெளியீடு ,சென்னை
- 4.கலித்தொகை - கழக வெளியீடு ,சென்னை
- 5.அகநானூறு - கழக வெளியீடு ,சென்னை
- 6.புறநானூறு - கழக வெளியீடு ,சென்னை
- 7.திருக்குறள் - பரிமேலழகர் உரை ,கழக வெளியீடு ,சென்னை
- 8.இணையதளம் -www.tamilvu.org , www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2

CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

CourseCode	CourseTitle	L	T	P	C
23111AEC41	ADVANCED ENGLISH-IV	6	0	0	3

COURSE OBJECTIVE:

- To familiarize with the objectives and types of interview
- To know the types of questions and answering techniques
- To prepare reviews and proposals
- To learn the grammatical forms
- To understand the meaning of a poem and write the content

- To write for and against a topic
- To draw a flowchart
- To write definitions

COURSE OUTCOME:

- Develop communicative skill
- Read and comprehend literature

UNIT I

Interviews Objectives, types, ten success factors, ten failure factors - Planning and preparation - Presentation - Type of questions - Answering techniques.

UNIT II

Flowchart
Proposals

UNIT III

Discourse markers
Review

UNIT IV

Grammatical forms
Paraphrasing

UNIT V

Definition
Writing for and against a topic.

REFERENCE:

English Grammar	-Wren and Martin English
Grammar and Composition	-Radhakrishna Pillai
Essentials of Business Communication	-Rajendra Pal & J.S Korlahalli Sultan Chand & Sons
Technical Communication	-Meenakshi Sharma & Sangeetha Sharma English
for writers and translators	-Robin Macpherson
English Work Book-I&II	-Jewelcy Jawahar

Course Code	Course Title	L	T	P	C
23111AEC42	ENGLISH-IV	4	0	0	2

COURSE OBJECTIVE:

- To introduce learners to the standard literary texts
- To impart wisdom through morally sound poems and essays
- To introduce Shakespeare to non-literature students

COURSE OUTCOME:

- Read and comprehend literature

UNIT –I

How to be a Doctor -Stephen Leacock
 My Visions for India -A.P.J. Abdul Kalam Woman,
 not the weaker sex- M.K. Gandhi

UNIT –II

My Last Duchess -Robert Browning
 The Toys -Coventry Patmore
 I, too -Langston Hughes

UNIT –III

The Best Investment I ever made-A.J.Cronin The Verger -W.S
 Maugham
 A Willing Slave -R.K.Narayan

UNIT –IV

Macbeth
 As You Like It

UNIT –V

Henry IV
 Tempest

REFERENCES:

English for Enrichment -.Devaraj Emerald Publishers Selected
 Scenes from Shakespeare Book I &II -Emerald Publishers

Course Code	Course Title	L	T	P	C
23160DSC07	Human Resource Management	5	0	0	4

COURSE OBJECTIVE:

- Explain the concepts, functions and process of HRM
- Examine the selection and placement process
- Evaluate performance appraisal and compensation
- Understand Labor management strategies and trade union policies
- Understand the recent trends in HR

UNIT I

Nature and scope of Human Resources Management – Differences between personnel management and HRM – Environment of HRM – Human resource planning

UNIT II

Recruitment – Selection – Methods of Selection – Uses of various tests – interview techniques in selection and placement. Induction – Training – Methods – Techniques – Identification of the training needs – Training and Development.

UNIT III

Performance appraisal – Transfer – Promotion and termination of services – Career development. Remuneration - Components of remuneration – Incentives – Benefits – Motivation – Welfare and social security measures.

UNIT IV

Labour Relation – Functions of Trade Unions – Forms of collective bargaining- Workers’ participation in management – Types and effectiveness – Industrial Disputes and Settlements (laws excluded)

UNIT V

Human Resource Audit – Nature – Benefits – Scope – Approaches. HRIS. Recent trends in HRM: Green HRM & Virtual HRM Practices

COURSE OUTCOME:

- CO1 Explain the concepts, functions and process of HRM
- CO2 Examine the selection and placement process
- CO3 Evaluate performance appraisal and compensation
- CO4 Understand labour management strategies and trade union policies
- CO5 Understand the recent trends in HR

Reading List	
1.	Shashi K. Gupta & Rosy Joshi , Human Resource Management , Kalayani Publisher 1st Edition, 2018
2.	Steve Brown, HR on Purpose: Developing Deliberate People Passion, Society for Human Resource Management, 1 st Edition, 2017
3	Bernard Marr, Data-Driven HR: How to Use Analytics and Metrics to Drive Performance, Kogan Page, 1 st Edition, 2018
4	Kirs Wayne Cascio and John Boudreau, Investing in People: Financial Impact of Human Resource Initiatives, Prentice Hall , 2nd Edition, 2015
5	Srinivas R Kandula, , Compentency Based Human Resource Managemet, PHI Learning , 1st Edition, 2013
References Books	
1.	V S P Rao, Human Resource Management : Text & Cases, Excel Books, 3 rd Edition ,2010
2.	K.Ashwathappa, Human Resource Management- Text and cases, McGraw Hill Education India, 6 th Edition
3.	Garry Deseler, Human Resource Management, Pearson, 15 th Edition, 2017
4.	L M Prasad , Human Resource Management , Sultan Chand and Sons 3 rd Edition , 2014
5.	Tripathi. P C, Human Resource Management, Sultan Chand and Sons 1st Edition, 2010

Web Resources	
1	https://mrcet.com/downloads/MBA/digitalnotes/Human%20Resource%20Management.pdf
2	http://kamarajcollege.ac.in/Department/BBA/III%20Year/e003%20Core%2019%20-%20Human%20Resource%20Management%20-%20VI%20Sem.pdf
3	https://backup.pondiuni.edu.in/sites/default/files/HR%20Management-230113.pdf
4	https://www.studocu.com/row/document/jagannath-university/business-communication/hrm-notes-bba/4305835
5	http://14.139.185.6/website/SDE/SLM-III%20Sem%20BBA%20Human%20Resource%20Management.pdf

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	M	M		S	S	
CO 2	M	M		S		S	S	
CO 3		M				M	S	M
CO 4		M	M	M	S	S		
CO 5	M					S		M

S-Strong M-Medium L-Low

CO-PO Mapping (Course Articulation Matrix)

Level of Correlation between PSO's and CO's

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	2	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	14	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	2.8	3.0	3.0

Course Title	Unit	Hours Allotment
Human Resource Management	I	15
	II	15
	III	15

	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSC08	Business Regulatory Frame Work	5	0	0	4

COURSE OBJECTIVE:

- Explain Indian Contracts Act
- Understand Sales of goods act & contract of agency
- Understand Indian Companies Act 1956
- Understand Consumer Protection Act – RTI
- Understand Cyber law

UNIT I

Brief outline of Indian Contracts Act - Special contracts Act

UNIT II

Sale of goods Act - Contract of Agency

UNIT III

Brief outline of Indian Companies Act 1956.

UNIT IV

Consumer Protection Act – RTI

UNIT V

Brief outline of Cyber laws – IT Act 2000 & 2008

COURSE OUTCOME:**CO1** Explain Indian Contracts Act**CO2** Understand Sales of goods act and Contract of Agency**CO3** Understand Indian Companies Act 1956**CO4** Understand Consumer Protection Act – RTI**CO5** Understand Cyber law**Reading List**

1	Tulsian.P.C Business Law (2018) Third Edition, McGraw Hill Publications
2	Pillai R S N, Bhagavati, Business Law, Third Edition, Sultan Chand
3	Dr. Sreenivasan. M, Business Law, Third Edition (2007) Mc Graw Hill Publication
4	Constitutional Law – Dr. M.R. Sreenivasan & Ananda Krishna Deshkulkarni
5	Business Law (Commercial Law) – Dr. M.R. Sreenivasan

References Books

1	N.D. Kapoor, 1993, Business Laws, Sultan Chand, New Delhi
2	K.S. Anantharaman, 2003 Business and Corporate Laws, Sitaraman & co. Pvt. Ltd.
3	Chandrasekaran, 2004 Sitaraman & co Pvt Ltd, Intellectual Property Law
4	Bare Acts- FEMA, Consumer Protection Act
5	Acharya -2004, Intellectual Property Rights Asia Law House Publication,

Web Resources

1	https://www.gkpad.com/sachin/06-22/bcom-Business-Regulatory-Framework---1.html
2	http://www.simplynotes.in/e-notes/mcomb-com/business-regulatory-framework/
3	https://www.studocu.com/in/course/mahatma-gandhi-university/business-regularly-framework/51661
4	International Journal of Law (lawjournals.org)
5	https://www.himpub.com/BookDetail.aspx?BookId=1936&NB=&Book_Titl eM=%20Business%20Regulatory%20Framework

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M	M				S	S	M
CO 2				M		S	S	M
CO 3			M	M		S	S	M

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5		
CO 1	3	3	3	3	3		
CO 2	3	3	3	3	3		
CO 3	3	3	2	3	3		
CO 4	2	3	3	3	3		
CO 5	3	3	3	3	3		
Weightage	14	15	14	15	15		
Weighted percentage of Course Contribution to Pos	2.8	3.0	2.8	3.0	3.0		
CO 4			M			S	M
CO 5			S			M	S

S-Strong M-Medium L-Low

CO-PO Mapping (Course Articulation Matrix)

Course Title	Unit	Hours Allotment
Business regulatory Frame Work	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DGE04	Operation Research	4	0	0	3

COURSE OBJECTIVE:

- Analyse Linear Programming
- Analyse Transportation problem
- Analyse Assignment problem
- Analyse Network models
- Analyse Game Theory

UNIT I

Linear Programming problem -Concept and scope of OR, general mathematical model of LPP, steps of L.P model formulation, Graphical method of the solution of LPP- simple problems.

UNIT II

Transportation problem- Basic definitions, formulation of transportation problem as LPP, finding an initial basic feasible solution- North -west corner rule, row minima method, column minima method, least cost entry method- Vogel's approximation method to find the optimal solution.

UNIT III

Assignment problem-Hungarian method- Minimization and Maximization case, unbalanced assignment problem. Sequencing Problem-Processing n jobs on 2 machines, processing n jobs on 3 machines, processing n jobs on m machines.

UNIT IV

Network models-PERT and CPM — difference between PERT and CPM- constructing network- critical path, various floats, three-time estimates for PERT

UNIT V

Game Theory- Maximin-Minmax criterion, Saddle point, Dominance property, Graphical method for solving 2xn and mx2 game

COURSE OUTCOME:

CO1 Analyse Linear Programming

CO2 Analyse Transportation problem

CO3 Analyse Assignment problem

CO4 Analyse Network models

CO5 Analyse Game Theory

Reading List	
1.	<u>Operational Research Research.com</u>
2.	<u>Operations Research PubsOnLine (informs.org)</u>
3.	Prabandhan : Journal of Management
4.	International Journal of Operations research ^[1] _[SEP]
5.	DR H. Premraj, Elements of Operation Research, Margham publications, Chennai, 2019 ^[1] _[SEP]
References Books	
1.	P.R. Vittal& V. Malini, Operative Research – Margham Publications – Chennai – 17.
2.	P.K. Gupta& Man Mohan, Problems in Operations Research – Sultan Chand & sons – New Delhi
3.	V.K. Kapoor, Introduction to operational Research – Sultan Chand & sons – New Delhi
4.	Hamdy A Taha, Operation Research – An Introduction prentice Hall of India- New Delhi
5.	P. Gupta, N. Aruna Rani, M. Haritha (2018), Operations Research and Quantitative Techniques, First edition, Himalaya Publishing House.
Web Resources	

	<ol style="list-style-type: none"> 1. chromeextension://efaidnbmninnibpcajpcglclefindmkaj/https://www.rcmindore.com/wp-content/uploads/2021/04/Operations-Research.pdf 2. chromeextension://efaidnbmninnibpcajpcglclefindmkaj/https://www.bbau.ac.in/dept/UIET/EMER601%20Operation%20Research%20Queuing%20theory.pdf 3. https://www.onlinemathlearning.com › <i>linear-programming-example</i> [SEP] 4. https://www.kellogg.northwestern.edu › <i>weber</i> › <i>Notes_6_Decision_trees</i> [SEP] 5. www.pondiuni.edu.in › <i>sites</i> › <i>default</i> › <i>files</i> [SEP]
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	M	S	S	S	M	M	S
CO2	S	M	S	S	S	M	M	S
CO3	S	M	S	S	S	M	M	S
CO4	S	M	S	S	S	M	M	S
CO5	S	M	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PO's	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
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Operation Research	I	12
	II	12
	III	12
	IV	12
	V	12

Course Code	Course Title	L	T	P	C
23160SEC6	Tally. ERP 9	2	0	0	2

Course Code	Course Title	L	T	P	C
23160SEC78	Intellectual Property Rights	2	0	0	2

COURSE OBJECTIVE:

- To learn aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
- To disseminate knowledge on patents, patent regime in India and abroad and registration aspects
- To evaluate the copyright law
- To disseminate knowledge on copyrights and its related rights and registration aspects
- To understand about Geographical Indicators

UNIT I

IPR Introduction: and the need for intellectual property right – IPR in India –Different Classifications – Important Principles of IP Management – Commercialization of Intellectual Licensing – Intellectual by Licensing – Intellectual Property Rights in the Cyber World.

UNIT II

Introduction – Classification –Importance – Types of Patent Applications in India - Patentable Invention – Inventions Not Patentable.

UNIT III

Introduction – Fundamentals – Concept – Purpose – Functions – Characteristics – Guidelines - For Registration of Trade Mark – Kinds of TM – Protection – Non-Registrable Trademarks -Industrial Designs – Need for Protection of Industrial Designs.

UNIT IV

Introduction to Copyright – Conceptual Basis – Copy Right and Related Rights – Author & Ownership of Copyright - Rights Conferred By Copy Right- Registration – Transfer – Infringement – Copyright pertaining to Software/Internet and other Digital media.

UNIT V

GEOGRAPHICAL INDICATIONS: Concept, Protection & Significance

COURSE OUTCOME:

CO1 Imbibe the knowledge of IPR through various laws

CO2 Apply the knowledge of patents

CO3 Understand the process of acquiring a trademark

CO4 Create an awareness about copyrights

CO5 Understand geographical indicators

Reading List									
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
1.	Journal of Intellectual Property Rights	CO 1		M			S	S	S
2.	Intellectual Property Rights Text and Cases: DR.R. Radhakrishnan, DR.S. Basubramanian	CO 2		M			S	S	S
3.	Intellectual Property Patents, Trade Marks, And Copy Rights – Richard Stim	CO 4		M			S	S	S
		CO 5					S	S	S
4.	Intellectual Property Rights by Asha Vijay Durafe and Dhanashree K.Toradmalle, Wiley								
5.	Fundamentals of Intellectual Property Rights For Students, Industrialist and Patent Lawyers by Ramakrishna and Anil Kumar HS								

References Books

1.	Landmark Judgements on Intellectual Property rights by Kush Kalra. Central Law Publishing								
2.	Intellectual Property Rights in India by V.k.Ahuja, Lexis Nexis								
3.	Introduction To Intellectual Property Rights Softbound By Singh, Phundan, Daya Publishing House								
4.	Introduction To Intellectual Property Rights by Chawkam H.S, Oxford &Ibh								
5.	Intellectual Property - Patents, Copyright, Trade Marks and Allied Rights by W Cornish and D Llewelyn and T Pain								

Web Resources

1.	https://nptel.ac.in/courses/110/105/110105139/								
2.	https://www.wipo.int/edocs/pubdocs/en/wipo_pub_450_2020.pdf								
3.	https://ipindia.gov.in/								
4.	https://www.tutorialspoint.com/explain-the-intellectual-property-rights								
5.	https://www.icsi.edu/media/webmodules/FINAL_IPR&LP_BOOK_10022020.pdf								

PSO's and CO's

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted Percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

S-
Strong
M-
Medium
L-
Low

CO-PO
Mapping
with
Programme
Specific
Outcomes
(Course
Articulation
Matrix):
Level of
Correlation
between

Course Title	Unit	Hours Allotment
Intellectual Property Rights	I	6
	II	6
	III	6
	IV	6
	V	6

Course Code	Course Title	L	T	P	C
231ENSTU - II	Environmental Studies	1	0	0	1

Course Code	Course Title	L	T	P	C
23160AECC4	Participation In Bounded Research	2	0	0	2

Course Code	Course Title	L	T	P	C
231LSCLS	Leadership and Management Skills	0	0	0	1

COURSE OBJECTIVE:

- Help students to develop essential skills to influence and motivate others
- Inculcate emotional and social intelligence, and integrative thinking for effective leadership
- Create and maintain an effective and motivated team to work for the society
- Nurture a creative and entrepreneurial mindset
- Make students understand the personal values and apply ethical principles in professional and social contexts.

COURSE OUTCOME:

- Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision
- Learn and demonstrate a set of practical skills such as time management, self management, handling conflicts, team leadership, etc.
- Understand the basics of entrepreneurship and develop business plans
- Apply the design thinking approach to leadership
- Appreciate the importance of ethics and moral values for making of a balanced personality.

UNIT I-Leadership Skills

a. Understanding Leadership and its Importance

- What is leadership?
- Why Leadership required?
- Whom do you consider as an ideal leader?

b. Traits and Models of Leadership

- Are leaders born or made?
- Key characteristics of an effective leader
- Leadership styles
- Perspectives of different leaders

c. Basic Leadership Skills

- Motivation
- Teamwork
- Negotiation
- Networking

UNIT II -Managerial Skills

a. Basic Managerial Skills

- Planning for effective management
- How to organize teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate
- Conflict Management

b. Self Management Skills

- Understanding self concept
- Developing self-awareness
- Self-examination
- Self-regulation

UNIT III –Entrepreneurial Skills

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurship
- Traits and competencies of entrepreneur

b. Creating Business Plan

- Problem identification and idea generation
- Idea validation
- Pitch making

UNIT IV - Innovative Leadership and Design Thinking

a. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

b. Design Thinking

- What is design thinking?
- Key elements of design thinking:
 - Discovery
 - Interpretation
 - Ideation
 - Experimentation

- Evolution.

- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

UNIT V- Ethics and Integrity

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

b. Ethics and Conduct

- Importance of ethics
- Ethical decision making
- Personal and professional moral codes of conduct
- Creating a harmonious life

REFERENCE:

- Ashokan, M. S. (2015). Karmayogi: A Biography of E. Sreedharan. Penguin, UK.
- Brown, T. (2012). Change by Design. HarperBusiness
- Elkington, J., & Hartigan, P. (2008). The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World. Harvard Business Press.
- Goleman D. (1995). Emotional Intelligence. Bloomsbury Publishing India Private Limited
- Kalam A. A. (2003). Ignited Minds: Unleashing the Power within India. Penguin Books India
- Kelly T., Kelly D. (2014). Creative Confidence: Unleashing the Creative Potential Within Us All. William Collins

- Kurien V., & Salve G. (2012). I Too Had a Dream. Roli Books Private Limited
- Livermore D. A. (2010). Leading with cultural intelligence: The New Secret to Success. New York: American Management Association
- McCormack M.H. (1986). What They Don't Teach You at Harvard Business School: Notes From A Street-Smart Executive. RHUS
- O'Toole J. (2019) The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good. HarperCollins
- Sinek S. (2009). Start with Why: How Great Leaders Inspire Everyone to Take Action. Penguin
- Sternberg R. J., Sternberg R. J., & Baltes P. B. (Eds.). (2004). International Handbook of Intelligence. Cambridge University Press.

SEMESTER V

Course Code	Course Title	L	T	P	C
23160DSC09	Advertising Management and Sales Promotion	5	0	0	4

COURSE OBJECTIVE:

- To understand the role of advertising and audience
- To manage Media
- To design implementation strategies and select agencies
- To device sale promotion
- To understand social impact of sales and advertising

UNIT I

Advertising: Advertising, objectives, task and process, market segmentation and target audience – Message and copy development.

UNIT II

Media: Mass Media - Selection, Planning and Scheduling – Web Advertising

UNIT III

Implementation: Implementing the programme coordination and control – Advertising agencies – Organization and operation.

UNIT IV

Sales Promotion: Why and When Sales promotion activities, Consumer and sales channel oriented – planning, budgeting and implementing and controlling campaigns

UNIT V

Control: Measurement of effectiveness – Ethics, Economics and Social Relevance - Integrated marketing communication.

COURSE OUTCOME:

CO1 Understand the concepts and principles of sales and advertising

CO2 Comprehend and decide the usage of mass media

CO3 Design and deliver advertisements

CO4 Summarize and operationalize sales promotion

CO5 Control and justify the process of advertising.

Reading List

Reading List	
1.	Advertising and Sales promotion By Pankuri Bhagat
2.	Advertising and promotion By Nick Erling
3.	Advertising, Sales and promotion Management , Chunawalla S A, Himalaya publishing House
4	Advertising and Sales promotion By Dr T K Jain and Madhvi Singh

5	Advertising selling and promotion By Ritu Narang, pearsons publications
References Books	
1.	Advertising Promotion And Other Aspects Of Integrated Marketing Communications, 9th Edition, J Craig Andrews
2	Advertising and promotion By George E Belch,Keyoor Purai,Michael A Belch, Tata Mc Graw Hill Pubishing
3	Advertising and Personal selling by Dr Ruchi Gupta
4	Advertising: Principles and practices By wells , W./Moriarty , S./Burnett, Pearsons
5	Tested advertising methods by John Caples, prentice hall
Web Resources	
1	https://oms.bdu.ac.in/ec/admin/contents/175_P16MBA4EM4_2020051909561946.pdf
2	https://www.bimkadapa.in/materials/ASPM%20TOTAL%205%20UNITS%20MATERIAL.pdf
3	International Journal of Research in Marketing. Elsevier
4	Journal of Advertising – Taylor and Francis
5	https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBAA7010.pdf

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S		S				
CO 2		S		S	M	S	S	
CO 3	S	S			S			
CO 4		S	M					
CO 5		S	S					S

S-Strong M-Medium L-Low

CO-PO Mapping (Course Articulation Matrix)

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	2	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	14	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	2.8	3.0	3.0

Course Title	Unit	Hours Allotment
Intellectual Property Rights	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSC10	Total Quality Management	5	0	0	3

COURSE OBJECTIVE:

- To grasp the nature and importance of various components that constitute TQM
- To Understand the contribution of Quality Gurus in TQM Journey
- To get familiarized with the basic concept and framework of Total Quality management

UNIT-I

Introduction – Evolution of quality, Definition, Concept and Features of TQM, - Eight building blocks of TQM.

UNIT-II

TQM thinkers and Thought – Juran Trilogy, PDCA cycle, 5S, Kaizen, Crosby's theory on Quality Management, Quality Performance Excellence Award- Deming Application Award, European Quality Award, Malcolm Baldrige National Quality Award

UNIT-III

TQM tools- Benchmarking: Definition, concepts, benefits, elements, reasons for benchmarking, process of benchmarking, FMEA, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept and need.

UNIT-IV

Six Sigma- Features of six sigma, Goals of six sigma, DMAIC, Six Sigma implementation. Statistical Process Control- Central Tendency, The seven tools of quality, Normal curve, Control charts, Process Capability.

UNIT-V

Quality Systems- ISO 9000, ISO 9000:2000, ISO 14000, other quality systems.

COURSE OUTCOME:

CO1 The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

CO2 To realize the importance of significance of quality

CO3 Manage quality improvement teams

CO4 Identify requirements of quality improvement programs

CO5 The student manager will be able to explain the concept of Six Sigma its DMAIC process.

TEXT BOOKS:

1. Dale H. Besterfield, et al., “Total quality Management”, Pearson Education Asia, Third Edition, Indian Reprint 2006.

2. Dale H. Besterfield, et al., “Total Quality Management”, Pearson Education, Inc. 2003

REFERENCE BOOKS:

1. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, 8th Edition, First Indian Edition, Cengage Learning, 2012.

2. Suganthi.L and Anand Samuel, “Total Quality Management”, Prentice Hall (India) Pvt. Ltd., 2006. 3.

Janakiraman. B and Gopal .R.K., “Total Quality Management – Text and Cases”, Prentice Hall (India) Pvt. Ltd., 2006.

Course Code	Course Title	L	T	P	C
23160DSC11	Operation Management	5	0	0	4

COURSE OBJECTIVE:

- To provide comprehensive outlook on basic concepts, theories and practices of production.
- To know the quality concepts & and quality control measures in area of production.
- To understand layout and service facilities
- To compare and contrast inventory management techniques
- To analyse work study methods

UNIT I

Introduction: Nature and Scope of Operations Management. Production design & Process planning: Plant location: Factors to be considered in Plant Location – Plant Location Trends.

UNIT II

Layout of manufacturing facilities: Principles of a Good Layout – Layout Factors – Basic Types of Layouts – Service Facilities.

UNIT III

Production and Inventory Control: Basic types of production – Basic Inventory Models – Economic Order Quantity, Economic Batch Quantity – Reorder point – Safety stock – Classification and Codification of stock – ABC classification – Procedure for Stock Control, Materials Requirement Planning (MRP). JIT

UNIT IV

Methods Analysis and Work Measurement: Methods Study Procedures – The Purpose of Time Study – Stop Watch Time Study – Performance Rating – Allowance Factors – Standard Time – Work Sampling Technique. Quality Control: Purposes of Inspection and Quality Control – Acceptance Sampling by Variables and Attributes – Control Charts.

UNIT V

Service Operations Management: Introduction – Types of Service – Service Encounter–Service Facility Location – Service Processes and Service Delivery.

COURSE OUTCOME:

CO1 Provide comprehensive outlook on basic concepts, theories and practices of production

CO2 Describe route chart, maintenance schedule for production.

CO3 Identify right plant location and plant layout of factory

CO4 Know work study & method study, its procedure & quality control techniques in production.

CO5 Understand service operations management

Reading List	
1.	International Journal of Operations & Production Management
2.	Journal of Operation Management – Wiley Online Library
3	Chatterjee Biswajit , Operations Management and Control, S Chand , Revised Edition, 2010
4	Anil Kumar S and N Suresh, Operation Management ,New Age International 1 st Edition, 2018
5	William J. Stevenson, Operations Management, McGraw Hill; 13th Edition ,2022
References Books	
1.	P.Saravanavel and S.Sumathi; Production and Materials Management, Margham Publications, 2015
2.	N.G. Nair; Production Management, JBA Publishers, Edition 2004
3.	K.ShridharaBhat; Production and Materials Management, Himalaya publishing house, 2012
4.	P. Ramamurthy; Production and Operations Management, JBA publishers, 2nd edition 2013.
5.	R.B.Khana; Production and Operations Management, Prentice hall publications, 2007.
Web Resources	
1	https://mrcet.com/downloads/digital_notes/ME/III%20year/POM%20NOTES.pdf
2	https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_OM_NOTES.pdf
3	https://www.vssut.ac.in/lecture_notes/lecture1429900757.pdf
4	https://backup.pondiuni.edu.in/sites/default/files/Part%20I%20Operations%20Management.pdf
5	https://www.studocu.com/in/course/lovely-professional-university/operation-management/4335497

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1						S	S	S
CO 2						S	S	
CO 3						S	S	
CO 4				M		S	S	M
CO 5						M	S	S

S-Strong M-Medium L-Low

CO-PO Mapping (Course Articulation Matrix)

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	2	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	14	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	2.8	3.0	3.0

Course Title	Unit	Hours Allotment
Operation Management	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSC12	Financial Management	5	0	0	4

COURSE OBJECTIVE:

- Understand the basics of finance and roles of finance manager
- Evaluate Capital structure & Cost of capital
- Evaluate Capital budgeting
- Assess dividends
- Appraise Working Capital

UNIT I

Meaning, objectives and Importance of Finance – Sources of finance – Functions of financial management – Role of financial manager in Financial Management.

UNIT II

Capital structures planning - Factors affecting capital structures – Determining Debt and equity proportion – Theories of capital structures – Leverage concept.

Cost of capital – Cost of equity – cost of preference capital – Cost of debt – Cost of retained earnings – weighted Average (or) composite cost of capital (WACC)

UNIT III

Capital Budgeting: ARR, Pay back period, Net present value, IRR, Capital rationing, simple problems on capital budgeting methods.

UNIT IV

Dividend policies – Factors affecting dividend payment - Company Law provision on dividend payment –Various Dividend Models (Walter’s Gordon’s –M.M. Hypothesis)

UNIT V

Working capital – components of working capital –operating cycle – Factors influencing working capital – Determining (or) Forecasting of working capital requirements.

COURSE OUTCOME:

- CO1** Understand the basics of finance and roles of finance manager
CO2 Evaluate Capital structure & Cost of capital
CO3 Evaluate Capital budgeting
CO4 Assessing dividends
CO5 Appraise Working Capital

Reading List	
1.	Dr Kulkarni and Dr. SathyaPrasad, Financial Management, 13 th Edition 2011
2.	Advanced Financial Management kohok, M A, Everest Publishing House

3.	Financial Management Kishore R M, Taxman Allied Service
4.	Strategic Financial Management Jakhotiya
5.	Financial Management & Policy Srivastava, R M Himalaya

References Books

1.	Financial Management - I.M.Pandey, 2009 Vikas Publishing
2.	Financial Management – PrasannaChandra , 2008, Tata Mc Graw Hill, New Delhi
3.	Financial Management – S.N.Maheswari
4.	Financial Management – Y. Khan and Jain 2009 Edition, Sultan Chand & Sons
5.	Financial Management – A. Murthy

Web Resources

1.	https://mycbseguide.com/blog/financial-management-class-12-notes-business-studies/
2.	https://images.topperlearning.com/topper/revisionnotes/8006_Topper_21_10_1_504_553_10201_Financial_Management_up201904181129_1555567170_5654.pdf
3.	Journal of Financial Management (esciencepress.net)
4.	Financial Management on JSTOR
5.	Financial Management Wiley online library

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		M				M	S	
CO 2		S					S	
CO 3		S					S	
CO 4		S					S	
CO 5		S					S	

S-Strong M-Medium L-Low

CO-PO Mapping (Course Articulation Matrix)

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	2	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	14	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	2.8	3.0	3.0

Course Title	Unit	Hours Allotment
Financial Management	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSE V	Digital Marketing	4	0	0	3

COURSE OBJECTIVE:

- To provide basic knowledge about digital marketing.
- To understand and develop various digital marketing tools used for business.
- To know the digital analytics and measurement tools used for digital marketing.
- To familiarise online and Social media marketing
- To Understand various data analytics and measurement tools in digital marketing

UNIT I

Introduction to Digital Marketing – Origin & Development of Digital Marketing – Traditional vs Digital Marketing – Opportunities & Challenges- Online Marketing Mix – Digital Advertising Market in India. 6M Framework – ASCOR & POEM Digital Marketing framework.

UNIT II

Content Marketing – Content creation process – Content pillar - Types – A/B Testing – Display Advertising – Search Engine Marketing – Search Engine Optimization (On page & Off page optimization) - Email Marketing, –

Mobile Marketing.

Reading List	
1.	Journal of Digital & Social Media Marketing
2.	International Journal of Internet Marketing and Advertising

UNIT III

Social Media Marketing: Building successful social media digital strategy – Piggy bank theory – Personal branding in social media – Crowd sourcing – Lead generation & sales in

social media.

UNIT IV

Online Reputation Management: Social commerce: Ratings & Reviews -Word of Mouth- User generated content – Co-Marketing – Affiliate Marketing - Influencer Marketing.

UNIT V

Digital Analytics & Measurement: Importance of Analytics in digital space – Data capturing in online space – Types – Tracking Mechanism – Google Analytics structure – Conversion tracking – Digital Engagement funnel; Define – Key performance indicator(s) (KPIs) – Ad words & Display Networks. Overview – Applications of Sentiment analysis & Text Mining; Measuring campaign effectiveness – ROI (Return on Investment) & CLV (Customer life term value)

COURSE OUTCOME:

CO1 Discuss digital marketing and its framework

CO2 Identify, use appropriately and explain digital marketing tools

CO3 Explain social media marketing and crowd sourcing

CO4 Discuss online reputation management and its influence

CO5 Identify the various data analytics and measurement tools in digital marketing

3.	Understanding Digital Marketing, Damian ryan, 4 th Edition 2017 publisher: Korgan page limited USA
4.	Digital Marketing current trends , vandanahuja, 7 th edition 2015 Oxford University press , Chennai
5.	Digital Marketing essentials you always wanted to know, 7 th edition 2012, Vibrant publishers USA

References Books

1.	Ian Dodson, The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns, Wiley Publications, First Edition, 2016.
2.	Nitin C Kamat & Chinmay Nitin Kamat, Digital Social Media Marketing, Himalaya Publishing House, 2018.
3.	Philip Kotler, Marketing 4.0, Moving from Traditional to Digital, Wiley Publications, 2017.
4.	Vandhana Ahuja, Digital Marketing, Oxford University Press, 2015.
5.	Romi Sainy, Rajendra Nargundhkar, Digital Marketing Cases from India, Notion Press, Incorporated, 2018.

Web Resources

	<p>1. https://www.soravjain.com/ebook/ebook.pdf</p> <p>2. https://testbook.com/digital-marketing/digital-marketing-course-syllabus-and-content-for-beginners</p> <p>3. https://www.optron.in/blog/digital-marketing/</p> <p>4. https://www.tutorialsduniya.com/notes/digital-marketing-notes/</p> <p>5. https://digitalmarketinginstitute.com/resources/ebooks</p>
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	M	S	S	S	S	M	M
CO2	M	M	S	M	S	M	M	M
CO3	M	M	S	M	S	M	M	M
CO4	M	M	S	S	S	M	M	M
CO5	M	M	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PO's	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Digital Marketing	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSE V	Industrial Relation	4	0	0	3

COURSE OBJECTIVE:

- To educate about the Industrial legislation in India.
- To provide knowledge about maintaining harmonious relations in India and to resolve disputes, handling grievances etc.,
- To know about Labor Legislation

- To provide knowledge about the Councils and Collective Bargaining
- To educate about Trade Unions

UNIT I

Industrial Relations: Origin, Definition, Scope, Role, Objectives, Factors, Participants & Importance of IR. Approaches to Industrial relations. System of IR in India.

UNIT II

Industrial Dispute: Meaning, Employee Dissatisfaction, Strikes – Lockouts, Lay Off & Causes of Conflict. Settlement of Disputes – Machinery – Negotiations Conciliation, Meditation, Arbitration and Adjudication. Grievance: Definition & Redressal Procedure

UNIT III

Labor Legislation: Factories Act 1948, Employee state insurance act 1948, Employee Compensation act 1923, Employee Provident Funds and Miscellaneous Provisions Act 1952 & Trade Union Act 1926.

UNIT IV

Workers' participation in management: Labors Participation in Management Structure, Scope, Works Committee, Joint Management Council & Shop Council. Pre-Requisites for Successful Participation. Collective Bargaining: Definition, Meaning, Types, Process & Importance.

UNIT V

Trade Unions – Growth – Economic, Social and Political Conditions - Objectives-Structures and Functions–Social And Economic Responsibilities of Trade Union.

COURSE OUTCOME:

CO1 Understand the role and importance of Industrial Relations

CO2 Understanding the concepts of industrial Disputes and settlement.

CO3 Understanding the concepts of Labour legislation.

CO4 Identifying the concepts of Workers Participation in Management

CO5 Understanding the concepts of Trade Union

Reference Books	
1.	Pradeep Kumar; Personnel Management and Industrial Relations, Kedarnath Ramnath and Company, 2018
2.	Gupta CB (Dr), Kapoor N.D., Tripathi PC; Industrial Relations and Labour Laws, Sultan Chand and Sons, 2020.
3.	Chris Hall; Trade Union and its State, Princeton University, 2017
4.	Ian Beard well; Contemporary Industrial Relation, Oxford University Press, 1996

5.	R C Sharma; Industrial Relation and Labour Legislation, PHL learning Pvt ltd, 2016
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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1						S		
CO 2	S		S			M		

Text Books	
1	Industrial Relations Journal
2	C S Venkata Ratnam , Manoranjan Dhal, Industrial Relations, Oxford, 2 nd Edition
3	A M Sharma, Industrial Relations and Labour Laws, HPH, Revised Edition
4	P R N Sinha, Indu Bala Dinha, Seema Priyadarshini Shekhar, Industrial Relations , Trade Unions and Labour Legislation, Pearson , 3e
5	Labor Laws, Taxmann
Web Resources	
1.	https://www.studocu.com/in/document/panjab-university/mangerial-finance/bba-specialization-hrm-vi-sem-industrial-relations/15804491
2.	https://www.srcc.edu/e-resources?field_e_resources_tid=447
3.	https://labour.gov.in/industrial-relations
4.	https://labourcommissioner.assam.gov.in/portlet-innerpage/what-is-a-trade-union
5.	https://theintactone.com/2022/08/17/joint-management-councils/

CO 3	S	M						S
CO 4					M	S		
CO 5	S	S		M				S

Course Title	Unit	Hours Allotment
Industrial Relation	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSE VI	Financial Literacy	4	0	0	3

COURSE OBJECTIVE:

- To impart knowledge about basic of finance

- To provide understanding risk vs return on various financial investments
- To familiarize students about Investments in Commodities and Real Estates

1.	Jack R. Kapoor (Author), Les R. Dlabay (Author), Robert J. Hughes (Author), Melissa M. Hart (Author); Personal Finance, Mg Graw hill, 12 th Edition
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- To impart knowledge about Mutual Funds
- To familiarize students about Crypto investments and Tax

Planning

UNIT I

Financial institutions, Financial Intermediaries, Financial markets and financial instruments

UNIT II

Financial Planning, Investment Objectives, Basics of Risk and return- Insurance policies – Significance of Term insurance and Health insurance

UNIT III

Investments in Commodity, Real estate investments

UNIT IV

Mutual Funds Analysis – Evaluation criteria of Selecting the best fund, Stock Analysis – Evaluation criteria of best stocks

UNIT V

Crypto Investments – Financial freedom -Tax Planning

COURSE OUTCOME:

CO1 Describe nature, scope, role, levels, functions of financial institutions, Financial Intermediaries, Financial markets and financial instruments and Insurance

CO2 Comprehend investment objectives, Risk and return

CO2 Comprehend investment objectives, Risk and return and Insurance

CO3 Identify Investments in Commodity, Real estate investments

CO4 Analyse Mutual fund and Stock

CO5 Understand Crypto currency, Tax and Financial Freedom.

2.	Jeff Madura; Personal Finance , Pearson, 7 th Edition.
3	R.K Mohapatra; Mutual Funds: A powerful Investment Avenue for Individuals, Blue Rose, 1st Edition
4	HoHN C Bogle, The little book of common sense investing, Wiley, 2 nd Edition
5	Dr Pradip Kumar Sinha, Personal Financial Planning Nirali Prakashan

References Books

1.	Richard A Lambert, Financial Literacy, Wharton School Press
2.	Eric Tyson, Personal Finance for Dummies, IDG Books, 9 th Edition
3.	Alan John and Jon Law, Crypto Technical Analysis, Alan John
4.	G Victor Hallman and Jerry S Resenbloom, Private Wealth Management, Wharton School Press, 8 th edition
5.	H Sadhak, Mutual Funds in India, Sage Response, 2 nd edition

Web References

1.	https://www.moneycontrol.com/mutual-funds/find-fund/
2.	www.screener.in
3.	https://www.iarfc.org/publications/journal-of-personal-finance
4.	https://ticker.finology.in/
5.	https://www.investopedia.com/terms/m/mutualfund.asp

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1						S		
CO 2	S		S			M		
CO 3	S	M						S
CO 4					M	S		
CO 5	S	S		M				S

S-Strong M-Medium L-Low

CO/POS	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted Percentage of Course Contribution to PSO	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Financial Literacy	I	15
	II	15
	III	15
	IV	15
	V	15

COURSECODE	COURSETITLE	L	T	P	C
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23160DSC56	Disaster Management	3	0	1	2
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Objective:

1. To provide basic conceptual understanding of disasters.
2. To understand approaches of Disaster Management
- 3. To build skills to respond to disaster**

Unit: I Definition and types of disaster

Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters, earthquakes, floods drought, landside, land subsidence, cyclones, volcanoes, tsunami, avalanches, global climate extremes. Man-made disasters: Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires.

Unit: II Study of Important disasters

Earthquakes and its types, magnitude and intensity, seismic zones of India, major fault systems of India plate, flood types and its management, drought types and its management, landside and its managements case studies of disasters in Sikkim (e.g) Earthquakes, Landside). Social Economics and Environmental impact of disasters.

Unit: III Mitigation and Management techniques of Disaster

Basic principles of disasters management, Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warning Systems, Building design and construction in highly seismic zones, retrofitting of buildings.

Unit IV Training, awareness program and project on disaster management

Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management, Mini project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas.

OUTCOMES:

- **Develop a deep understanding of disaster resilience, risk mitigation, and recovery policies as they arise from natural hazards around the globe; Develop the capacity to participate in debates on disaster governance and societal reconstruction.**

Text Books:

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
5. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.

Course Code	Course Title	L	T	P	C
231ACLSPSL	Professional Skills	0	0	0	1

COURSE OBJECTIVE:

- Acquire career skills and fully pursue to partake in a successful career path
- Prepare a good resume, prepare for interviews and group discussions
- Explore desired career opportunities in the employment market in consideration of an individual SWOT.

Unit I: Resume Skills

Resume Skills : Preparation and Presentation

- Introduction of resume and its importance
- Difference between a CV, Resume and Bio data
- Essential components of a good resume

Resume skills : common errors

- Common errors people generally make in preparing the resume
- Prepare a good resume of her/his considering all essential components

Unit II: Interview Skills

i. Interview Skills : Preparation and Presentation

- Meaning and types of interview (F2F, telephonic, video, etc.)
- Dress Code, Background Research, Do's and Don'ts
- Situation, Task, Approach and Response (STAR Approach) of facing an interview
- Interview procedure (opening, listening skills, closure, etc.)
- Important questions generally asked in a job interview (open and closed ended questions)

ii. Interview Skills : Simulation

- Observation of exemplary interviews
- Comment critically on simulated interviews

iii. Interview Skills : Common Errors

- Discuss the common errors generally candidates make in interview
- Demonstrate an ideal interview

Unit III: Group Discussion Skills

Meaning and methods of Group Discussion

- Procedure of Group Discussion
- Group Discussion-Simulation
- Group Discussion – Common Errors

Unit IV: Exploring Career Opportunities

Knowing yourself – personal characteristics

- Knowledge about the world of work, requirements of jobs including self-employment.
- Sources of career information
- Preparing for a career based on their potentials and availability of opportunities

COURSE OUTCOME:

CO1 Prepare their resume in an appropriate template without grammatical and other errors and using proper syntax

CO2 Participate in a simulated interview

CO3 Actively participate in group discussions towards gainful employment

CO4 Capture a self - interview simulation video regarding the job role concerned

CO5 Enlist the common errors generally made by candidates in an interview

CO6 Perform appropriately and effectively in group discussions

CO7 Explore sources (online/offline) of career opportunities

CO8 Identify career opportunities in consideration of their own potential and aspirations

CO9 Use the necessary components required to prepare for a career in an

identified occupation.

SEMESTER VI

Course Code	Course Title	L	T	P	C
23160DSC13	Material Management	5	0	0	4

COURSE OBJECTIVE:

- To provide functional knowledge on Materials Management.
- To Enable the students to gain knowledge on Inventory control, Procurement, Store keeping.
- To furnish students about Vendor management and Vendor rating.
- To Understand and maintain effective stores and material handling system
- To give an insight to Purchase Management

UNIT I

Materials Management- Definition-Function-Importance of Materials Management

UNIT II

Integrated materials management- the concept- service function advantages- Inventory Control- Function of Inventory - Importance-Replenishment Stock-Material demand forecasting- MRP- Basis tools - ABC-VED- FSN Analysis - Inventory Control Of Spares And Slow Moving Items -

Reading List

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UNIT III

Purchase Management- Purchasing - Procedure - Dynamic Purchasing - Principles – import substitution- International purchase- Import purchase procedure

UNIT IV

Store Keeping and Materials Handling- Objectives - Functions - Store Keeping - Stores Responsibilities - Location of Store House - Centralized Store Room - Equipment – Security Measures - Protection and Prevention of Stores.

UNIT V

Vendor Rating - Vendor Management - Purchase Department - Responsibility - Buyer Seller Relationship - Value Analysis - Iso Types.

COURSE OUTCOME:

- CO1 Understand the principles of effective materials management
- CO2 Outline inventory control concepts and its replenishment to manage inventory
- CO3 Discuss purchase management procedure
- CO4 Explain store keeping functions and its security
- CO5 Identify Vendor rating mechanisms and vendor relationship management.

1.	International Journal of Purchasing & Materials Management
2.	Journal of Operations Management
3	Journal of Supply Chain Management
4	K.Shridhara Bhat; Material Management; Himalaya Publishing House; Mumbai 2016
5	R.B Khanna, production and Operations management , Prentice Hall Publications, 2015

References Books

1.	P. Saravanavel & S. Sumathi; Production and Materials Management, Margham Publications, 2015.
2.	Steve Chapman, Tony K. Arnold, Ann K. Gatewood, Lloyd Clive; Introduction to Materials Management. Eighth Edition, Pearson, 2017.
3.	P. Gopalakrishnan; Purchasing Materials Management, 1s edition, McGraw Hill Education, 2017.
4.	P. Gopalakrishnan & Abid Haleem; Hand book of Materials Management, Second Edition, PHI Learning Pvt., Ltd., 2015.
5.	Prem Virat; Materials Management, Springer Nature, 2014.

Web Resources

1.	https://ebooks.lpude.in/management/mba/term_4/DMGT525_MATERIALS_MANAGEMENT.pdf
2.	https://examupdates.in/materials-management-notes/
3	https://www.slideshare.net/DevikaAntharjanam/3integrated-approach-to-materialmanagement
4	https://www.slideshare.net/rohit3615/materials-handling-15528281
5	https://www.investopedia.com/terms/e/economicorderquantity.asp

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	S	S	S	S	M	M	S
CO2	S	M	S	S	S	M	M	S
CO3	M	M	S	S	S	M	M	S
CO4	M	S	M	S	S	M	M	M
CO5	S	S	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
Material Management	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSC14	Service Marketing	5	0	0	4

COURSE OBJECTIVE:

- To recall the basic concepts of Services Marketing.
- To know the Marketing Mix in Service Marketing
- To examine effectiveness of Service Marketing.
- To discuss on delivering Quality Service.
- To analyze the Marketing of Services.

UNIT I

Marketing Services: Introduction growth of the service sector. The concept of service. Characteristics of service - classification of service designing of the service, blueprinting using technology, developing human resources, building service aspirations.

UNIT II

Marketing Mix in Service Marketing: The seven Ps: product decision, pricing strategies and tactics, promotion of service and distribution methods for services. Additional dimension in services marketing- people, physical evidence and process.

UNIT III

Effective Management of Service Marketing: Marketing demand and supply through capacity planning and segmentation - internal marketing of services - external versus internal Orientation of service strategy.

UNIT IV

Delivering Quality Service: Causes of service - quality gaps. The customer expectations versus perceived service gap. Factors and techniques to resolve this gap. Customer relationship management. Gaps in services - quality standards, factors and solutions – the service performance gap - key factors and strategies for closing the gap. External communication to the customers- the promise versus delivery gap - developing appropriate and effective communication about service quality.

UNIT V

Marketing of Service With Special Reference To:1. Financial services, 2. Health services, 3. Hospitality services including travel, hotels and tourism, 4. Professional service, 5. Public utility service, 6. Educational services.

COURSE OUTCOME:

CO1 To define and understand the concepts of Services Marketing.

CO2 To Examine and apply Marketing Mix in Service Marketing

CO3 To analyze and design various strategies in the field of Services Marketing

CO4 To evaluate the role of delivering Quality Service

CO5 To design the tools of Marketing

Reading List	
1.	Reddy P.N. (2011)– Services Marketing – Himalaya Publication
2.	Christopher Lovelock ,Jochen Wirtz (2016)– Services Marketing – World Scientific Publisher
3.	The Journal Of Services Marketing
4.	Valarie A Zeithmal and Mary JO Bitner,Services Marketing:Integrating Customer Focus across the firm,Tata Mc Graw Hill NewDelhi
5	C.Bhattacharjee,Services Marketing ,Excel Books,NewDelhi
References Books	
1.	Dr. B. Balaji, Services Marketing and Management, S. Chand & Co, New Delhi.
2.	S.M. Jha, Services marketing, Himalaya Publishers, India
3.	Baron, Services Marketing, Second Edition. Palgrave Macmillan

4.	Dr. L. Natarajan Services Marketing, Margham Publications, Chennai.
5.	Thakur.G.S. Sandhu supreet & Dogra Babzan, Services marketing, kalyanni Publishers, Ludhianna.
Web Resources	
1	https://www.managementstudyguide.com/seven-p-of-services-marketing.htm
2	https://www.economicdiscussion.net/marketing-2/what-is-service-marketing/31875
3	https://www.marketingtutor.net/service-marketing/
4	https://www.marketing91.com/service-marketing/
5	https://www.marketing91.com/service-marketing-mix/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	S	S	M	S	M	S	M
CO2	S	M	S	M	S	M	M	M
CO3	S	S	S	M	M	M	S	S
CO4	S	M	S	S	S	S	M	S
CO5	M	S	M	S	M	S	S	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Title	Unit	Hours Allotment
Services Marketing	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSC15	Business Taxation	5	0	0	4

COURSE OBJECTIVE:

- To understand the basic concepts of Taxes.
- To provide insights on the Income Tax Act.
- To evaluate the procedure for assessment and methods of valuation for customs.
- To discuss on GST.
- To analyze and apply the returns, Tax payment and Penalties under GST

UNIT I

Objectives Of Taxation – Canons of Taxation – Tax System In India – Direct And Indirect Taxes – Meaning And Types.

UNIT II

Income Tax Act 1961 – Basic Concepts and Definitions – Income, Assessee, Person, Previous Year, Assessment Year, Gross Total Income, Total Income. Meaning of Permanent Account Number, Return of Income, TDS - Meaning - Rates - Filing and Return, Advance Tax, Rates of Taxation, Assessment Procedure

UNIT III

Customs Act 1962 - Introduction, Objectives, Definitions, Functions and powers of customs authorities, different types of custom duties. Classification of goods, procedure for assessment and methods of valuation for customs, demand and recovery of customs duty, procedure for claiming customs duty drawback.

UNIT IV

Definitions of GST – business related person’s capital goods – levy and collection of tax – mixed supply, composite supply – meaning, advantages and disadvantages of unregistered supplier – time and value of supply – goods, services – input tax credit – Registration of GST – person liable for registration, not liable for registration, Registration of casual taxable person, deemed on cancellation of registration, revocation of cancellation of registration.

UNIT V

Tax Invoice, Credit and Debit notes –Return of GST, Refunds, payment of tax, assessment and audit. An Overview of Tax Audit – Tax Incentives and Export Promotions, Deductions and Exemptions.

COURSE OUTCOME:

CO1 To define and understand the basic concepts of tax.

CO2 To Examine and apply GST rules in real-time business situations.

CO3 To analyze the elements of GST mechanism in India.

CO4 To evaluate the rules of Income Tax and methods of valuation for customs.

CO5 To prepare the needed documents under GST Compliance.

Reading List	
1.	V.S. Datey, Central Excise , JBA Publishers, Edition 2013. Reddy. T. S and Y. Hari Prasad Reddy.
2.	Business Taxation (Goods & Services TAX - GST) , Margam Publication, Edition 2019.
3.	Srinivasan N.P and Priya Swami. M, Business Taxation , Kalyani publishers Edition 2013
4.	Pagaredinkar, Business Taxation , Sultan Chand and Sons, 2012.
5.	VISION: Journal of Indian Taxation
References Books	
1.	Senthil and Senthil, Business Taxation, Himalaya Publication, 4 th Edition.
2.	Vinodk.Singania, Indirect Tax, Sultan Chand and Sons, Edition 2013.
3.	Dr. Vinodk.Singania and Dr. Monica Singhania, Students Guide to Income Tax (including service tax, vat) , JBA Publishers, Edition 2013.

4.	DR. VandhanaBangar , Yogendra Bangar , Indirect tax laws, AadhyaPrakasam Allahabad 2018.
5.	T.S. Reddy & Y.Hariprasad Reddy , Business Taxation, Margham Publications, Chennai 2018.
Web Resources	
1.	https://www.gst.gov.in/
2.	https://gstcouncil.gov.in/
3.	https://taxguru.in/custom-duty/types-duties-customs.html
4.	https://www.indiantradeportal.in/vs.jsp?lang=0&id=0,25,857,3901
5.	https://www.aegonlife.com/insurance-investment-knowledge/tax-structure-in-india- explained/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	M	S	S	S	M	M	S
CO2	S	M	S	S	M	M	M	S
CO3	S	S	S	S	S	M	M	M
CO4	S	M	S	M	S	S	M	S
CO5	M	M	S	M	S	S	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PO's	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Course Title	Unit	Hours Allotment
Business Taxation	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSE VII	Consumer Behaviour	5	0	0	3

COURSE OBJECTIVE:

- To explain the concept of consumer behavior
- To evaluate the factors affecting consumer behaviour in detail and analyze the consumer decision process.
- To understand the Consumer Decision Making Process
- To impart knowledge about personality and Consumer Behaviour
- To know about Consumer Learning and Consumer Involvement

UNIT I

Introduction to Consumer Behaviour and Consumer Research: Consumer Behaviour – Definition, Consumer and Customers, Buyers and Users, Organizations as Buyers, Development of Marketing Concept, Consumer Behaviour and its Applications in Marketing, Consumer Research Process.

UNIT II

Factors influencing Consumer Behaviour– External Influences – Culture, Sub Culture, Social Class, Reference Groups, Family, Internal Influences– Needs & Motivations, Perception, Personality, Lifestyle, Values, Learning, Memory, Beliefs & Attitudes.

UNIT III

Consumer Decision Making Process - Types of consumer decisions, Consumer Decision Making Process - Problem Recognition - Information Search - Alternative Evaluation –Purchase Selection – Post purchase Evaluation, Buying pattern in the new digital era.

UNIT IV

Personality and consumer behavior – nature and characteristics of personality-theories of personality- influence

Text Books	
1.	Dr. L Natarajan; Consumer Behavior, Margham Publication, 2019

of
personalit
y on
consumer
behavior-
consumer
motivatio
n -
concepts,
needs,
goals and
motives-
themes in
consumer
motivatio
n. Attitude
-
characteri
stics -

components – functions of attitude – factors influencing attitude – themes of attitude

UNIT V

Consumer Learning, Memory and Involvement: Introduction, Components of Learning, Behavioral Theory, Cognitive Learning Theory, Concept of Involvement, Dimensions of Involvement - Model of consumer involvement

COURSE OUTCOME:

- CO1 Describe concepts underlying consumer behaviour
- CO2 Evaluate the influence of internal and external factors on consumer consumption preferences.
- CO3 Interpret the power of individual influences on decision making and consumption.
- CO4 Identify & outline the significance of Motivation, Personality & Attitude with consumer behavior.
- CO5 Relate consumer learning, involvement & decision making.

2.	Michael R. Solomon, Tapah Kumar Panda, Consumer Education, 2020.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
3.	Ms. Sujata and R. Nair; Consumer Behavior in Indian Perspective, Himalaya Publishing house Pvt Ltd, 2015					M	S	S	
4.	Michael R Solomon; Consumer Behaviour: Buying, Having and Being. Pearson Education, 2014		S				M		
5.	Leon G Schiffman, Joseph Wesen Blit, S. Ramesh Kumar; Consumer Behavior, Pearson Publication, 11th Edition, 2015					S	S		
		CO 5	M	S			S	S	

References Books

1.	Bennet and Kassar, Consumer Behaviour, Prentice Hall of India, New Delhi
2.	Jay D. Lindquist and Joseph Sirgy, Shopper, Buyer and Consumer Behavior, Biztranza 2008.
3.	Paul Peter et al., Consumer Behavior and Marketing Strategy, Tata McGraw Hill, Indian Edition, 7th Edition 2005.
4.	Sheth Mittal, Consumer Behavior- A Managerial Perspective, Thomson Asia (P) Ltd., 2003.

**S-Strong
M-Medium
L-Low**

CO/POS	David L. Loudon and Albert J Della Bitta, Consumer Behavior, McGraw Hill, New Delhi 2002.	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1		3	3	3	3	3
CO 2		3	3	3	3	3
CO 3	1. https://theintactone.com/2019/08/31/cesubba-401-consumer-behavior/	3	3	3	3	3
CO 4	2. https://indiafreemotes.com/bba406-consumer-behavior/	3	3	3	3	3
CO 5	3. https://opentextbc.ca/introconsumerbehaviour/chapter/involvement-levels/	3	3	3	3	3
Weightage	https://www.yourarticlelibrary.com/consumers-personality-consumers-personality-of-consumer-nature-theories-and-life-style-concept/64136	15	15	15	15	15
Weighted Percentage of Course	https://www.iedunote.com/attitude-and-consumer-behavior	3.0	3.0	3.0	3.0	3.0
Contribution to PSO						

Course Title	Unit	Hours Allotment
Consumer Behaviour	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
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23160DSE VII	Competency Mapping	5	0	0	3
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COURSE OBJECTIVE:

- To develop an understanding about the competency-based HR practices
- To learn the art of developing and validating competency models
- To know about Team Competency and Competency Mapping
- To understand the intricacies of assessment and appraisal
- To provide knowledge about Competency Profiling

UNIT I

Introduction: Concept and definition of Role and competency, Characteristics of competency, Core Competency versus competence, Performance versus competency; skills versus competency, behavior indicators, Types of competencies - generic/specific, threshold/performance, and differentiating and technical, managerial and human; Competency Method in Human Resource Management: Features of Competency Methods, Historical Development, Definitions.

UNIT II

Competency framework - development of personal competency framework, Lancaster Model of managerial competencies, competency modeling framework developing a competency model - Understanding job positions, Data collection instruments for job descriptions, Stages in design and implementation of competency model, Validation of the competency model after data gathering

UNIT III

Team Competencies (project driven), Role competencies (Role wise); Competency identification Consolidation of checklist, Rank Order and finalization, Validation, and Benchmark; Competency assessment - 360 degrees, Competency Mapping - Strategy-Structure Congruence, Structure Role Congruence, Vertical & horizontal Role linkages, Positioning to bring in competitive advantage

UNIT IV

Identification of Role competencies, elemental competencies, assessment center, what do the assessment centers assess? Design of assessment center, Use of psychometric testing in assessment center, 360-degree feedback, potential appraisal through assessment center, Creating Competency Dictionary.

UNIT V

Steps in development of competencies map, studying job, processes, and environment, studying attributes of good performer; Strategy structure congruence, Structure Role congruence - Each role to be unique, Non-Repetitive, and Value adding; Vertical and horizontal role congruence, Ensure non repetitive tasks in two different roles, Ensure core competencies for each task, Link all the above and position to bring in competitive advantage. Using competency maps for Competency profiling - Job competency profiling, Role competency, profiling Functional competency profiling, Core competency profiling Competency based selection, competency-based interviews, competency-based performance management, competency driven careers, and competency linked remuneration, competency driven culture. Career Development Tools.

COURSE OUTCOME:

Text Book

CO1
Describe concepts, characteristics, types of competencies

CO2
Understand the various models, job descriptions, stages in design and implementation

CO3

Identify the design of competency model and competency gap analysis

CO4 Relate mapping jobs through competency model

CO5 Understand the Competency profiling

1.	Sharma, Radha. 360-degree feedback, competency mapping & assessment centers, R. Tata McGraw Hill – 2003								
2.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
	Michael Armstrong and Helen Murlis, 2005, Handbook of Reward Management, Crest Publishing House, New Delhi.					S			
3.	R K Sadhu, Competency Mapping, Excel Books, 2 nd Edition							S	
4.	Margaret Dale and Paul Miles, 2002, Assessing Management Skills – a guide to competencies and evaluation techniques, Jaico Publishing House, Mumbai.								
5.	Sravan Mukherjee, Competency Mapping for Superior Results, TMH								

References Books

1.	McClelland, David Competence at Work, Spencer and Spencer, 1993.
2.	Shermon, Ganesh. Competency based HRM. 1st edition, Tata McGraw Hill.
3.	Sanghi, Seema. The Handbook of Competency Mapping: Understanding, Designing and Implementing Competency Models in Organizations, 2nd e, Sage Publications Pvt. Ltd. 2007
4.	Competency Mapping: A pre- requisite for HR Excellence - by Dr. Lovy Sarikal
5.	The Competencies Handbook, 2005, Steve Whiddett & Sarah Hollyforde, Jaico Publishing House

S-Strong
M-Medium
L-Low

Web Resources

1.	https://indiafreenotes.com/competency-mapping-meaning-features-need-and-importance/
2.	https://www.whatishumanresource.com/competency-mapping
3.	http://www.consultseven.com/case/pdf/Competency_Profiling.pdf
4.	https://www.16personalities.com/free-personality-test
5.	https://www.valamis.com/hub/competency-model

CO/POS	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15

Weighted Percentage of Course Contribution to PSO	3.0	3.0	3.0	3.0	3.0
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Course Title	Unit	Hours Allotment
Competency Mapping	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSE VII	Security Analysis Portfolio Management	5	0	0	3

COURSE OBJECTIVE:

- Understand Financial intermediaries, financial markets and risk return trade off
- Evaluate the performance of bonds and Equity Valuation
- To study Fundamental and Technical analysis
- Illustrate Portfolio Management
- To know about Derivatives

UNIT I

Theory: Meaning, objectives, classification of investment. Investment versus speculation. security markets-primary and secondary, market indices- calculation of SENSEX and NIFTY. Stock exchanges- BSE, NSE, OTCEI. Financial intermediaries. Return and Risk – Meaning, types of risk

Problem: Measurement of risk and return

UNIT II

Theory: Equity analysis & valuation, Types of debt instruments, bond immunization, bond volatility, bond convexity

Problem: Equity valuation models -Walter model, Gordon's model, the p/e ratio or earnings multiplier approach, measuring bond yields- yield to maturity, holding period return

UNIT III

Theory: Fundamental Analysis: Economic analysis: factors, Industry Analysis: Industry Life Cycle. Company Analysis: Tools of Financial Statement Analysis. Technical Analysis: Dow Theory, Elliot wave theory, Efficient Market Hypothesis; Concept and Forms of Market Efficiency. Charts, Patterns, Trend Lines, Support and Resistance Levels

Problems: Relative Strength Analysis, Moving Averages breadth of market

UNIT IV

Theory: steps in portfolio management, Portfolio Models –Capital Asset Pricing Model, Arbitrage Pricing Theory

Problems: Evaluation of Portfolios; Sharpe Model, Jensen's Model, Treynor's model

UNIT V

Text Books	
1.	<u>Punithavathy Pandian</u> (2012), Security Analysis & Portfolio Management, Vikas Publishing 2nd edition

Theory: characteristics, types of derivatives, participants in derivative market. Characteristics of futures, forwards, swaps, options.

COURSE OUTCOME:
CO1 Recall the meaning of the basic terminologies used in stock market.
CO2 Explain and infer the final worth of various investment processes
CO3 Solve problems relating to various investment decisions

CO4 Analyze theories and problems relating to stock market

2	Prasanna Chandra, (2021) Investment Analysis & Portfolio Management, McGraw Hill 6 th edition									
3	E. Fischer Donald, J. Jordan Ronald, K. Pradhan Ashwini (2018) Security Analysis & Portfolio Management, Pearson 7 th edition	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	
4	S Kevin (2006) Portfolio Management, PHI publishing, 2nd Revised edition	CO 1	S	S		S	S	M		
5	L.Natarajan, (2012), Investment Management, 1st Ed., Margham Publications, Chennai	CO 2	S	S			S			
		CO 3	S	S			S			
		CO 4		S	References Books		S	M		
1.	Reilly & Brown, Investment Analysis and Portfolio Management, Cengage, 10 th edition, 2016.	CO 5				M				
CO/POS				PSO 1	PSO 2	PSO 3	PSO 4	PSO 5		
2.	Bodi, Kane, Markus, Mohanty, Investments, 8 th edition, Tata McGraw Hill, 2011.									
CO 1				3	3	3	3	3		
CO 2	V.A.Avadhan, Securities Analysis and Portfolio Management, Himalaya PublishingHouse, 2013.			3	3	3	3	3		
CO 3				3	3	3	3	3		
CO 4	V.K.Bhalla, Investment Management, S.Chand & Company Ltd., 2012			3	3	3	3	3		
CO 5				3	3	3	3	3		
Weightage	Jay M Desai, Nishag A Joshi, Investment Management, Dham Tech Press			15	15	15	15	15		
Weighted Percentage of Course Contribution to PSO				3.0	3.0	3.0	3.0	3.0		
1.	www.stock-trading-infocentre.com									
2.	www.sebi.gov.in									
3.	https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/fundamental-analysis/									
4.	https://www.investopedia.com/terms/t/technicalanalysis.asp									
5.	https://groww.in/p/portfolio-management									

CO5
Interpret the various investment models that aid in investment decision making

Course Title	Unit	Hours Allotment
Security Analysis Portfolio Management	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
23160DSE VIII	Logistics and Supply Chain Management	5	0	0	3

COURSE OBJECTIVE:

- To impart knowledge about basic functions of Logistics and Supply Chain Management
- To provide understanding of Value Chain and SCM
- To familiarize students about Inventory Management
- To learn about Logistics Packaging
- To Know about Logistics Information system and e commerce

UNIT I

Concept of Logistics: Introduction, Objectives, Concept of Logistics, Objectives of logistics, Types of logistics, Concept of Logistics Management, Evolution of Logistics, Role of Logistics in an Economy, Difference between Logistics and Supply Chain Management, Logistics and Competitive Advantage, Logistics Mix, Logistics in Organized Retail in India.

UNIT II

Supply Chain Management: Introduction, Objectives, Defining Value Chain, Organization level, Activities, Industry level, Value reference model, Concept of Supply Chain Management (SCM), Functions and Contribution of Supply Chain Management, Creating value, Enlisting suppliers to innovate, Leveraging value chain partners, Supply Chain Effectiveness and Indian Infrastructure, Framework for Supply Chain Solution, Supply Chain Relationships, Building a long-term relationship with vendors, Supplier relationship management (SRM).

UNIT III

Inventory Management: Introduction, Objectives, Concept of Inventory, Types of Inventory, Concept of Inventory Management, Importance of inventory management, Objectives of inventory management, Different Types of Inventory Costs, Inventory Performance Measures, Inventory turnover ratio (ITR), Framework of performance indicators, Inventory Planning Measures, Economic order quantity (EOQ), Reorder point, Safety stock, Supplier-managed inventory.

UNIT IV

Logistical Packaging: Introduction, Objectives, Concept of Logistical Packaging, Design Consideration in Packaging, Types of Packaging Material, Packaging Costs, Introduction to Logistics Outsourcing.

Text books

UNIT V

Logistics Information System: Introduction, Objectives, Concept of Logistics Information System (LIS), Importance of LIS, Principles of designing LIS, Logistics Information Architecture, Application of Information Technology in Logistics and Supply Chain Management, Introduction to E – Commerce Logistics.

COURSE OUTCOME:

CO1 Discuss about the Logistics and Supply Chain Management and its Retail usage.

CO2 Identify the Framework and relationship Supply Chain Management

CO3 Identify the various techniques of Inventory Management

CO4 Understand the Packaging techniques and outsourcing of Logistics Services.

CO5 Understand the use of Information System and E-Commerce in Logistics and Supply Chain Management.

1.	Martin Christopher, Logistics & Supply Chain Management, Prentice Hall, Fourth Edition, 2013							
2.	D. K. Agrawal, Textbook of Logistics and Supply Chain Management, Macmillan, 2009							
3.	Saikumari. V, S. Purushothaman, Logistics & Supply Chain Management, Sultan Chand & Sons, First Edition, 2022							
4.	Satish C. Ailawadi, Rakesh P. Singh, Logistics & Supply Chain Management, HI Learning Private Limited, 2011	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
5.	Paul Myerson, Lean Supply Chain and Logistics Management, Mc Graw Hill, 2012	CO 1						
		CO 2	S	S				
1.	Janet Shah, Supply Chain Management – Text and Cases, Pearson Education, 5th edition, 2012.	CO 3						
2.	Sudh Chopra and Peter Meindl, Supply Chain Management-Strategy Planning and Operation, PHI Learning / Pearson Education, 5th edition, 2012.	CO 4						
3.	Bruce Ronald H, Business Logistics and Supply Chain Management, Pearson Education, 5th edition, 2013.	CO 5						
4.	Joel D. Wisner, G. Keong Leong, Keah-Choon Tan, Principles of Supply Chain Management A Balanced Approach, South-Western, Cengage Learning, 3rd edition, 2011.							
5.	Altekar Rahul V, Supply Chain Management-Concept and Cases, PHI, 3rd edition, 2005.							
CO/POS				PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	Web Resources			3	3	3	3	3
CO 2	1. https://www.techtarget.com/search/definitions/logisticsmanagement			3	3	3	3	3
CO 3	2. https://logistikknowhow.com/en/sortier-packing-department/the-packaging-logistics/			3	3	3	3	3
CO 4	3. https://www.bigcommerce.com/articles/ecommerce/inventory-management/			3	3	3	3	3
Weightage	https://www.mbaknol.com/management-information-systems/logistic-information-system-and-its-objectives/			15	15	15	15	15
Weighted Percentage of Course Contribution to PSO	https://www.oracle.com/in/scm/what-is-supply-chain-management/#:~:text=At%20the%20most%20fundamental%20level,product%20at%20its%20final%20destination.			3.0	3.0	3.0	3.0	3.0

S-
Strong M-
Medium
L-
Low

Course Title	Unit	Hours Allotment
Logistics and Supply Chain Management	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
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23160DSE VIII	E-Business	5	0	0	3
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COURSE OBJECTIVE:

- To understand the basic concepts of electronic business.
- To identify web-based tools.
- To examine the security threats to e-business.
- To discuss the strategies on marketing.
- To analyze the business plan for e-business.

UNIT I

Introduction to electronic business - meaning - value chains - the Internet and the web - infrastructure for e-business

UNIT II

Web based tools for e - business - e - business software - overview of packages

UNIT III

Security threats to e - business - implementing security for e - commerce and electronic payment systems.

UNIT IV

Strategies for marketing, sales and promotion - B2C and strategies for purchasing and support activities - B2B - web auction virtual - web portals

UNIT V

The environment of e-business - international - legal ethical - tax issues - business plan for implementing e-business

COURSE OUTCOME:

- CO1** To define and understand the basic concepts of business done through web
CO2 To Examine and apply web tools in real-time business situations.
CO3 To analyze the security threats in e-business.
CO4 To evaluate strategies for marketing.
CO5 To prepare the environment for e-business.

Text Books	
1.	Garry P Schneider and James T Perry - Electronic Commerce, Course technology, Thomson Learning, 2000

2.	Diwan, Prag and Sunil Sharma - E-Commerce - Managers guide to E-Business								
3.	Kosiv, David - Understanding E-Commerce	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
4.	Turban, Efraim, David King et. el.: Electronic Commerce: A Managerial Perspective, Pearson Education Asia, Delhi.	CO 1	M				S	S	
5.	C S Rayudu, E Commerce E Business, HPH	CO 2	S			S	S	S	
		CO 3					S	S	S
		CO 4	M	References Books				S	
1.	Dave Chaffey: E-Business and E-Commerce Management, Pearson Education.	CO 5	M	M	S	M			M
2.	Kalakota, Ravi: Frontiers of Electronic Commerce, Addison - Wesley, Delhi.								
3.	Smantha Shurety,: E-Business with Net Commerce, Addison - Wesley, Singapore.								
4.	David Whitely, E Commerce Strategy, Technology and Applications, TMH								
5.	J. Christopher Westle and Theodre H K Clarke, Global Electronic Commerce – Theory and Case Studies, University Press								
Web Resources									
1	https://www.tutorialspoint.com/e-commerce/e-commerce-tutorial.pdf								
2	https://www.techtarget.com/searchcio/definition/e-business								
3	https://www.britannica.com/technology/e-commerce								
4	https://www.geeksforgeeks.org/different-types-of-threat-to-e-commerce/								
5	https://irp-cdn.multiscreensite.com/1c74f035/files/uploaded/introduction-to-e-commerce.pdf								

S-Strong
M-Medium
L-Low

CO/POS	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted Percentage of Course Contribution to PSO	3.0	3.0	3.0	3.0	3.0

Course Title	Unit	Hours Allotment
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E-Business	I	15
	II	15
	III	15
	IV	15
	V	15

Course Code	Course Title	L	T	P	C
	Project Work	5	0	0	4

A group of 3 students will be assigned a project in the beginning of the final year. The project work shall be submitted to the college 20 days before the end of the final year and the college has to certify the same and submit to the university 15 days prior to the commencement of the University examination.

The project shall be evaluated externally. The external examiner shall be forming the panel of examiners suggested by the board of studies from to time.

COURSE OBJECTIVE:

- To Give Idea about Research Project
- To identify the research problem
- To review Literature
- To give knowledge on Data Collection and Analysis
- To Learn Project Preparation

COURSE OUTCOME:

- CO1** Gain knowledge about Research Project
- CO2** Increase knowledge on research problem
- CO3** Improve practice in review of literature
- CO4** Gain knowledge on Data Collection and Analysis
- CO5** Be Proficient in Project Preparation

PROJECT DESCRIPTION

GUIDELINES

1. Project report is to bridge theory and practice.
2. The project work should be neatly presented in not less than 50 pages and not more than 120 pages
3. Paper Size should be A4

4. 1.5 spacing should be used for typing the general text. The general text shall be justified and typed in the Font style - Font: Times New Roman / Font Size: 12 for text)
5. Subheading shall be typed in the Font style (Font: Times New Roman / Font Size: 14 for headings). The report should be professional.
6. The candidate should submit periodical report of the project to the supervisor.
7. Two reviews will be conducted before the Viva Voce
8. Each candidate should submit hardcopy (3 copies) and a soft copy to the Department. After the Evaluation of the project report one hard copy will be returned to the candidate.

CO-PO Mapping

CO/POS	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	
CO 1	M								
CO 2	S	M							
CO 3			M						
CO 4		S		M	M				
CO 5						S	S	S	
Weighted Percentage of Course Contribution to PSO					3.0	3.0	3.0	3.0	3.0

SEMESTER -VI

COURSECODE	COURSETITLE	L	T	P	C
231ACSSIST	Indian knowledge system	4	0	0	2

OBJECTIVES:

Establish, guide and monitor subject-wise interdisciplinary research groups comprising of researchers from institutes, centers and individuals. Create and promote popularization schemes. Facilitate funding of various projects and develop mechanisms to undertake research

Unit I: Introduction to Indian Knowledge System (IKS), Definition, Concept and Scope of IKS (4) 1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in ancient India and in modern India

Unit II: IKS and Indian Scholars, Indian Literature (8) 2.1 Philosophy and Literature (Maharishi Vyas, Manu, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhashkaracharya, Varahamihira and Brahmgupta) 2.3 Medicine and Yoga (Charak, Susruta, Maharishi Patanjali and Dhanwantri) 2.4 Sahitya (Vedas, Upvedas, Upavedas (Ayurveda, Dhanurveda, Gandharvaveda) Puran and Uprnishad) and shad darshan (Vedanta, Nyaya, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma and Meditation) 2.5 Shashtra (Nyaya, vyakarana, Krishi, Shilp, Vastu, Natya and Sangeet)

Unit III: Indian Traditional/tribal/ethnic communities, their livelihood and local wisdom(6) 3.1 Geophysical aspects, Resources and Vulnerability 3.2 Resource availability, utilization pattern and limitations 3.3 Socio-Cultural linkages with Traditional Knowledge System 3.4 Tangible and intangible cultural heritage.

Unit-IV

unique Traditional Practices and Applied Traditional Knowledge (8) 4.1 Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives 4.2 Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices

UNIT-V

Protection, preservation, conservation and Management of Indian Knowledge System (4) 5.1 Documentation and Preservation of IKS 5.2 Approaches for conservation and Management of nature and bio-resources 5.3 Approaches and strategies to protection and conservation of IKS

COURSE OUTCOMES:

- Under Ministry of Education, Government of India has established IKS division with a vision to promote interdisciplinary and transdisciplinary research on all aspects of IKS, and disseminate IKS knowledge for further innovations and societal applications

Course Code	Course Title	L	T	P	C
	Extension Activity	0	0	0	1

Course Code	Course Title	L	T	P	C
231SSCIM	Interview Skills Training and Mock Test	1	0	0	1



MASTER OF BUSINESS ADMINISTRATION (FULL TIME)

Choice Based Credit System

(With effect from the academic year 2023)

REVISED REGULATIONS

Program Educational Outcomes;

PEO 1 – Employability: To develop students with industry specific knowledge & skills to meet the industry requirements and also join Public sector undertaking through competitive examinations.

PEO 2 - Entrepreneur: To create effective business service owners, with a growth mindset by enhancing their critical thinking, problem solving and decision-making skills.

PEO3 – Research and Development: To instill and grow a mindset that focusses efforts towards inculcating and encouraging the students in the field research and development.

PEO 4 – Contribution to Business World: To produce ethical and innovative business professionals to enhance growth of the business world.

PEO 5 – Contribution to the Society: To work and contribute towards holistic development of society by producing competent MBA professionals.

Program Outcomes:

PO1: Problem Solving Skill: Application of tools & techniques relevant to management theories and practices in analyzing & solving business problems.

PO2: Decision Making Skill: Fostering analytical and critical thinking abilities for data-based decision making.

PO3: Ethical Value: Ability to develop value based leadership attributes.

PO4: Communication Skill: Ability to understand, analyze and effectively communicate global, economic, legal and ethical aspects of business.

PO5: Individual and Team Leadership Skill: Ability to be self-motivated in leading & driving a team towards achievement of organizational goals and contributing effectively to establish industrial harmony.

PO6: Employability Skill: Foster and enhance employability skills through relevant industry subject knowledge.

PO7: Entrepreneurial Skill: Equipped with skills and competencies to become a global entrepreneur.

PO8: Contribution to Society: Strive towards becoming a global influencer and motivating future generation towards building a legacy that contributes to overall growth of humankind.

PEO – PO MAPPING

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
PEO 1	Y	Y	Y	Y	Y	Y	Y	Y
PEO 2	Y	Y	Y	Y	Y		Y	Y
PEO3	Y	Y	Y	Y	Y	Y		y
PEO 4	Y	Y	Y	Y	Y	Y	Y	Y
PEO 5	Y	Y	Y	Y	Y	Y	Y	Y

Y - Yes

Template for PG Programmes

Semester-I	Credit	Semester-II	Credit	Semester-III	Credit	Semester-IV	Credit
1.1. Core-I	4	2.1. Core-IV	4	3.1. Core-VII	4	4.1. Core-X	4
1.2 Core-II	4	2.2 Core-V	4	3.2 Core-VII	4	4.2 Core-XI	4
1.3 Core – III	4	2.3 Core – VI	4	3.3 Core – IX	4	4.3 Core – XII	4
1.4 Elective (Generic / Discipline Centric)- I	3	2.4 Elective (Generic / Discipline Centric) – III	3	3.4 Elective (Generic / Discipline Centric) – V	3	4.4 Elective (Generic / Discipline Centric) – VI	3
1.5 Elective (Generic / Discipline Centric)-II	3	2.5 Elective (Generic / Discipline Centric)-IV	3	3.5 Core Industry Module	3	4.5 Project with Viva-Voce	3
1.6 Ability Enhancement Course- Soft Skill -1	2	2.6 Ability Enhancement Course - Soft Skill -2	2	3.6 Ability Enhancement Course- Soft Skill -3	2	4.6 Ability Enhancement Course- Soft Skill -4	2
Skill Enhancement Course SEC 1	2	2.7 Skill Enhancement Course SEC 2	2	3.7 Skill Enhancement Course – Term Paper and Seminar Presentation SEC 3	2	4.7 Skill Enhancement Course - Professional Competency Skill	2
				3.8 Internship/ Industrial Activity	2	4.8 Extension Activity	1
	22		22		24		23
	Total Credit Points						91

**MASTER OF BUSINESS ADMINISTRATION
CURRICULUM - (2023 ONWARDS)
COURSE STRUCTURE**

Sem No	Subject Code	Subject Title	L	T	P	C
I	23260AEC11	Management Principles and Business Ethics	4	1	0	4
I	23260AEC12	Managing Organizational Behaviour	3	1	0	4
I	23260AEC13	Accounting for Managers	4	1	0	3
I	23260AEC14	Entrepreneurship Development	3	1	0	3
I	23260AEC15	Legal Systems in Business	4	1	0	3
I	23260AEC16	Managerial Economics	4	1	0	3
I	23260SEC17	Executive Communication	2	-	0	2
		Total	24	6	0	22
II	23260AEC21	Applied Operations Research	3	1	0	3
II	23260AEC22	Human Resource Management	4	1	0	3
II	23260AEC23	Marketing Management	4	-	0	3
II	23260AEC24	Operations Management	3	-	0	3
II	23260AEC25	Financial Management	3	-	0	3
II	23260AEC26	Strategic Management	4	-	0	3
II	23260AEC27	International Business	3	-	0	3
II	23260SEC28	Research Methodology	2	-	0	2
II	23260SEC29	Business Etiquette	2	-	0	2
		Total	28	2	0	25
III	23260AEC31	Quantitative Techniques and Research Methods in Business	4	1	0	4
III	23260E-	Elective	3	-	0	3
III	23260E-	Elective	3	-	0	3
III	23260E-	Elective	3	-	0	3
III	23260E-	Elective	3	-	0	3
III	23260E-	Elective	3	-	0	3
III	23260E-	Elective	3	-	0	3
III	23260SEC38	Employability skills	3	1	0	2
III	23260SEC39	Leadership and Team Building Skills	2	1	0	2
III	23260SEC40	Summer Internship	-	-	0	3
		Total	27	3	0	29
IV	23260AEC41	Information Systems for Business	4	1	0	3
IV	23260PRW42	Project Work & Viva- Voce	20	5	0	12
		Total	24	6	0	15
Total Credit Programme			91			

III Sem Specialization Courses: Finance Management				
Sem	Paper no	Subject code	Sub title	Credit
III	1	23260EA32	Security Analysis and Portfolio Management	
III	2	23260EA33	Merchant Banking and Financial Services	3
III	3	23260EA34	Derivatives Management	3
III	4	23260EA35	Behaviour Finance	3
III	5	23260EA36	Capital Markets and Financial Services	3
III	6	23260EA37	International Financial Management	3
III Sem Specialization Courses: Marketing Management				
Sem	Paper no	Subject code	Sub title	Credit
III	1	23260EB32	Advanced Marketing Research and Consumer Behaviour	3
III	2	23260EB33	Advertising Management and Sales Promotion	3
III	3	23260EB34	Sales and Distribution Management	3
III	4	23260EB35	Digital Marketing	3
III	5	23260EB36	New Product Strategies	3
III	6	23260EB37	Strategic Marketing	3
III Sem Specialization Courses: Human Resource Management				
Sem	Paper no	Subject code	Sub title	Credit
III	1	23260EC32	Human Resources Development	3
III	2	23260EC33	Industrial and Labour Relations	3
III	3	23260EC34	Career Management	3
III	4	23260EC35	Emotional Intelligence for Managerial Effectiveness	3
III	5	23260EC36	Talent Management	
III	6	23260EC37	Stress Management	3
III Sem Specialization Courses: Logistics and Supply Chain Management				
Sem	Paper no	Subject code	Sub title	Credit
III	1	23260ED32	Supply Chain Management	3
III	2	23260ED33	Principles and Practice of Logistics Management	3
III	3	23260ED34	Inventory & Warehousing Management	3
III	4	23260ED35	Distribution Management	3
III	5	23260ED36	Logistics Infrastructure	3
III	6	23260ED37	Packing and material handling	3

III Sem Specialization Courses: Hospital Management				
Sem	Paper no	Subject code	Sub title	Credit
III	1	23260EE32	Health Policy and Health Care System	3
III	2	23260EE33	Hospital Planning and Administration	3
III	3	23260EE34	Hospital Records Management	3
III	4	23260EE35	Hospital Core Services	3
III	5	23260EE36	Hospital Support Services	3
III	6	23260EE37	Quality Assurance in Health Care	3
III Sem Specialization Courses: System Management				
III	1	23260EF32	Database Management System	3
III	2	23260EF33	System Analysis and Design	3
III	3	23260EF34	Decision Support System	3
III	4	23260EF35	Internet of Things	3
III	5	23260EF326	Software project and quality management	3
III	6	23260EF37	Data Warehousing	3

	EMPLOYABILITY
	ENTERPRENURSHIP
	SKILL DEVELOPMENT

SEMESTER I

SEM	ONE	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC11		4	0	1	4

Management Principles and Business Ethics	
Course Objectives	
C1	To familiarize the students to the basic concepts of management in order to aid in understanding how an organization functions.
C2	To provide insights on Planning & Decision Making
C3	To throw light on Organizing, Managing Change and Innovation
C4	To elucidate on Leadership, Communication and Controlling.
C5	To create awareness and importance of Business Ethics and Social Responsibility.
SYLLABUS	
UNIT	Details
I	Introduction: Nature of Management – Concepts and Foundations of Management- Managerial Functions- Management Skills- The Evolution of Management Thought – Tasks of a Professional Manager – Organizational Culture- Environment – Systems Approach to Management – Levels in Management – Disaster Management
II	Planning & Decision Making: Steps in Planning Process – Scope and Limitations – Short Term and Long Term Planning – Flexibility in Planning – Characteristics of a Sound Plan – Management By Objectives (MBO). Strategic Management Process Decision Making Process and Techniques. Business Models
III	Nature of Organizing: Organization Structure and Design - Authority Relationships – Delegation of Authority and Decentralization – Interdepartmental Coordinator – emerging Trends in corporate Structure, Strategy and Culture – Impact of Technology on Organizational design – Mechanistic vs. Adoptive Structures – Formal and Informal Organization. Span of control – Pros and Cons of Narrow and Wide Spans of Control – Optimum Span - Managing Change and Innovation.
IV	Leadership and Control: Leadership: Approaches to Leadership and Communication. Control: Concept of Control – Application of the Process of Control at Different Levels of Management (top, middle and first line). Performance Standards – Measurements of Performance – Remedial Action - An Integrated Control system in an Organization – Management by Exception (MBE) –
V	Business Ethics: Importance of Business Ethics – Ethical Issues and Dilemmas in Business - Ethical Decision Making and Ethical Leadership – Ethics Audit - Business Ethics and-CSR Models.
Course Outcomes	
Course Outcomes	On completion of this course, students will;
	Program Outcomes

CO1	Possess the knowledge on the basic concepts of management and understand how an organization functions.	PO4, PO6, PO8
CO2	Possess knowledge on planning & decision making.	PO1, PO2
CO3	Have insights on organizing, managing change and Innovation	PO5, PO6, PO7
CO4	Learn leadership, communication and controlling skills.	PO4, PO5
CO5	Have better understanding on business ethics and social responsibility.	PO3, PO8

Reading List

1.	https://deb.ugc.ac. In
2.	http://www.managementconcepts. Com
3.	International journal of Management Concepts and Philosophy
4.	Journal of Management, Sage Publications

References Books

1.	Mukherjee, K., Principles of Management, 2 nd Edition, Tata McGraw Hill Education Pvt. Ltd., 2009
2.	S. K. Mandal., Management Principles and practice, 3 rd Edition, Jaico Publishing House, Jan.2011.
3.	Griffin, R. W., Management, 11 th Edition, South-Western College Publication, January 2018.
4.	Koontz, H. and Weihrich, H., Essentials of Management: An International Perspective, 11 th Edition, Tata McGraw Hill Education Private Ltd., July 2020
5.	Certo, S C. and Certo, T, Modern Management, 13 th Edition, Prentice Hall, January 2014.
6.	Robbins, S and Coulter, M, 11 th Edition, Management, Prentice Hall, 11 th edition, January 2012
7.	Shaikh Ubaid, Disaster Management, Technical publications, 1 st edition, 2020

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		2		2
CO 2	2	3						
CO 3					2	2	2	
CO 4				3	3			
CO 5			3					3

3-Strong 2-Medium 1-Low

SEM	ONE	NATURE	CORE	L	P	T	C
COURSE CODE	23260AEC12			4	0	1	3

Managing Organizational Behaviour		
Course Objectives		
C1	To familiarize the students to the basic concepts of managing Organizational Behaviour in order to aid in understanding how an men behave in an organization.	
C2	To provide insights on Individual Differences, perception, learning, Attitudes values and motivation	
C3	To throw light on Group Dynamics and Interpersonal Communication	
C4	To elucidate on Leadership, Politics, Conflicts and Negotiation.	
C5	To create awareness and importance of work stress and Emotional Intelligence and its influence on employees in an organization.	
SYLLABUS		
UNIT	Details	
I	Introduction to Organizational Behaviour: Historical background of OB - Concept Relevance of OB – Contributing disciplines -to the field of OB, challenges and opportunities for OB, foundations of Individual Behaviour. Theory – social theory- Organizational Citizenship Behaviour	
II	Individual Difference - Personality – concept and determinants of personality – theories of personality – type of theories – trait theory – psycho analytic theory - social learning theory – Erikson’s stages of Personality Development Chris Argyris Immaturity to Maturity Continuum. Personality – Job fit. Perception: Meaning Process – Factors influencing perception – Attribution theory Learning: Classical, Operant and Social Cognitive Approaches – Managerial implications. Attitudes and Values: – Components, Attitude – Behaviour relationship, formation, values. Motivation: Early Theories of Motivation – Hierarchy of needs theory, Theory X and Theory Y, Two factor theory, McClelland’s theory of needs and Contemporary theories of motivation – Self – Determination theory, Job Engagement, Goal Setting theory, Self-efficacy theory, Re – inforcement theory, Equity theory, Expectancy theory.	
III	Group Dynamics – Foundations of Group Behaviour – Group and Team - Stages of Group Development–Factors affecting Group and Team Performance - Group Decision making Interpersonal Communication – Communication Process – Barriers to Communication– Guidelines for Effective Communication	
IV	Leadership – Trait, Behavioural and Contingency theories, Leaders vs Managers Power and Politics: Sources of Power – Political Behaviour in Organizations – Managing Politics. Conflict and Negotiation: Sources and Types of Conflict –Negotiation Strategies– Negotiation Process.	
V	Work Stress: Stressors in the Workplace – Individual Differences on Experiencing Stress - Managing Workplace Stress. Organizational Culture and Climate: Concept and Importance – Creating and Sustaining Culture. Emotional Intelligence, Work Life Integration Practices. Knowledge based enterprise- systems and Processes; Networked and virtual organizations.	
	Total	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes

CO1	Possess the knowledge on the basic concepts of managing Organizational Behaviour in order to aid in understanding how an men behave in an organization	PO4
CO2	Possess knowledge on Individual Differences, perception, learning, Attitudes values and motivation	PO3, PO6
CO3	Have insights on Group Dynamics and Interpersonal Communication	PO2, PO4, PO5
CO4	Learn Leadership, Politics, Conflicts and Negotiation.	PO5
CO5	Have better understanding on work stress and Emotional Intelligence and its influence on employees in an organization.	PO6, PO8

Reading List

1.	www.himpub.com
2.	https://iedunote.com/organisational-behaviour
3.	www.yourarticlelibrary.com/organisation/
4.	Journal of Organizational Behaviour – wiley Online Library

References Books

1.	Prasad .L.M., Organisational Behaviour ,Sultan Chand and Sons, 2019
2.	C.B.Guptha, A Textbook Of Organisational Behaviours ,S.Chand & Company,2019
3.	K. Aswattappa, Organisational Behaviour, Himalaya Publishing House, 12th Edition, 2016.
4.	Luthans, F. Organizational Behaviour, 12th Edition, Tata McGraw Hill Education, 2017.
5.	McShane, S.L., Von Glinow, M.A., and Sharma, R.R., Organizational Behaviour, 5th Edition, Tata McGraw-Hill Education Pvt. Ltd., 2011.
6.	Stephen P. Robins, Timothy A. Judge and Neharika Vohra, Essentials of Organisational Behaviour, 18th Edition, Pearson Education, 2019.

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2				
CO 2			3			3		
CO 3		3		3	3			
CO 4					3			
CO 5						3		2

3-Strong 2-Medium 1-Low

SEM	ONE	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC13		3	0	1	3

Accounting For Managers		
Course Objectives		
C1	To acquaint the students with the fundamentals of principles of financial, cost and management accounting	
C2	To enable the students to prepare, analyses and interpret financial statements	
C3	To acquaint the students with the tools and techniques of financial analysis	
C4	To enable the students to take decisions using management accounting tools.	
C5	To enable the students to prepare the reports with the accounting tools and facilitate managerial decision making.	
SYLLABUS		
UNIT	Details	
I	Financial Accounting – Meaning - Objectives - functions. Branches of Accounting: Financial, Cost and Management Accounting - Accounting Concepts and conventions. Journal – Ledger – Trial Balance – Preparation of Final Accounts: Trading, Profit and Loss Account and Balance Sheet (problems); International Accounting Standards - IFRS	
II	Financial Statement Analysis - Objectives - Techniques of Financial Statement Analysis: Common Size and Comparative Financial Statements, Trend analysis, Ratio Analysis. Fund Flow Statement - Statement of Changes in Working Capital - Preparation of Fund Flow Statement - Cash Flow Statement Analysis- Distinction between Fund Flow and Cash Flow Statement – problem.	
III	Marginal Costing - Definition - distinction between marginal costing and absorption costing - Break even point Analysis - Contribution, p/v Ratio, margin of safety - Decision making under marginal costing system-key factor analysis, make or buy decisions, export decision, sales mix decision- Problems.	
IV	Budget, Budgeting, and Budgeting Control - Types of Budgets - Preparation of Flexible and fixed Budgets, master budget and Cash Budget - Problems - Zero Base Budgeting.	
V	Cost Accounting : meaning – Objectives - Elements of Cost – Cost Sheet(Problems) – classification of cost – Cost Unit and Cost Centre – Methods of Costing – Techniques of Costing. Standard costing and variance analysis Reporting to Management – Uses of Accounting information in Managerial decision-making. Reporting-Accounting Standards and Accounting Disclosure practices in India; Exposure to Practical Knowledge of using Accounting software- Open Source.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the fundamentals of principles of financial, cost and management accounting	PO6

CO2	Be able to prepare, analyze and interpret financial statements	PO1, PO2, PO4, PO6, PO7
CO3	Be able to use the tools and techniques of financial analysis.	PO1, PO2, PO3, PO6, PO7
CO4	Be able to take decisions using management accounting tools.	PO1, PO2, PO6, PO7
CO5	Be able to prepare the reports with the accounting tools and facilitate and take managerial decisions.	PO2, PO3, PO4, PO6, PO7, PO8
Reading List		
1.	http://files.rajeshindukuristudyplace.webnode.com/200000014-9621c971b8/accounting%20for%20managers.pdf	
2.	http://shodhganga.inflibnet.ac.in/bitstream/10603/70588/9/09_chapter%201.pdf	
3.	http://educ.jmu.edu/~drakepp/principles/module6/capbudtech.pdf	
4.	https://www.researchgate.net/publication/313477460_concept_of_working_capital_management	
References Books		
1.	Gupta, A., Financial Accounting for Management: An Analytical Perspective, 5th Edition, Pearson, 2016.	
2.	Khan, M.Y. and Jain, P.K., Management Accounting: Text, Problems and Cases, 8th Edition, Tata McGraw Hill Education Pvt. Ltd., 2021.	
3.	Nalayiram Subramanian, Contemporary Financial Accounting and reporting for Management – a holistic perspective- Edn. 1, 2014 published by S. N. Corporate Management Consultants Private Limited	
4.	Horngren, C.T., Sundem, G.L., Stratton, W.O., Burgstahler, D. and Schatzberg, J., 16th Edition, Pearson, 2013	
5.	Noreen, E., Brewer, P. and Garrison, R., Managerial Accounting for Managers, 13th Edition, Tata McGraw-Hill Education Pvt. Ltd., 2009.	
6.	Rustagi, R. P., Management Accounting, 2nd Edition, Taxmann Allied Services Pvt. Ltd, 2011	

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1						2		2
CO 2	3	3		3		3	2	
CO 3	3	3	3			3	2	
CO 4	3	3				3	3	
CO 5		3	3	3		3	2	2

3-Strong 2-Medium 1-Low

SEM	FOUR	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC14			0	0	3

Entrepreneurship Development		
Course Objectives		
C1	To introduce students to entrepreneurship and its growth in India.	
C2	To impart knowledge on innovation, its types, role of technology in innovation, patents and licensing.	
C3	To orient the students on new venture creation	
C4	To enable students to prepare a feasible business plan	
C5	To give inputs on various types of financing available for new ventures.	
SYLLABUS		
UNIT	Details	
I	Introduction: The Entrepreneur – Definition – Characteristics of Successful entrepreneur. Entrepreneurial scene in India; MSME; Analysis of entrepreneurial growth in different communities – Case histories of successful entrepreneurs. Similarities and Distinguish between Entrepreneur and Intrapreneur.	
II	Innovation in Business: Types of Innovation – Creating and Identifying Opportunities for Innovation – Design Thinking- The Technological Innovation Process – Creating New Technological Innovation and Intrapreneurship – Licensing – Patent Rights – Innovation in Indian Firms	
III	New Venture Creation: Identifying Opportunities for New Venture Creation: Environment Scanning – Generation of New Ideas for Products and Services. Creating, Shaping, Recognition, Seizing and Screening of Opportunities. Feasibility Analysis: Technical Feasibility of Products and Services – Marketing Feasibility: Marketing Methods – Pricing Policy and Distribution Channels	
IV	Business Plan Preparation: Benefits of a Business Plan – Elements of the Business Plan – Developing a Business Plan – Guidelines for preparing a Business Plan – Format and Presentation; Start-ups and e-commerce Start-ups. Business Model Canvas	
V	Financing the New Venture: Capital structure and working capital Management: Financial appraisal of new project, Role of Banks – Credit appraisal by banks. Institutional Finance to Small Industries – Incentives – Institutional Arrangement and Encouragement of Entrepreneurship.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to know about growth of entrepreneurship in India	PO4, PO7
CO2	Gain knowledge on innovation, its types, role of technology in innovation, patents and licensing	PO7, PO8
CO3	Obtain knowledge on new venture creation	PO6, PO7
CO4	Be able to prepare a business plan	PO7, PO8

SEM	ONE	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC15		4	0	1	3

Legal Systems in Business	
Course Objectives	
C1	To create knowledge and understanding on law of contracts
C2	To describe about sale of goods and Negotiable instrument act
C3	To have an overall understanding about partnership act and company law.
C4	To familiarize various labor laws for effective administration of Human Resource of an organization.
C5	To provide insights and awareness about consumer protection act, Cyber-crimes, Intellectual property Rights.
SYLLABUS	
UNIT	Details
I	The Law of Contracts: Definition of Contract Offer and Acceptance – Essential Elements of a Valid Contract: Free Consent – Competency of Parties – Lawful Consideration – Legality of Object. Void, Voidable, Unenforceable and Illegal Contracts – Performance of Contracts – Privity of Contracts – Assignment of Contracts – By Whom Contract must be Performed – Time and Place of Performance – Performance of Reciprocal Promises – Contracts which need not be performed, Discharge of Contracts : By Performance, By Agreement, By Impossibility, By Lapse of Time, By Operation of Law and By Breach of Contracts – Remedies for Breach of Contracts.
II	Sale of Goods Act: Definition of a Sale and a Contract of Sale – Difference between (1) Sale and an Agreement to Sell (2) Sale and a Contract Form (3) Sale and Bailment (4) Sale and Mortgage of Goods (5) Sale and Time Purchase Conditions and Warranties – Passing of Property of Goods – Rights of an Unpaid Seller. Negotiable Instruments Act: Negotiable Instruments in General: Cheques, Bills of Exchange and Promissory Notes – Definition and Characteristics
III	Partnership Act: Evolution – Definition of Partnership – Difference between Partnership and Joint Family Business – Kinds of Partnerships – Registration – Rights and Liabilities of Partners – Dissolution. Company Law: Evolution of Company Form of Organisation – Companies Separate Legal Entity – Comparison of Company with Partnership and Joint Hindu Family Business – Kinds of Companies – Comparison of Private and Public Companies – Formation of Companies – General Idea About Memorandum and Articles of Association, Prospectus, Statement in lieu of Prospectus – Management of Companies – General Idea of Management of Companies – Officers, Meetings – Resolutions – Accountant and Audit – Winding up of Companies – General Idea of the Different Modes of Winding Up.
IV	Labour Law: Factories Act, Minimum Wages Act, Industrial Disputes Act, Employees Compensation Act, Payment of Bonus Act 1965. Payment of Gratuity Act 1972. ESI

	Act, Employees Provident Fund and Miscellaneous Provisions Act 1952, Maternity Benefits Act, Child labour Abolition & Regulation Act, 1986- Inter-state Migrant Workmen (Regulation of Employment & Conditions of services) Act 1979- Bonded Labour system (Abolition) Act 1976- Sexual Harassment of women at Workplace (Prevention, Prohibition & Redressal) Act 2013- Contract Labour (Regulation and Abolition) Act- Four Labour Codes and Rules-RTI Act 2005.	
V	Consumer Protection Act, Competition Act 2002, Cyber Crimes, IT Act 2008 – Intellectual Property Rights: Types of Intellectual Property – Trademarks Act 1999 – The Copyright Act 1957 – International Copyright Order, 1999 – Design Act, 2000; UNICITRAL – United Nations Commission on International Trade Law.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Have knowledge on understandings on law of contract.	PO4, PO6, PO7
CO2	Know the sale of Goods & Negotiable instrument act.	PO6
CO3	Have understandings on partnership and company law	PO6, PO7
CO4	Have familiarize with various labour laws.	PO5, PO6, PO7
CO5	Possess insights & awareness about consumer protection Act Cyber Crimes, Intellectual Property Rights.	PO8
Reading List		
1.	http://www.legalserviceindia.com/article/	
2.	http://www.freebookcentre.net/Law/Law-Books.html 2	
3.	https://www.mooc-list.com/course/business-law-wma	
4.	https://ilj.law.indiana.edu/	
References Books		
1.	Kapoor ND., Legal Systems in Business, Edition 2 (2021), Sultan Chand & Sons.	
2.	Rao, P.M., Mercantile Law, PHI Learning, 2011.	
3.	Majumdar, A. K. and Kapoor, G.K., Company Law, 15 th Edition, Taxmann Publications Pvt. Ltd., 2012.	
4.	Majumdar, A. K. and Kapoor, G.K., Company Law and Practice, 17 th Edition, Taxmann Publications Pvt. Ltd., 2012.	
5.	Intellectual Property Laws, Universal Law Publishing, 2012.	
6.	Daniel Albuquerque , Legal systems in Business, Oxford University Press India, 2 nd Edition, 2015.	

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		2	2	
CO 2						2		
CO 3						2	2	
CO 4					2	2	2	

SEM	ONE	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC16		4	0	1	3

Managerial Economics	
Course Objectives	
C1	To familiarize the students about managerial economics and to know the fundamental concepts affecting business decisions.
C2	To understand the concept of utility and demand analysis and demand forecasting
C3	To know about production function and market structure
C4	To have an idea and understanding about Macroeconomics like National Income, savings and investment, Indian economic policy and Planning.
C5	To Provide insights on Money Market, Inflation and Deflation, Monetary and Fiscal policies, FDI and cashless economy.
SYLLABUS	
UNIT	Details
I	Introduction: Definition of Managerial Economics. Decision Making and the Fundamental Concepts Affecting Business Decisions – the Incremental Concept, Marginalism, Equi-marginal Concept, the Time Perspective, Discounting Principle, Opportunity Cost Principle- Micro and Macro Economics.
II	Utility Analysis and the Demand Curve: Elasticity of Demand - Demand Analysis: Basic Concepts, and tools of analysis for demand forecasting. Use of Business Indicators: Demand forecasting for consumer, Consumer Durable and Capital Goods. Input-Output Analysis – Consumer Behavior-Consumer Equilibrium
III	The Production Function: Production with One Variable Input – Law of Variable Proportions – Production with Two Variable Inputs – Production Isoquants – Isocost Lines Estimating Production Functions- Returns to Scale– Economies Vs Diseconomies of Scale – Cost Concepts – Analysis of cost – Short and long run costs. Market Structure: Perfect and Imperfect Competition – Monopoly, Duopoly, Monopolistic Competition – Pricing Methods.
IV	Macro Economic Variables – National Income- Concepts – Gross Domestic Product, Gross National Product, Net National Product – Measurement of National Income, Savings, Investment - Business Cycles and Contracyclical Policies – Role of Economic Policy – Indian Economic Planning
V	Commodity and Money Market: Demand and Supply of Money – Money Market Equilibrium – Monetary Policy – Inflation – Deflation – Stagflation-Role of Fiscal Policies- Indian Fiscal Policies - Government Policy towards Foreign Capital and Foreign Collaborations – Globalization and its Impact. Cashless economy and digitalized cash transfers; Economic models and its steps; FEMA-GST-Industrial Policy in India and its effects on growth.

Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the basic concepts of managerial economics that helps the firm in decision making process.	PO2, PO4
CO2	Be familiar about the Basic concepts of Demand, Supply and Equilibrium and their determinants	PO4, PO6, PO7
CO3	Have better idea and understanding about production function and market structure	PO6, PO7
CO4	Have better insights about macroeconomics concepts like National income, Savings and Investment, Indian Economic Policy and planning	PO8
CO5	Possess better knowledge about Money market, Monetary and Fiscal policy, inflation and deflation, FDI and globalization and Cashless economy and digitalized cash transfers.	PO7

Reading List

1.	http://pearsoned.co.in/prc/book/paul-g-keat-managerial-economics-economic-tools-todays-decision-makers6e-6/9788131733530
2.	http://www.onlinevideolecture.com/mba-programs/kmpetrov/managerial-economics/?courseid=4207
3.	https://www.slideshare.net/dvy92010/nature-and-scope-of-managerial-economics-76225857
4.	The Indian Economic Journal - SAGE Journals

References Books

1.	1. Damodaran, S., Managerial Economics, 2nd Edition, Oxford University Press, 2011.
2.	Dwivedi, D.N., Managerial Economics, Vikas Publishing House, 2011.
3.	R. L. Varshney , K.L. Maheshwari., Managerial Economics, Sultan Chand & Sons, 2014.
4.	William F. Samuelson, Stephen G. Marks, Jay L., Zagorsky., Managerial Economics, Wiley Publishers, 9 th Edition (2021)
5.	H. L. Ahuja., Managerial Economics., Atlantic Publishers and distributors(P) Ltd., 2017.
6.	Dominick Salvatore, Managerial Economics: Principles and worldwide applications, 9E Adaptation, Oxford university press, 9 th Edition, 2020.

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		2		3				
CO 2				3		2	2	

CO 3						3	3	
CO 4								2
CO 5							2	

3-Strong 2-Medium 1-Low

SEM	ONE	NATURE	Soft Skills I	L	P	T	C
COURSE CODE		23260SEC17		2	0	026	2

Executive Communication		
Course Objectives		
C1	To acquire communication awareness they are going to get for the industry.	
C2	To make the customer realize that you can provide them with information and other essential things	
C3	To explore the skill of writing business proposals	
C4	To develop a plan for the meetings and interviews	
C5	To analyze the skills required for non-verbal communication	
SYLLABUS		
UNIT	Details	
I	UNIT 1- Communication: Meaning and Significance of Communication for Management- Types of Communication Factors Affecting Effectiveness of Communication- Barriers to Communication- Principles of Effective Communication Dyadic Communication- Face-to-face Communication. Other Modes of Communication.	
II	UNIT 11- Business Correspondence: Planning Business Messages: Analyzing the Task, Anticipating the Audience. Adapting the Message Organizing and Writing Business Messages: Patterns of organization, Use of Tools such as Mind Maps, Composing the Message- Norms for Business Letters Letters for Different Kinds of Situation: Personalized Standard Letters, Enquiries, Inviting Quotations, Sending Quotations, Placing Orders, Inviting tenders, Claim letters, Customers Complaints, Collection Letters, Sales Promotion Letters- Revising Business Messages: Revising for Clarity. Conciseness and Readability, Proof reading and Evaluating- Letters of application and resume.	
III	UNIT III- Business Reports and Proposals: Structure of Reports- Long and Short Reports: Formal and Informal Reports- Writing Research Reports- Technical Reports- Norms for Including Exhibits and Appendices- Writing Business Proposals.	
IV	UNIT IV- Conducting Meetings and Interviews: Procedure for Conducting Meetings- Preparing Agenda, Minutes and Resolutions- Conducting Seminars and Conferences- Procedure of Regulating Speech- Evaluating Oral Presentations Drafting Speech- Participating in Debates and Group Discussions- Presentation Skills- Fluency Development Strategies- Attending and Conducting Interviews- Listening.	
V	UNIT V- Non-verbal Communication: Personal Appearance- Posture- Body Language- Reading Nonverbal Messages- Use of Charts. Diagrams and Tables- Visual and Audio-visual Aids for Communication.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Understanding of theories and concepts, types and	PO4, PO6

	various modes of communication in organizations	
CO2	Development of skills on developing Business Correspondence	PO4, PO6
CO3	Development of skills on preparing Business Reports and Proposals	PO4, PO6
CO4	To draft effective business correspondence with brevity, and clarity in designing and developing clean and lucid organizing skills.	PO4, PO6
CO5	To demonstrate his/her verbal and non-verbal communication ability through presentations.	PO4, PO6
Reading List		
1.	https://www.skillsyouneed.com/ips/communication-skills.html	
2.	https://mtbt.fpg.unc.edu/more-baby-talk/10-ways-promote-language-and-communication-skills-infants-and-toddlers	
3.	http://skillopedia.com	
4.	https://www.habitsforwellbeing.com/9-effective-communication-skills	
References Books		
1.	Chaney, L. and Martin, J., Intercultural Business Communication. Person, 4 ed., 2008.	
2.	Chaturvedi, Business Communication, Person, 2 edition, 2011	
3.	Bovec L. Courtland and John V. Thill, Business Communication Today, 10 ed., Pearson Education, New Delhi, 2011.	
4.	American Management Association, The AMA Handbook of Business Writing: The Ultimate Guide to Style, Usage, Punctuation, Construction and Formatting, 2010.	
5.	Gerson, Sharan J., and Steven M Gerson, Technical Writing: Process and Product, Person Education, New Delhi, 2008	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				3		3		
CO 2				3		3		
CO 3				3		3		
CO 4				3		3		
CO 5				3		3		

3-Strong 2-Medium 1-Low

SEMESTER II

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC21		3	0	1	3

Applied Operations Research		
Course Objectives		
C1	To provide the students with introduction on OR and its models to aid in understanding its applicability in the various functional areas of management.	
C2	To understand the concept of linear programming models in determining profit maximization and cost minimization	
C3	To learn about various methods adopted in transportation and Assignments models.	
C4	To determine about inventory models, replacement models, job sequencing, networking model and Queuing model	
C5	To throw light on dynamic model and game models and the application of pure and mixed strategies in competitive environment.	
SYLLABUS		
UNIT	Details	
I	Introduction: Overview of operations research – Origin – Nature, scope & characteristics of OR – Models in OR – Application of operations research in functional areas of management	
II	Linear Programming Problem: Linear programming problem model – Formulation – Maximization & Minimization problem – Graphical method – Simplex method – Artificial variable – Primal & Dual.	
III	Transportation problem: Basic Solution – North / West corner Solution, LCM, VAM, Matrices method – Optimal Solution – Stepping stone method – Vogel's approximation method – Modi method – Degeneracy – Imbalance matrix. Assignment model: Hungarian method – Traveling salesmen problem.	
IV	Project Scheduling and Resource Management: Deterministic Inventory models – Purchasing & Manufacturing models – Probabilistic inventory models – Replacement model – Sequencing – Brief Introduction to Queuing models. Networking – Programme Evaluation and Review Technique (PERT) and Critical Path Method (CPM) for Project Scheduling- Crashing – Resource allocation and Resource Scheduling.	
V	Game Theory and Strategies: Games theory – two player zero sum game theory – Saddle Point –Mixed Strategies for games without saddle points – Dominance method – Graphical and L.P Solutions- Goal Programming; Simulation; Integer programming and Dynamic programming.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Obtain insight on the origin and nature of OR and also the application of various models of OR.	PO4, PO6
CO2	Learn about the graphical, Simplex, Big M and dual methods of Linear programming problem.	PO1, PO2, PO6, PO7

CO3	Be well versed with the concept of transportation and Assignments models	PO1, PO2, PO6, PO7
CO4	Have better understanding on inventory models, replacement models, job sequencing, networking model and Queuing model	PO1, PO2, PO6, PO7
CO5	Be imparted knowledge on the various methods of game model	PO2, PO7

Reading List

1.	www.cbom.atozmath.com
2.	http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_gt.pdf
3.	http://164.100.133.129:81/econtent/Uploads/Operations_Research.pdf
4.	https://www.journals.elsevier.com/operations-research-perspectives

References Books

1.	Anderson,D.R.,Sweeney,D.J.,Williams,T.A.andMartin,K.,AnIntroduction toManagementScience:QuantitativeApproachtoDecisionMaking,14 th Edition Paperback – 1, Cengage Learning India Pvt. Ltd., 2019
2.	Gupta,P.K.,andComboj,IntroductiontoOperationsResearch, S.Chand, 2014
3.	Hiller,F.,Liebermann,NagandBasu,IntroductiontoOperationsResearch,11 th Edition Paperback,TataMcGraw-HillPublishingCo.Ltd., 2021
4.	Khanna,R.B.,QuantitativeTechniquesforManagerialDecisionMaking,3 rd Edition – Paperback,New Age International Publishers, 2018
5.	Taha,H.A., OperationsResearch:AnIntroduction,10 th Edition,Pearson, 2019
6.	Vohra,N.D.,QuantitativeTechniquesinManagement, 5 th Edition,TataMcGrawHillEducationPvt.Ltd.,2017.

Sl. No	Course Objectives	No. of Hours
1	C1	08
2	C2	12
3	C3	12
4	C4	18
5	C5	10
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		2		
CO 2	3	2				2	2	
CO 3	3	3				3	2	
CO 4	3	3				2	2	
CO 5		3					2	

3-Strong 2-Medium 1-Low

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC22		4	0	1	3

Human Resource Management	
Course Objectives	
C1	To embark importance of HRM role, functions and need
C2	To assimilate theoretical and practical implications of HRP
C3	To critically use appropriate training tools
C4	To analyze and implement an effective performance management
C5	To extrapolate and design compensation management techniques
SYLLABUS	
UNIT	Details
I	Introduction: Introduction of Human Resource Management: Importance of Human Resources, Definition and Objectives of Human Resources Management, Qualities of a good HR manager – Evolution and growth of Human Resource Management in India. Functions of Human Resource Management. Strategic Human Resource Management (SHRM). Human Resource Policies: Need, type and scope, Human Resource Accounting and Audit- Gig Economy.
II	Human Resource Planning (HRP): Human Resources Planning: Long and Short term planning, Job Analysis, Skills inventory, Job Description, Job Specification and Succession Planning, Strategic Human Resource Planning. Recruitment and selection: Purposes, types and methods of recruitment and selection, Relative merits and demerits of the different methods, Recruitment and Social Media. Placement, Induction, Transfers, Promotions, Dismissal, Resignation, Exit Interviews, Reduction of attrition rate- Attrition and retention management
III	Training, Development & Career Management: Importance and benefits of Training and Development, Types of Training Methods, Executive Development Programs, Concept and process of Career Management; Competency mapping, Knowledge Management & Talent Management.
IV	Performance Management: Importance, process and Methods: Ranking, rating scales, critical incident method, Removing subjectivity from evaluation, MBO as a method of appraisal, Performance Feedback, Online PMS. Human Resource Information System; International Human Resource Management; Cross cultural diversity management; Hybrid work culture; work-life balance; Quality of work-life; HR Analytics.
V	Compensation Management: Wage and Salary Administration: Job Evaluation, Calculation of Wage, Salary, Prerequisites, Compensation Packages, Cost of Living Index and Calculation of Dearness Allowance, Rewards and Incentives; ESOP- Financial and non-financial incentives, Productivity-

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Gain an understanding of HRM policies and importance.	PO4, PO6
CO2	Implement appropriate HRP in workplace.	PO6
CO3	Apply feasible Training method and manage career progressions.	PO5, PO6, PO7
CO4	Demonstrate managing performance of human resources.	PO6, PO7
CO5	Design and justify compensation framework.	PO4, PO6, PO7

Reading List

1.	https://businessjargons.com/performance-management.html
2.	https://www.hr-guide.com/data/G400.htm
3.	https://www.managementstudyguide.com/training-development-hr-function.htm
4.	https://www.tandfonline.com/toc/rjih20/current

References Books

1.	Ashwathappa,K.,HumanResourceManagement,9 th Edition,TataMcGraw-HillEducation Pvt.Ltd.,2021.
2.	Ivanecevich, J.M., Human Resource Management, 12 th Edition, Tata McGraw-HillEducation Pvt.Ltd.,2020.
3.	Gary Dessler & Biju Varrkey,HumanResourceManagement,16 th Edition, PearsonIndiaPvt.Ltd.,2020.
4	DeCenzo,D.A.,Robbins S.P., Susan L Verhulst,HumanResourceManagement,11 th Edition,WileyIndiaPvt.Ltd.,2015.
5.	Leigh Thompson,Making the team, A guide for Managers, Pearson, 6 th Edition 2019.
6.	Gary Dessler,Fundamentals of Human Resource Management,Pearson, 4 th Edition 2017.

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				M		M		
CO 2						M		
CO 3					S	S	M	
CO 4						M	M	
CO 5				M		M	M	

3-Strong 2-Medium 1-Low

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE	23260AEC23			4	0	0	3

Marketing Management	
Course Objectives	
C1	To develop an understanding and enhance the knowledge about marketing theories, principles, strategies and concepts and how they are applied.
C2	To provide with opportunities to analyze marketing activities within the firm.
C3	To analyze and explore the buyer behavior pattern in marketing situations.
C4	To understand the branding, pricing and strategies in marketing a product.
C5	To upgrade the knowledge and awareness of Consumer Rights in the Market.
SYLLABUS	
UNIT	Details
I	Introduction: Marketing Management Philosophies – What is marketing- The concepts of marketing- Marketing and Services – Digital Marketing – Social Media Marketing – Current marketing challenges; Rural Marketing – E-Rural Marketing – International Marketing – Industrial Marketing.
II	Strategic Marketing– Marketing Management Process – Analysis of Marketing opportunities, Selecting Target Consumers, developing Marketing Mix Analysis of Macro and Micro environment Marketing Research as an Aid to Marketing, Marketing Research Process – Sales Forecasting –Techniques. Marketing Tactics, The Mix Service and Retail Marketing.
III	MIS: Marketing Information Systems- Customer Relationship Management (CRM) Customer Engagement Marketing – Sales force Automation- Marketing Analytics
IV	Buyer Behaviour: Factors Influencing Consumer Behaviour – Buying situation– Buying Decision Process – Industrial Buyer Behaviour. Market Segmentation : Targeting and Positioning – Competitive Marketing Strategies. Customer Life Cycle – Customer Life time Value, Product Portfolio Management.
V	Product Policies: Consumer and Industrial Product Decisions, Branding, Packaging and Labelling – New Product Development and Product Life Cycle Strategies, Pricing – Pricing Strategies and approaches, Promotion Decisions: Promotion Mix – Integrated Marketing Communication – Advertising and Sales Promotion - Sales Force Decisions, Selection, Training, Compensation and Control – Publicity and Personal Selling – Distribution Management – Channel Management: Selection, Co-operation and Conflict Management – Vertical, Horizontal and Multi-channel Systems Consumer Protection – Awareness of Consumer Rights in the Market Place.
Course Outcomes	
Course Outcomes	On completion of this course, students will;
	Program Outcomes

CO1	Understand the fundamental principles of marketing, marketing concepts and ideas.	PO4, PO6, PO7
CO2	Understand the organization's marketing strategy and marketing environment. Familiar with marketing research with forecasting techniques.	PO4, PO6
CO3	Understand the buyer behavior and market segmentation and competitive marketing strategies.	PO4, PO6, PO7
CO4	Think strategically about branding, pricing and marketing issues.	PO3, PO4, PO6, PO7
CO5	Familiar with Promotion decisions along with awareness on Consumer Rights in the Market Place.	PO6, PO8
Reading List		
1.	https://ocw.mit.edu/courses/sloan-school-of-management/15-810-marketing-management-fall-2010/lecture-notes/	
2.	https://cpbucket.fiu.edu/mar3023vd1131/syllabus.html	
3.	https://www.ama.org/ama-academic-journals/	
4.	https://www.emerald.com/insight/publication/issn/0736-3761	
References Books		
1.	Pillai & Baghawathy, Marketing Management, S.Chand , 2010.	
2.	Gupta Prachi, Aggarwal Ashita , et al., Marketing Management: Indian Cases, 1 st Edition, 2017	
3.	G.Shainesh Philip Kotler, et..al., Marketing Management; Indian Case Studies included, 16 th Edition, Pearson, 2022	
4.	Warren J. Keegan, Global Marketing Management, 8thEdition, Pearson, 2017.	
5.	Mullins,MarketingManagement: AStrategicDecisionMakingApproach,7 th Edition,McGraw-Hill,2010.	
6.	Philip Kotler and Keven Lane Keller, Marketing Management, 15 th Edition, Pearson, 2015	

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		2	2	
CO 2				3		3		
CO 3				2		2	2	
CO 4			2	2		2	2	
CO 5						2		2

3-Strong 2-Medium 1-Low

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE	23260AEC24			3	0	0	3

Operations Management	
Course Objectives	
C1	To understand the production function, production design & capacity planning,
C2	Exploring the Make or Buy decision, and thus understanding the role of inventory management
C3	To determine multiple plant location decisions and effective utilization of plant layout. To explain the models, concepts, and techniques adopted in the areas of inventory control and maintenance.
C4	To elucidate the importance and usefulness of work-study and quality control tools
C5	To provide insights on service operations management and waiting line analysis.
SYLLABUS	
UNIT	Details
I	INTRODUCTION: Operations Management- Nature, Scope, Historical Development, Functions- Long term Vs Short term issues- A Systems Perspective- Challenges- Manufacturing Trends in India-Production Design and Process Planning- Types of Production Processes- Plant Capacity-Capacity Planning- Make or Buy Decisions- Use of Crossover Chart for Selection Processes-Types of Charts used in Operations Management.
II	FACILITY DESIGN: Plant Location: Factors to be considered in Plant Location- Location Analysis Techniques- Choice of General Region, Particular community and Site- Multiple Plant Location Decision- Plant Location Trends. Layout of Manufacturing Facilities: Principles of a Good Layout- Layout Factors- Basic Types of Layout- Principles of Materials Handling- Materials Handling Equipment - Role of Ergonomics in Job Design.
III	INVENTORY CONTROL AND MAINTENANCE: Basic Inventory Models- Economic Order Quantity- Economic Batch Quantity- Reorder Point-Safety Stock- Inventory Costs-Classification and Codification of Stock- ABC Classification-Materials Requirement Planning (MRP)- JIT- Implications of Supply Chain Management. Maintenance: Preventive Vs Breakdown Maintenance- Group Replacement Vs Individual Replacement- Breakdown Time Distribution- Maintenance of Cost Balance- Procedure for Maintenance.
IV	DESIGN OF WORK SYSTEMS AND QUALITY CONTROL: Work Study- Objectives- Procedure- Method Study and Motion Study- Work Measurement- Time Study-Performance Rating- Allowance Factors- Standard Time- Work Sampling Techniques- Job Sequencing and Scheduling. Quality Control:

	Purpose of Inspection and Quality Control- Different Types of Inspection-Acceptance Sampling- The Operating Characteristic Curve- Control Charts for Variables and Attributes; Quality Circles; TQM – Six Sigma, Kaizen	
V	SERVICE OPERATIONS MANAGEMENT: Introduction to Services Management- Nature of Services- Types of Services- Service Encounter- Designing Service Organizations- Service Facility Location and Layout- Service Blueprinting-Waiting Line Analysis for Service Improvement- Service Processes and Service Delivery.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Understand the concepts of production and its design, capacity planning and make or buy decisions.	PO2, PO4
CO2	Be cognizant of the complexity involved in plant location decisions and utilization of plant layout.	PO2, PO7
CO3	Understand the Inventory models and the importance of maintenance techniques.	PO6, PO7
CO4	Be aware of work-study procedures and the importance on quality control tools	PO1, PO2, PO6, PO7
CO5	Have insight on service operations, service delivery and waiting line analysis.	PO2, PO6, PO7
Reading List		
1.	www.shsu.edu/~mgt ves/mgt560/ServiceManagement.ppt	
2.	zums.ac.ir/files/research/site/ebooks/strategy/operations-strategy.pdf	
3.	https://www.emerald.com/insight/publication/issn/0144-3577	
4.	https://www.inderscience.com/jhome.php?jcode=ijaom	
References Books		
1.	Aswathappa K and Shridhara Bhat K, Production and Operations Management, 2nd Edition, Himalaya Publishing House, 2021.	
2.	Mahadevan B, Operations Management Theory and Practice, 3rd Edition, Pearson Education, 2015.	
3.	Russel and Taylor, Operations and Supply Chain Management, 8th Edition, Wiley, 2021.	
4.	William J Stevenson, Operations Management, 14th Edition, McGraw Hill, 2021.	
5.	Gerard Cachon and Christian Terwiesch, Operations Management, 3 rd Edition, McGraw Hill, 2022.	
6.	Prof. K C Jain, Production and Operations Management, 1 st Edition, Wiley, 2022.	

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
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CO 1		2		2				
CO 2		2					2	
CO 3						2	2	
CO 4	2	2				2	2	
CO 5		2				2	2	

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC25		3	0	0	3

Financial Management	
Course Objectives	
C1	To create an understanding and familiarize the students to the fundamentals of financial management and create awareness on the various sources of finance.
C2	To create awareness on the various investment techniques on the investment decision making.
C3	To throw light on the concept of cost of capital and familiarize on the technique of identifying the right source of capital.
C4	To educate on the concept of capital structure and the create understanding on the concept of dividend.
C5	To create an understanding on the concept of working capital, its need, importance, factors and forecasting technique
SYLLABUS	
UNIT	Details
I	Introduction: Financial management: Definition and scope – objectives of Financial Management – Profit Maximization - wealth maximization - functions and role of finance manager. Sources of finance – short term – Bank Sources – Long term – Shares – Debentures – Preferred stock – Debt: Hire purchase, Leasing, Venture Capital – Private equity- International Financial Management- Financial Planning- Behavioural Finance- Capital Market- Money Market- Micro Finance- Financial Information System.
II	Investing Decision - Capital Budgeting Process – Techniques of Investment Appraisal: Pay Back Period; Accounting Rate of Return, Time Value of Money- DCF Techniques – Net Present Value, Profitability Index and Internal Rate of Return- Problems - Risk analysis in Capital Budgeting- Introduction to Fintech – Digital Currency - Cryptocurrency – Financial Modeling; Hurdle Rate.
III	Cost of Capital - Cost of specific sources of capital – Cost of equity capital – Cost of debt – Cost of preference – Cost of retained earnings - weighted average cost of capital. EBIT -EPS Analysis - Operating Leverage - Financial Leverage-problems.
IV	Capital structure - Factors influencing capital structure – optimal capital structure - capital structure theories – Net Income Approach – Net Operating Income (NOI) Approach – Modigliani - Miller(MM) Approach – Traditional Approach – Practical Problems. Dividend and Dividend policy: Meaning, classification - sources available for dividends -Dividend policy general, determinants of dividend policy.

V	Working Capital Management - Definition and Objectives - Working Capital Policies - Factors affecting Working Capital requirements - Forecasting Working Capital requirements (problems) - Cash Management - Receivables Management and - Inventory Management - Working Capital Financing - Sources of Working Capital and Implications of various Committee Reports- Financial Analytics.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be aware of the basic concepts of financial management and understand the various sources of finance.	PO4, PO6, PO7
CO2	Possess knowledge on investment decision making.	PO1, PO2, PO6, PO7
CO3	Have insights on the cost of capital and would have familiarized themselves with the technique of calculating the cost of capital.	PO2, PO7
CO4	Have learnt the concept of capital structure and dividend	PO6, PO7
CO5	Have good understanding on the concept of working capital, its need, importance, factors and the methods of forecasting it.	PO1,PO2, PO4, PO7
Reading List		
1.	https://accountingexplained.com/managerial/capital-budgeting/	
2.	http://www.studyfinance.com/lessons/workcap/	
3.	Journal of International Financial Management & Accounting	
4.	The Management Accountant Journal - icmai-rnj.in	
References Books		
1.	S.N.Maheswari, Financial Management, Sulthan Chand & Sons, 15th Edition, 2019	
2.	I.M. Pandey Financial Management, Vikas Publishing House Pvt. Ltd., 11th edition, 2018.	
3.	Van Horne, J.C., Financial Management and Policy, 13th Edition, Pearson, 2015.	
4.	Prasanna Chandra, Financial Management, 10th edition, Tata McGraw Hill, 2019	
5.	Periasamy, P., Financial Management, 4th Edition, Tata McGraw-Hill Education Pvt. Ltd., 2017.	
6.	Brigham, E.F. and Ehrhardt, M.C., Financial Management: Theory and Practice, 14th Edition, 2015.	

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		2	2	

CO 2	2	3				2	2	
CO 3		2					3	
CO 4						2	3	
CO 5	2	2		3			2	

3-Strong 2-Medium 1-Low

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC26		4	0	0	3

Strategic Management	
Course Objectives	
C1	To enable the students understand the importance of vision and mission in framing corporate strategy.
C2	To provide insights on how business is responsible socially and ethically.
C3	To highlight on the environmental analysis framework.
C4	To throw light on strategic formulation and strategic choice.
C5	To understand strategic implementation and strategic control.
SYLLABUS	
UNIT	Details
I	Introduction: Strategy – Strategic Management Process – Developing a Strategic Vision –Mission- Setting Objectives– Strategies and Tactics – Importance of Corporate Strategy – the 7-S Framework- Corporate Governance– Board of Directors: Role and Functions – Board Functioning – Top Management: Role and Skills.
II	Corporate Policy and Planning in India: Importance – Characteristics – Objectives - Policy Formulation and Development – Types of Business Policies- Implementation of Policies. Society and Business: Social Responsibility of Business –Corporate Governance and Ethical Responsibility.
III	Environmental Analysis: Environmental Scanning – Industry Analysis - The Synthesis of External Factors - Internal Scanning – Value Chain Analysis – SWOT Audit –Scenario planning- Creating an Industry Matrix.
IV	Strategy Formulation and Analysis: Strategy Formulation – Strategic Factors Analysis Summary Matrix (SFAS) Portfolio Analysis – Business Strategy- TOWS Matrix– Corporate Strategy – Functional Strategy – Strategic Choice – Generic, Competitive Strategies; ETOP, TOWS
V	Strategy Implementation: Strategy Implementation - Corporate Culture – Matching Organisation Structure to Strategy – Mergers and Acquisitions and Diversifications – Strategic Leadership Strategic Control: Measurement in Performance- Problems in Measurement of Performance- Strategy Audit-Strategic Control Process – Du Pont’s Control Model – Balanced Score Card – Michael Porter’s Framework for Strategic Management – Future of Strategic Management – Strategic Information System.
Course Outcomes	
Course	Program Outcomes
	On completion of this course, students will;

Outcomes		
CO1	Be able to frame vision and mission statements.	PO3, PO4, PO7
CO2	Be social and ethically responsible.	PO3, PO8
CO3	Possess insights on making environmental analysis.	PO3, PO8
CO4	Possess knowledge on learning strategic formulation & strategy choice.	PO2, PO5, PO7
CO5	Understanding strategic implementation and control.	PO4, PO5, PO7
Reading List		
1.	Strategic Management Journal – Wiley online Library	
2.	Journal of strategy and Management – Emerald Insight	
3.	Mastering Strategic Management – www.opentextbooks.org.hk	
4.	Mastering Strategic Management – www.saylor.org .	
References Books		
1.	V S P Rao, Strategic Management Text and Cases, 2nd edition 2013.	
2.	Kazmi, A., Strategic Management and Business Policy, 15th Edition, Tata McGraw-Hill Education, 2018.	
3.	Dess, G., Lumpkin, G.T. and Eisner, A., Strategic Management, 8th Edition, Tata McGraw-Hill, 2018.	
4.	Hill, C.W.L. and Jones, G.R., Strategic Management: An Integrated Approach, 9th Edition, Cengage Learning, 2012.	
5.	Pearce II, J., Robinson, R.B. and Mittal, A., Strategic Management: Formulation, Implementation and Control, 12th Edition, McGraw-Hill, 2017.	
6.	Wheelen, T.L. and Hunger, D., Strategic Management and Business Policy, 13th Edition, Pearson, 2012.	

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1			3	2			3	
CO 2			3					3
CO 3			2					3
CO 4		2			3			2
CO 5				3	3			3

3-Strong 2-Medium 1-Low

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE	23260AEC27			3	0	0	3

International Business	
Course Objectives	
C1	To understand and analyze international situations and evaluate international collaborative arrangements and strategic alliances.
C2	To apply knowledge of political, legal, economic and cultural country differences to develop competitive strategies in foreign, regional and global markets.
C3	To throw light on international trade theories and the management of business functional operations in an international context.
C4	To analyze and evaluate barriers, opportunities, market entry modes and the process of internationalization.
C5	To know about regional economic integration and contemporary issues in international business.
SYLLABUS	
UNIT	Details
I	Introduction: Introduction to International Business: Importance, nature and scope of International business-International Business Vs. Domestic Business; Tariff and non-tariff barriers- transition from Domestic to International Business; Advantages and disadvantages of International business; Balance of Payments; Balance of Trade; Balance of Current Account . Modes of entry into International Business- Internationalization process and managerial implications- Multinational Corporations and their involvement in International Business- Issues in foreign investments, technology transfer, pricing and regulations- International collaborative arrangements and strategic alliances- Counter Trade; Import-Export Process and Documentation.
II	International Business Environment and Cultural Differences: International Business Environment: Economic, Political, Cultural and Legal environments in International Business. Framework for analyzing International Business environment. Differences in Culture: Introduction — Social Structure — Religion — Language — Education — Culture and the Workplace — Cultural Change — Cross-cultural Literacy — Culture and Competitive Advantage.
III	International Trade Theory: Introduction — Mercantilism, Neo-Mercantilism — Theory of Absolute Advantage — Theory of Comparative Advantage — Heckscher-Ohlin Theory — The New Trade Theory — National Competitive Advantage — Porter's Diamond — General Agreement on Tariff and Trade (GATT)- World Trade Organization (WTO)- GATS-UNCTAD- Trade Blocks; Customs Union-EU- PTA- European Free Trade Area (EFTA)-Central American Common Market(CACM)-Latin American Free Trade

	Association(LAFTA)- North American Free Trade Agreement(NAFTA)- Association of South East Asian Nations(ASEAN)- CARICOM- GSTP-GSP-SAPTA-Indian Ocean RIM Initiative- BIMSTEC- Bretton Woods Twins- World Bank & IMF, International Finance Corporation- Multilateral Investment Guarantee Agency (MIGA).
IV	Global Trading and Investment Environment: Recent Trends in India's Foreign Trade- India's Commercial Relations and Trade Agreements with other countries- Institutional Infrastructure for export promotion in India- Export Assistance- Export Finance- Export Processing Zones (EPZs) - Special Economic Zones (SEZs)- Exports by Air, Post and Sea- Small Scale Industries (SSI) and Exports- Role of ECGC- Role of EXIM Bank of India- Role of Commodity Boards- Role of State Trading Agencies in Foreign Trade- STC, MMTC, etc. Foreign Exchange Market- Functions of Foreign Exchange Market- Foreign Direct Investments (FDI); forms of FDI — Horizontal and Vertical Foreign Direct Investment — Advantages of FDI to Host and Home Countries.
V	Contemporary Issues: Contemporary Issues in International Business- International Sales Contract- Major Laws- INCO terms- Standard Clauses of International Sales Contract- Role of Indian Council of Arbitration / International Chamber of Commerce in solving Trade disputes. Export Regulations: Procedure for export of goods- Quality Control and Pre- shipment Inspection- Customs Clearance- Port formalities- Exchange regulations for Export- Role of Clearing and Forwarding Agents.

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be aware of the international situations and evaluate international collaborative arrangements and strategic alliances.	PO2, PO4, PO7
CO2	Possessed knowledge of political, legal, economic and cultural country differences to develop competitive strategies in foreign, regional and global markets.	PO4, PO7
CO3	Know the various international trade theories and the management of business functional operations in an international context.	PO4, PO6, PO7
CO4	Be able to evaluate barriers, opportunities, market entry modes and the process of internationalization.	PO2, PO4, PO7
CO5	Have better understanding on regional economic integration and contemporary issues in international business.	PO6, PO7, PO8

Reading List

1.	www.internationalbusinesscorporation.com
2.	www.business-ethics.org
3.	https://www.jstor.org/journal/jintebusistud
4.	Journal of International Business and Management (JIBM)

References Books

1.	International Business: Competing in the Global Marketplace (SIE) 11th Edition – 14 August 2018 by Charles W. L. Hill (Author), G. Tomas M. Hult (Author), Rohit Mehtani (Author)
2.	International Business Fourth Edition By Pearson – 30 November 2017 by S. Tamer Cavusgil (Author), Gary Knight (Author), John Riesenberger (Author)
3.	Cherunilam, F., International Business: Text and Cases, 5th Edition, PHI Learning, 2010.
4.	Paul, J., International Business, 5th Edition, PHI Learning, 2010.
5.	Deresky, H., International Management: Managing Across Borders and Cultures,

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		2		3			2	
CO 2				M			2	
CO 3				3		3	3	
CO 4		3		3			3	
CO 5						3	3	3

3-Strong 2-Medium 1-Low

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE		23260SEC28		2	0	0	2

RESEARCH METHODOLOGY

LEARNING OBJECTIVES:

1. To acquaint the students with concepts and techniques used in Research
2. To enable them to apply this knowledge in business decision-making.
3. To give in-depth knowledge in emerging statistical tools in Research.
4. To explore the different methods of data collection
5. To prepare report catering to different industry requirements

UNIT I

Research : Meaning, Scope and Objectives, Types of Research, Steps Involved in Research Process, Definition of Research problem, Criteria for selecting research problem, techniques involved in defining research problem Research Design: Meaning and Types – Descriptive, Exploratory, Experimental Researches., Relevance of Research for decision making in various functional areas of Management.

UNIT II

Methods of data Collection – Census, Sample, Library. Techniques of Data Collection - Observation, Interview, Questionnaire and Schedules- Measurement and Scaling techniques - normal, ordinal, ratio, interval-Reliability and validity of the tool, pre-testing of the tool, Selection of samples, meaning of sample, Universe, Sampling Techniques and sample size determination for survey research, - Formulation of Hypothesis - Hypothesis testing.

UNIT III

Data Analysis: Editing, Coding of data: Univariate, Bivariate – Measures of dispersion -chi-square test - correlation and Regression analysis - Single and Two factor analysis of variance - Application of statistical tests - Parametric and Non-Parametric and interpretation of test results.

UNIT IV

Multivariate Analysis - Elementary concepts of factor analysis, Multiple Regression Analysis, Discriminate analysis, cluster analysis and conjoint analysis and their application in Management problem solving.

UNIT V

Presentation of Research results: Tabulation, Need, Nature and Guidelines- ungrouped and grouped frequency tables, Charts and Diagrams, organizing report: Report Writing, Types and Layout of Research Report, Mechanics of report writing, Precautions in Preparing the Research Report, Use of Executive summary, appendix and Bibliography.

Text Books:

1. C.R. Kothari- Research Methodology: Methods and Techniques, New Age International Publishers, Second edition.
2. Donald Cooper&Pamela Schindler , Business Research Methods, McGraw-Hill Education, 12th Edition.
3. S.P.Gupta - Statistical Methods, Sultan Chand & Sons, 28th Edition.

Reference Books

1. Aczel A.D. and Sounderpandian J., “Complete Business Statistics”, 6th edition, Tata McGraw – Hill Publishing Company Ltd., New Delhi, 2012.
2. Anderson D.R., Sweeney D.J. and Williams T.A., Statistics for business and economics, 11th edition, Thomson (South – Western) Asia, Singapore, 2012
3. Ken Black, Applied Business Statistics, 7th Edition, Wiley India Edition, 2012
4. N. D. Vohra, Business Statistics, Tata McGraw Hill, 2012.
5. Richard I Levin and David S.Rubin, Statistics for Management, Pearson Education, 7th Edition, 2011.
6. Srivatsava TN and Shailaja Rego, Statistics for Management, Tata McGraw Hill, 2008.

COURSE OUTCOMES:

Upon the completion of the course, students will be able

- CO1: To identify the research problem
 CO2: To apply the different methods of data collection in real life situations
 CO3: To understand the relevance of research for decision making
 CO4: To Analyze the data using statistical tools
 CO5: To Examine the Presentation of research results.

CO/PO	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	2	2	3	2	2
CO2	2	3	2	2	2	2	2	2
CO3	2	2	2	2	2	2	2	2
CO4	2	2	3	2	2	3	2	2
CO5	2	2	3	3	2	2	2	2

Strong – 3; Medium – 2; Poor - 1

SEM	TWO	NATURE	CORE	L	P	T	C
COURSE CODE	23260SEC29			2	0	0	2

Soft Skills II - Business Etiquette	
Course Objectives	
C1	To analyze the Business etiquette at workplace
C2	To determine the Principles of exceptional work behavior
C3	To explore Tech etiquette in using various telecommunication devices and channels
C4	To successfully handle Multi-cultural challenges
C5	To ascertain sensitivity to new and emerging issues in etiquette
SYLLABUS	
UNIT	Details
I	Introduction to business etiquette: The ABCs of etiquette Meeting and greeting scenarios-Developing a culture of excellence The principles of exceptional work behaviour - What is the role of Good Manners in Business?-Enduring Words Greetings and Introductions: Guideline for receptionists - Making introductions and greeting people- Greeting Components- The protocol of shaking hands- Introductions - Introductory scenarios - Addressing individuals.
II	Meeting and Boardroom Protocol: Guidelines for planning a meeting - Before the meeting - On the day of the Meeting - Guidelines for Attending the meeting - For the Chairperson- For attendees - For Presenters - Planning a power point presentation-Dealing with customer complaints. Entertaining Etiquette: Planning a meal- Issuing invitations -Business meals basics - Basics of table etiquette - Holding and resting utensils - Business dining etiquette - Multi-cultural Highlight: Japanese Dinning-Specific food Etiquette guidelines.
III	Telephone Etiquette: Cell phone etiquette-Social Media Usage etiquette- Telephone etiquette guidelines - Mastering the telephone courtesy - Active listening - Putting callers on hold -Transferring a call - Screening calls - Taking at message - Voice Mail-Closing the call - When Making calls - Closing the call- Handling rude or impatient clients Internet & email etiquette: Internet usage in the workplace Email- Netiquette - Online chat - Online chat etiquette - Online chat etiquette guidelines
IV	Business Attire & Professionalism: Business style and professional image - Dress code - Guidelines for appropriate business attire - Grooming for success - Guidelines for appropriate business attire - Grooming for success - Multicultural dressing

	Diversity Management- Gender Sensitivity- Social Media and Communication with colleagues-Preventing sexual harassment-Disability Etiquette: Basic disability Etiquette practices - Courtesies for wheelchair users Courtesies for blind or visually impaired - Courtesies for the deaf- People with speech impairments.		
V	Business Ethics: Ethics in the workplace - The challenge of business ethics - Creating an ethical compass - Business ethics and advantages - Ethical Issues - Conflict Management- Conflict resolution strategies - Choosing the appropriate gift in the business environment Multi-cultural challenges: Multi-cultural etiquette - Example of cultural sensitivity - Cultural differences and their effect on business etiquette- onsite projects-Cultural Highlight: China-Cultural Highlight: India.		
Total		30	
Course Outcomes			
Course Outcomes	On completion of this course, students will;	Program Outcomes	
CO1	Learn using business etiquette at work place	PO4, PO6, PO7	
CO2	Be able to acquire knowledge about the Principles of exceptional work behaviour	PO4, PO6, PO7	
CO3	Be able to enhance their knowledge of latest Tech etiquette in using various telecommunication devices and channels.	PO4, PO6, PO7	
CO4	Get familiarized with the Successful handling of Multi-cultural challenge	PO4, PO6, PO7	
CO5	Become sensitive to new and emerging issues in etiquette	PO4, PO6, PO7	
Reading List			
1.	https://accountingexplained.com/managerial/capital-budgeting/		
2.	http://www.studyfinance.com/lessons/workcap/		
3.	Journal of International Financial Management & Accounting		
4.	The Management Accountant Journal - icmai-rnj.in		
References Books			
1.	Gonda, C. M. (2016) Master of Business Etiquette: The Ultimate Guide to Corporate Etiquette and Soft Skills Embassy Books, First Edition.		
2.	Mehra, S. K. (2012) Business Etiquette A Guide For The Indian Professional. Noola: HarperCollins		
3.	Pachter, B. (2013). The Essentials of Business Etiquette: How to Greet, Eat, and Tweet Your Way to Success (1) edition New York: McGraw-Hill Education.		
4.	Past, K. (2008). Indian Business Etiquette: 1 (First edition). Ahmedabad Jaico Publishing House.		
5.	Travis, R. (2013). Tech Etiquette: OMG, 2 Edition, RLT Publishing.		
6.	Gonda, C. M. (2016) Master of Business Etiquette: The Ultimate Guide to Corporate Etiquette and Soft Skills Embassy Books, First Edition.		

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		2	2	
CO 2				2		2	2	
CO 3				2		2	2	
CO 4				2		2	2	
CO 5				2		2	2	

3-Strong 2-Medium 1-Low

SEMESTER III

SEM	ONE	NATURE	CORE	L	P	T	C
COURSE CODE		23260AEC31		3	0	1	4

Quantitative Techniques and Research Methods in Business	
Course Objectives	
C1	To provide the students with an introduction to probability theory and discuss how probability calculations may facilitate their decision making.
C2	To construct a coherent research proposal that includes an abstract, literature review, research questions, ethical considerations and methodology.
C3	To understand the basic statistical tools for analysis & interpretation of qualitative and quantitative data.
C4	To recognize the principles and characteristics of the multivariate data analysis techniques.
C5	To become familiar with the process of drafting a report that poses a significant problem
SYLLABUS	
UNIT	Details
I	Introduction: Probability - Rules of probability- Probability distribution; Binomial, Poisson and Normal Distributions, their applications in Business and Industrial Problem- Baye's Theorem and its applications - Decision Making under risk and uncertainty; Maximax, Maximin, Regret Hurwitz and Laplace Criteria in Business and Decision Making - Decision tree.
II	Research Methods: Research - Definition - Research Process - Research Design – Definition- Types Of Research Design - Role of Theory in Research - Variables in Research – Objectives - Hypothesis -Types of Data; Preliminary Vs Secondary- Methods of Primary Data Collection; Survey, Observation, Experiments - Construction Of Questionnaire - Questionnaire Schedule- Validity and Reliability of Instruments - Types of Scales; Nominal, Ordinal, Interval - Types of Attitude Measurement Scales – Sampling Techniques; Probability And Non probability Techniques- Optimal Sample Size determination.
III	Data Preparation and Analysis: Data Preparation - Editing –Coding- Data Entry- Data Analysis- Testing Of Hypothesis Univariate and Bivariate Analysis - Parametric And Nonparametric Tests and Interpretation of Test Results- Chi-Square Test- Correlation; Karl Pearson's Vs Correlation Coefficient and Spearman's Rank Correlation- Regression Analysis - One Way and Two Way Analysis of Variance.
IV	Multivariate Statistical Analysis: Exploratory and Confirmatory Factor Analysis - Discriminant Analysis- Cluster Analysis -Conjoint Analysis -Multiple Regression- Multidimensional Scaling- Their Application In Marketing Problems -Application of Statistical Software For Data Analysis- SEM Analysis
V	Report Writing and Ethics in Business Research: Research Reports- Different Types -Report Writing Format- Content of Report- Need For Executive Summary-

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to develop problem-solving techniques needed to accurately calculate probabilities.	PO1, PO2, PO6, PO7
CO2	Be able to devise research methods, techniques and strategies in the appropriate manner for managerial decision making and conduct research for the industry.	PO4, PO6
CO3	Be able to apply and interpret the different types of quantitative and qualitative methods of data analysis.	PO4, PO6
CO4	Be able to use multivariate techniques appropriately, undertake multivariate hypothesis tests, and draw appropriate conclusions.	PO4, PO6
CO5	Be able to present orally their research or a summary of another's research in an organized, coherent, and compelling fashion.	PO4, PO6

Reading List

1.	https://www.dartmouth.edu/~chance/teaching_aids/books_articles/probability_book/amsbook.mac.pdf
2.	https://study.com/academy/topic/probability.html
3.	https://onlinecourses.nptel.ac.in/noc18_ma07/preview
4.	https://hbr.org/1964/07/decision-trees-for-decision-making

References Books

1.	Kumar, R., Research Methodology: A Step-by-Step guide for Beginners, Sage, South Asia, 4th Edition, 2014.
2.	Srivastava, T.N. and Rego, S., Statistics for Management, 2nd Edition, Tata McGraw Hill, 3rd Edition, 2016.
3.	Cooper, D.R., Schindler, P. And Business Research Methods, Tata- McGraw Hill, 12th Edition, 2012.
4.	Cooper, D.R., Schindler, P. and Sharma, J.K., Business Research Methods, 11th Edition, Tata-McGraw Hill, 12 th Edition, 2018.
5.	Johnson, R.A., and Wichern, D.W., Applied Multivariate Statistical Analysis, PHI Learning Pvt. Ltd., 6 th Edition, 2012.
6.	Anderson, Sweeny, Williams, Camm and Cochran, Statistics for business and Economics, Cengage Learning, New Delhi, 13th Edition, 2017

Sl. No	Course Objectives	No. of Hours
1	C1	17
2	C2	10
3	C3	15
4	C4	09
5	C5	09
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3				3	3	
CO 2				3		3		

CO 3				2		2		
CO 4				2		2		
CO 5				2		3		

SEM	THREE	NATURE	SOFT SKILL	L	P	T	C
COURSE CODE	23260SEC38			3	0	1	2

EMPLOYABILITY SKILLS		
Course Objectives		
C1	To learn about the employability skills	
C2	To understand dimensions of task oriented skills	
C3	To study on critical problem-solving techniques	
C4	To develop employability skills	
C5	To understand the logical and reasoning skills	
SYLLABUS		
UNIT	Details	
I	INTRODUCTION TO EMPLOYABILITY SKILLS Meaning – Definition – Hard skills and soft skills –Employability skills and vocational skills – Employability and employment – Employability attributes.	
II	UNPACKING EMPLOYABILITY SKILLS Embedded employability skills – Dimensions of competency – Task skills –Task Management skills – Contingency Management skills – Job/Role Environment skills.	
III	INTER – RELATIONSHIPS OF EMPLOYABILITY SKILLS Communication – Team work – Problem solving – Initiative and Enterprise – Planning and Organizing – Self management Learning – Technology.	
IV	RESUME WRITING Meaning – Features of good resume – Model (Exercise). Etiquettes – Dress, Cleanliness, Etiquettes to be followed inside the employment seekingprocess.	
V	Arithmetic and Logical Reasoning Skills – Exercise.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Acquire employability skills	PO4, PO6, PO7
CO2	understand dimensions of task oriented skills	PO4, PO6, PO7
CO3	study on critical problem-solving techniques	PO4, PO6, PO7
CO4	develop employability skills	PO4, PO6, PO7
CO5	understand the logical and reasoning skills	PO4, PO6, PO7
Reading List		
1.	https://www.jobjumpstart.gov.au/article/what-are-employability-skills	
2.	https://www.simplilearn.com/why-are-employability-skills-important-article	

3.	https://blog.hubspot.com/marketing/employability-skills
4.	https://www.indeed.com/career-advice/finding-a-job/employability-skills
References Books	
1.	Soft Skills, Dr. K. Alex
2.	Winning Interview Skills, Compiled & Edited by J.K. Chopra.
3.	A Modern Approach to Verbal and Non- Verbal Reasoning, R. S. Aggarwal.
4.	Fafinski, S., Finch, E. (2014). Employability Skills for Law Students. United Kingdom: OUP Oxford.
5.	Trought, F. (2017). Brilliant Employability Skills: How to Stand Out from the Crowd in the Graduate Job Market. United Kingdom: Pearson Education Limited.
6.	Chaita, M. V. (2016). Developing Graduate Employability Skills: Your Pathway to Employment. United States: Universal Publishers.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				3		3		
CO 2				3		3		
CO 3		2		3		3		
CO 4				3	2	3	1	
CO 5				3		3		

3-Strong 2-Medium 1-Low

SEM	THREE	NATURE		L	P	T	C
COURSE CODE	23260SEC39			3	0	1	2

Leadership & Team Building Skills		
Course Objectives		
C1	To understand the characteristics, style, traits of leaders, and theories of leadership.	
C2	To learn more about self-leadership and developing team-building skills through case studies and examples.	
C3	To understand how to form, manage and lead the team.	
C4	To understand the measures of conflict in a team	
C5	To explore team roles & processes in developing and managing a team	
SYLLABUS		
UNIT	Details	
I	Leadership Theories: Nature of leadership theories & models of leadership - attributes of effective leaders - traits of leadership - interpersonal competence & leadership	
II	Leadership Styles: Leadership qualities -styles of leadership -attitudes-role models & new leadership - cultural differences and diversity in leadership - leader behaviour leadership in different countries- leadership ethics & social responsibility.	
III	Leadership Skills: Leadership skills - Leadership & management - transactional & transformational in leadership -Strength based leadership in practice - Tasks & Relationship approach in leadership - influence tactics of leaders- motivation and coaching skills. Establishing constructive climate- listening to out group members- communication and conflict resolution skills.	
IV	Team Work: Working in group & teams - characteristics of effective team- types- team development: Tuckman's team development stages- Belbin team roles - Ginnett - team effectiveness leadership model.	
V	Exploring team roles & processes: mapping the stages of group development - Building: and developing teams-overcoming resistance coping and conflict and Ego-leading a team managing meetings.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Critical understanding of theories and concepts of leadership and teamwork in organizations	PO4, PO5, PO6, PO7
CO2	Critical awareness of the importance of teamwork and development of the skills for building effective teams	PO4, PO5, PO6, PO7
CO3	Understanding of the techniques and practical understanding of how to apply theories and concepts to improve leadership skills.	PO2, PO4, PO5, PO6, PO7
CO4	Development of skills in effective leadership and	PO4, PO5, PO6, PO7

	professional communication	
CO5	Demonstrate effective written communication skills for plans, strategies and outcomes.	PO4, PO6, PO7
Reading List		
1.	Uday Kumar Halder, Leadership and Team Building,	
2.	D.K. Tripathy, Team Building and Leadership with Texts and Cases, Himalaya Publishing House, 2014	
3.	International Journal on Leadership, Publishing India Group	
4.	International Journal of Organizational Leadership, CIKD	
References Books		
1.	Gonda, C. M. (2016) Master of Business Etiquette: The Ultimate Guide to Corporate Etiquette and Soft Skills Embassy Books, First Edition.	
2.	Mehra, S. K. (2012) Business Etiquette A Guide For The Indian Professional. Noola: HarperCollins	
3.	Pachter, B. (2013). The Essentials of Business Etiquette: How to Greet, Eat, and Tweet Your Way to Success (1) edition New York: McGraw-Hill Education.	
4.	Past, K. (2008). Indian Business Etiquette: 1 (First edition). Ahmedabad Jaico Publishing House.	
5.	Travis, R. (2013). Tech Etlquette: OMG, 2 Edition, RLT Publishing.	
6.	Gonda, C. M. (2016) Master of Business Etiquette: The Ultimate Guide to Corporate Etiquette and Soft Skills Embassy Books, First Edition.	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				3	3	3	3	
CO 2				3	3	3	3	
CO 3		3		3	3	3	3	
CO 4				3	3	3	3	
CO 5				3		3	3	

3-Strong 2-Medium 1-Low

ELECTIVE
FINANCE MANAGEMENT

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EA32			3	0	0	3

Security Analysis and Portfolio Management	
Course Objectives	
C1	To provide insight about the relationship of the risk and return and how risk should be measured to bring about a return according to the expectations of the investors in investment avenues and securities market.
C2	To provide an overview of the operation of the securities markets and the mechanics of trading securities in stock exchanges.
C3	To ensure acquaintance of in-depth understanding of fundamental analysis tools to make optimum investment decision.
C4	To analyze stock price behavior in market, that is affected by various factors by calculating various technical indicators using Technical Analysis.
C5	To enable the students with a basic introduction to portfolio theory and study various methods of modeling the risk associated with stock investment.
Syllabus	
UNIT	Details
I	Investment - Concept of investment-importance-alternate forms of investment-LIC schemes-bank deposits-government securities-mutual fund schemes-post office schemes-provident fund-company deposits-real estate- Gold and Silver-Growth adjusted value investing strategy; G-Secs; P-note investments. Concepts of risk and return, measurement of risk is measured in terms of standard deviation and variance, the relationship between risk and return.
II	Securities Market - Investment Environment; Financial Market - Segments – Types - Participants in financial Market – Regulatory Environment, Primary Market – Methods of floating new issues, Book building – Role of primary market – Regulation of primary market, Stock exchanges in India – BSE, OTCEI, NSE, ISE, and Regulations of stock exchanges – Trading system in stock exchanges –SEBI.ESG, Stop loss, Fat finger trades, circuit breaker, T+1 and T+2 settlement, Funding of Social Sector; open interest volume and prices; free float in listed companies; Algo trading; Block Chain Technology.
III	Fundamental Analysis - Economic Analysis – Forecasting techniques. Industry Analysis; Industry classification, Industry life cycle – Company Analysis. Measuring Earnings – Forecasting Earnings – Applied Valuation Techniques – Graham and Dodds investor ratios.
IV	Technical Analysis - Fundamental Analysis Vs Technical Analysis – Charting methods – Market Indicators. Trend –Trend reversals – Patterns - Moving Average – Exponential moving Average – Oscillators – Market Indicators – Efficient Market theory.
V	Portfolio Management -Portfolio analysis –Portfolio Selection –Capital Asset Pricing model – Portfolio Revision –Portfolio Evaluation
Course Outcomes	
Course Outcomes	On completion of this course, students will;
	Program Outcomes

CO1	Understand the role of Risk Return propositions in securities analysis such as fixed income securities, preference shares and ordinary shares.	PO2, PO6, PO7
CO2	Explain the apprehend role, functions and key players in the securities market and the trading system of the stock market	PO2, PO4, PO6, PO7
CO3	Analyze the investment decisions with the help of fundamental analysis techniques.	PO2, PO4, PO7, PO8
CO4	Appraise the stock price movements and its behavior with the help of technical analysis techniques.	PO4, PO6 PO7
CO5	Write the benefit of diversification of holding a portfolio of assets, and the importance played by the market portfolio.	PO6, PO7

Reading List

1.	Falguni, H. Pandya, Security Analysis and Portfolio Management, PHI Learning, 2015
2.	Ambika Prasad Dash, Security Analysis and Portfolio Management, I.K. International, 2009
3.	The Journal of Portfolio Management, Springer
4.	Financial Markets and Portfolio Management, Scimago Journal and Country Rank

References Books

1.	Kevin, S., Security Analysis and Portfolio Management, PHI Learning, Second Edition, 2015.
2.	Prasanna Chandra, P., Investment Analysis and Portfolio Management, Tata McGraw-Hill Education, 5th Edition, 2017.
3.	Donald E. Fischer & Ronald J. Jordan, Security Analysis & Portfolio Management, PHI Learning., New Delhi, 8th edition, 2018.
4.	Khatri, D.K., Security Analysis and Portfolio Management, Macmillan Publishers India, First Edition, 2014.
5.	Ranganathan, M. and Madhumathi, R., Security Analysis and Portfolio Management, 2ndEdition, Pearson, 2015.
6.	Reilly, F. and Brown, K. C., Analysis of Investments and Portfolio Management, Cengage Learning, 11th Edition, 2019.

Sl. No	Course Objectives	No. of Hours
1	C1	09
2	C2	09
3	C3	09
4	C4	09
5	C5	09
	Total	45

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3				3	3	
CO 2		3		2		3		
CO 3		3		3		2		
CO 4				2		3	3	

CO 5						2	3	
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3-Strong 2-Medium 1-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EA33			4	0	0	3

Merchant Banking and Financial Services	
Course Objectives	
C1	To enable a better understanding of the financial structure in India and various regulations in the Merchant Banking domain and also throw light on the rules and regulations governing the Indian securities market.
C2	To familiarize the students with public issue management mechanism, role of issue manager, SEBI guidelines and marketing of securities.
C3	To create an understanding on the trends in financial services, merger and acquisition, portfolio management services and credit rating.
C4	Provide exposure to fund based financial services such as leasing and hire purchasing, financial evaluation.
C5	Students can understand other fund based financial services such as consumer credit, real estate financing, bill discounting, factoring and venture capital.
SYLLABUS	
UNIT	Details
I	Merchant Banking: Introduction–An Overview of Indian Financial System–Merchant Banking in India–Recent Developments and Challenges ahead – Institutional Structure – Functions of Merchant Bank - Legal and Regulatory Framework –Relevant Provisions of Companies Act- SERA- SEBI Guidelines - FEMA, etc. –Relation with Stock Exchanges and OTCEL.
II	Issue management: Role of Merchant Banker in Appraisal of Projects, Designing Capital Structure and Instruments –Issue Pricing – Book Building – Preparation of Prospectus – Selection of Bankers – Advertising Consultants etc.- Role of Registrars –Bankers to the Issue, Underwriters, and Brokers. – Offer for Sale – Green Shoe Option–E-IPO, Private Placement–Bought out Deals–Placement with FIs, MFs, FIIs, etc. Off-Shore Issues.–Issue Marketing–Advertising Strategies – NRI Marketing–Post Issue Activities.
III	Fee based financial services: Mergers and Acquisitions-Portfolio Management Services – Credit Syndication –Credit Rating – Business Valuation.
IV	Fund based financial services: Leasing and Hire Purchasing Basics of Leasing and Hire purchasing–Financial Evaluation.
V	Other fund based financial services: Consumer Credit – Credit Cards – Real Estate Financing–Bills Discounting – factoring and Forfeiting–Venture Capital.
Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	Recognize the financial structure in India and various regulations in the Merchant Banking Domain. Recall
	PO4, PO6

	the rules and regulations governing the Indian securities market.	
CO2	Identify the public issue management mechanism, various forms of issues, role of issue manager, SEBI guidelines and marketing of securities.	PO2, PO6
CO3	Appraise the recent trends in financial services, merger and acquisition, portfolio management services and credit rating.	PO2, PO4, PO6
CO4	Estimate on the fund based financial services such as leasing and hire purchasing, financial evaluation.	PO2, PO6
CO5	Plan on other fund based financial services such as consumer credit, real estate financing, bill discounting, factoring and venture capital.	PO4, PO6

Reading List

1.	Swati Dawan, Merchant Banking and Financial Services, Mcgraw Hill Education, 2011
2.	Pathak Barthi, Indian Financial System, 5 th Edition, Pearson Education, 2018
3.	Indian Journal of Finance, ISSN: 0973-8711, Researchgate
4.	Journal of Corporate Finance, Elsevier

References Books

1.	M. Y. Khan, Financial Services, Tata McGraw-Hill, 12 th Edition, 2012
2.	Nalini Prava Tripathy, Financial Services, PHI Learning, 2011.
3.	Machiraju, Indian Financial System, Vikas Publishing House, 2 nd Edition, 2010.
4.	J. C. Verma, A Manual of Merchant Banking, Bharath Publishing House, New Delhi,
5.	Varshney P. N. & Mittal D. K., Indian Financial System, Sultan Chand & Sons, New Delhi.
6.	Sasidharan, Financial Services and System, Tata McGraw Hill, New Delhi.

Sl. No	Course Objectives	No. of Hours
1	C1	09
2	C2	09
3	C3	09
4	C4	09
5	C5	09
	Total	45

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		2		
CO 2		2				2		
CO 3		2		2		2		
CO 4		2				2		
CO 5				2		2		

3-Strong 2-Medium 1-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EA34			3	0	0	3

Derivatives Management		
Course Objectives		
C1	To familiarize and enable the students to understand the fundamentals of Derivatives and its types.	
C2	To throw light on forward and futures contract.	
C3	To educate the students on Options.	
C4	To elucidate the various Option Pricing models.	
C5	To educate the students on the indices of various derivative instruments	
SYLLABUS		
UNIT	Details	
I	Introduction: Derivatives – Definition –Types – participants and functions-Forward Contracts – Futures Contracts – Options – Swaps – Differences between Cash and Future Markets – Types of Traders – OTC and Exchange Traded Securities – Types of Settlement – Uses and Advantages of Derivatives, Risks in Derivatives.	
II	Forward contracts – Futures contracts – structure of forward & futures markets -Types of Futures Contracts -Margin Requirements – Marking to Market – Hedging using Futures — Securities, Stock Index Futures, Currencies and Commodities – Delivery Options – Relationship between Future Prices, Forward Prices and Spot Prices.	
III	Options -Definition – Exchange Traded Options, OTC Options – Specifications of Options – Call and Put Options – organized options trading – listing requirements – contract size – exercise prices – expiration dates – position & exercise limits -American and European Options – Intrinsic Value and Time Value of Options – Option payoff, options on Securities, Stock Indices, Currencies and Futures – Options pricing models –Differences between future and Option contracts.	
IV	Principles of Option pricing – Put Call Parity relationship – Option pricing models – The Black Scholes Model – The Binomial model – Principles of forward and future pricing – the cost of carry model.	
V	Commodity Futures – Contract Terminology and Specifications for Stock Options and Index Options in NSE – Contract Terminology and specifications for stock futures and Index futures in NSE – Contract Terminology and Specifications for Interest Rate Derivatives.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	List the fundamentals of Derivatives and its types.	PO4, PO6
CO2	Classify the Forward and Future Contracts.	PO6, PO7
CO3	Assess the Options.	PO6, PO7

CO4	Summarize the various Option Pricing models.	PO6, PO7
CO5	Generalize the knowledge on the indices of various Derivative Instruments.	PO6, PO7
Reading List		
1.	Aron Gottesman, Derivatives Essentials: An Introduction to Forwards, Futures and Options and Swaps, Wiley, 2016	
2.	ArkadevChatterje, Robert A. Jarrow, An Introduction to Derivative Securities, Financial Markets, and Risk Management, World Scientific, Kindle Edition,	
3.	International Journal of Financial Markets and Derivatives, Inderscience Publishers	
4.	Journal of Risk and Financial Management, MDPI	
References Books		
1.	Chance, D. and Brooks, R., Derivatives and Risk Management Basics, South Western, 10th edition, 2015.	
2.	S.L. Gupta, Financial Derivatives, Theory, Concepts and Problems, PHI Learning 2nd edition, 2017	
3.	Hull, J.C. and Basu, S., Options, Futures and Other Derivatives, Pearson, 10th Edition, 2018.	
4.	Patrick Boyle, Jesse McDougall, Trading and Pricing Financial Derivatives, De Gruyter, A Guide to Future, Options and Swaps, 2nd Edition, Publishers, 2018.	
5.	James A. Overdahl, Financial Derivatives, Wiley India Pvt. Ltd, 3rd Edition, 2014	

Sl. No	Course Objectives	No. of Hours
1	C1	09
2	C2	09
3	C3	09
4	C4	09
5	C5	09
	Total	45

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		3	2	
CO 2						3	2	
CO 3						3	2	
CO 4						3	2	
CO 5						3	2	

3-Strong 2-Medium 1-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EA35			3	0	0	3

Behavioral Finance

Course Objectives

C1	To enable the students to understand the basics of Behavioural Finance
C2	To create awareness and understanding on the various theories of Behavioural Finance
C3	To elucidate the students on the various financial decision theory paradoxes
C4	To throw light on the non-behavioural finance through the extended knowledge on Efficient Market Hypothesis
C5	To educate the students on arbitrage, risks in share trade and on contemporary financial issues.

SYLLABUS

UNIT	Details
I	Introduction to Behavioral Finance: Introduction, Traditional vs Behavioural Theory, The Decision Making Process and Behavioural Biases, Limits to Arbitrage.
II	Behavioural Finance Theory and Bubbles: Prospect Theory, SP/A Theory, Behavioural Portfolio Theory, Empirical and Statistical detection tests.
III	Decision Theory Paradoxes: Nash Equilibrium: Keynesian Beauty Context and The Prisoner's Dilemma, The Monty Hall Paradox, The St. Petersburg Paradox, The Allais Paradox, The Ellsberg Paradox.
IV	Non-Behavioral Finance: Introduction - The roles of securities prices in the economy; Efficient markets hypothesis (EMH) – Definitions - EMH in supply and demand framework - Theoretical arguments for flat aggregate demand curve; Equilibrium expected return models.
V	Demand by Arbitrageurs and Average Investors & Contemporary Issues: Definition of arbitrageur; Long-short trades; Risk vs. Horizon; Transaction costs and short-selling costs; Fundamental risk; Noise-trader risk; Professional arbitrage; Destabilizing informed trading (positive feedback, predation), Definition of average investor; Belief biases; Limited attention and categorization; Nontraditional preferences – prospect theory and loss aversion; Bubbles and systematic investor sentiment - contemporary behavioral finance issues

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Explain the basics of Behavioural Finance	PO6
CO2	Compare and classify the awareness and understanding on the various theories of Behavioural Finance	PO6, PO7
CO3	Categorize the various financial decision theory paradoxes	PO2, PO6
CO4	Assess the non-behavioral finance through the	PO6

	extended knowledge on Efficient Market Hypothesis	
CO5	Estimate on arbitrage, risks in share trade and on contemporary financial issues.	PO6, PO7
Reading List		
1.	Subrahmanyam, A. (2008). Behavioural finance: A review and synthesis. European Financial Management.	
2.	Forbes, W. (2009). Behavioural finance. John Wiley & Sons.	
3.	Kapoor, S., &Prosad, J. M. (2017). Behavioural finance: A review. Procedia computer science.	
4.	Bloomfield, R. (2010). Behavioural finance. In Behavioural and Experimental Economics (pp. 32-41). Palgrave Macmillan, London.	
References Books		
1.	Prasaanna Chandra, Behavioural Finance, 2 nd Edition, Paperback – 1, Mcgraw Hill, 2020	
2.	Parag Parikh, Value Investing and Behavioural Finance: Insights into Indian Stock Markets, Mcgraw Hill Education, 2017	

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1			2			2		
CO 2						3	3	
CO 3							3	
CO 4		3				2	3	
CO 5						2	2	

3-Strong 2-Medium 1-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EA36			3	0	0	3

Capital Market and Financial Services	
Course Objectives	
C1	To acquire knowledge on Indian financial systems and its regulators
C2	To gain knowledge on listing and trading securities, Risk management in BSE & NSE, Index management.
C3	To understand leasing and hire purchase
C4	To familiarize with credit rating and securitization
C5	To know Depositories & Contemporary Issues
SYLLABUS	
UNIT	Details
I	<p>Indian Financial System: Regulators: Finance Ministry, Securities Exchange Board of India, Reserve Bank of India, Forward Market Commission, Insurance Regulatory and Development Authority. Primary Market: Role of Primary Market, Functions, Intermediaries, methods of floatation of capital – IPO’s, FPO’s and Rights issues, Investor protection in primary market, Recent trends in primary market. Book building process. Secondary Market: Functions, intermediaries, Demutualization structure, Major stock exchanges in India. Indian Stock Exchanges: Market types, order types and books. BSE: BOLT System, NSE: NEAT system OTCEI – Need, Features, Participants, Listing procedure, Trading and Settlement. Legislative framework guiding the capital markets and intermediaries</p>
II	<p>Listing and trading of Securities: Listing requirements, procedure, fee- Listing conditions of BSE and NSE – Delisting. Legislations related to listing. Trading cycle: T+2, Pay in and Pay out, Bad Delivery, Short delivery, Auction, Clearing & Settlement: Different types of settlements - DEMAT settlement, Physical settlement, Institutional settlement and Funds settlement. Risk Management system in BSE & NSE: Margins, Exposure limits, VAR, Circuit breakers and Surveillance system in BSE and NSE. Index Management: Importance of index computation Methods: Weighted Aggregate Value method, Weighted Average of Price Relatives method, Free Float method. Stock market indices in India</p>
III	<p>Leasing and Hire Purchase Lease and Hire purchase- – Meaning and Types of leasing – Legislative frameworks – Matters on Depreciation and Tax –Concepts and features – Tax and Depreciation implications Microfinance: Consumer Credit - Factoring and Forfaiting</p>
IV	<p>Credit rating & Securitization: Credit rating: Definition and meaning- Process of credit rating of financial instruments - Rating methodology - Rating agencies – Rating symbols of different companies. Legislative framework guiding the CRAs.</p>

	Securitization: Meaning-Features - Special Purpose Vehicle - Pass Through Certificate & mechanism – Benefits of Securitization – Issues in Securitization, Legislative framework guiding the securitization framework.	
V	Depositories & Contemporary Issues Depository services - Role of depositories and their services — Advantages of depository system – NSDL and CDSL - Depository participants and their role- Stock Broking Services including SEBI guidelines - Contemporary developments in capital market performance and implication of securitization in Indian scenario.	
Total		
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Estimate the Indian financial systems and its regulators	PO3,PO6
CO2	Summarize the listing and trading securities, Risk management in BSE & NSE, Index management.	PO6, PO7
CO3	Explain the leasing and hire purchase	PO7
CO4	Prioritize the credit rating and securitization	PO2,PO6,PO7
CO5	Summarize the depositories & contemporary Issues	PO6,PO7
Reading List		
1.	Carow, K. A., & Heron, R. A. (2002). Capital market reactions to the passage of the Financial Services Modernization Act of 1999. The Quarterly Review of Economics and Finance.	
2.	Stiglitz, J. E. (2000). Capital market liberalization, economic growth, and instability. World development.	
3.	Mensah, Y. M., & Werner, R. H. (2008). The capital market implications of the frequency of interim financial reporting: an international analysis. Review of Quantitative Finance and Accounting.	
References Books		
1.	Khan M.Y, Financial Services, 8th edition, McgrawHill ,2015,.	
2.	K Sasidharan, Alex. K Mathews, Financial Services and System, Tata McGraw Hill, 2008.	
3.	Jeff Madura, Financial Institutions and Markets, 10thEdition, Cengage Learning,2014..	
4.	Stephen Cecchetti, Kermit Schoenholtz, Money, Banking and Financial Markets, 4thedition, McGraw-Hill Education, 2014.	

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1			2			2		
CO 2						3	3	
CO 3							3	
CO 4		3				2	3	
CO 5						2	2	

3-Strong 2-Medium 1-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EA37			3	0	0	3

International Financial Management		
Course Objectives		
C1	To give clarity on the concept of international finance	
C2	To throw light on Foreign Exchange Market	
C3	To acquire knowledge on management of foreign exchange exposure and risk involved in it.	
C4	To understand cross-border investment decisions	
C5	To study about multinational financing institutions and contemporary issues	
SYLLABUS		
UNIT	Details	
I	Introduction to international finance: Introduction, Meaning, Nature, scope, Importance, Gold Standard, Bretton Woods system, Exchange rate regimes, fixed and floating exchange rates.	
II	Foreign exchange market: Function and Structure of the Forex markets, major participants, types of transactions and settlements, Foreign exchange quotations, process of arbitrage.	
III	Management of foreign exchange exposure and risk: Types of Exposure, Foreign Currency Exposure, Economic Exposure, Operations exposure, Interest rate exposure. Theories - Purchase Power Parity - Interest Rate Parity – International Fisher Effect	
IV	Cross-border investment decisions: Capital budgeting, Approaches to Project Evaluation, Risk in Cross-border Investment Decisions, Corporate Risk in Investment Decisions. Financing Decisions of MNC's.	
V	Multinational financing institutions and contemporary issues: The International Bank for Reconstruction and Development, the International Development Association, The International Finance Corporation, International monetary fund, Export and Import financing.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Identify the concept of international finance	PO2
CO2	Sketch on the functions of Foreign Exchange Market	PO6,PO7
CO3	Appraise the knowledge on management of foreign exchange exposure and risk involved in it.	PO2,PO7
CO4	Appraise the cross-border investment decisions	PO2, PO7
CO5	Generalize on multinational financing institutions and contemporary issues	PO6,PO7
Reading List		
1.	Madura, J. (2020). International financial management. Cengage Learning.	
2.	Apte, P. G., &Kapshe, S. (2020). International Financial Management . McGraw-Hill	

	Education.
3.	Iatridis, G. (2010). International Financial Reporting Standards and the quality of financial statement information. International review of financial analysis.
4.	Eun, C. S., & Resnick, B. G. (2010). International Financial Mgmt 4E. Tata McGraw-Hill Education.
References Books	
1.	Machi Raju International Financial Management, Third Edition, HPH, 2016.
2.	V. A Avadhani, International Financial Management, Second Edition, HPH, 2011
3.	Eiteman&Stonchill, “Multinational Business Finance”, 12 th Edition, Pearson, 2010
4.	Cheol Eul& Bruce Resnick, International Financial Management, 7 th Edition, China Machine Press, 2016.
5.	V.K.Bhalla. “International Financial Management for the Multinational Firm”,4 th Edition, S Chand,.2014
6.	

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		2						
CO 2						2	2	
CO 3		2					2	
CO 4		2					2	
CO 5						2	2	

3-Strong 2-Medium 1-Low

ELECTIVE
MARKETING MANAGEMENT

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EB32			3	0	0	3

Advanced Marketing Research and Consumer Behaviour							
Course Objectives							
C1	To create an understanding of market research concepts.						
C2	To create awareness of sampling techniques and its implications on market research.						
C3	To throw light on models of consumer behavior.						
C4	To foster knowledge on determinants of consumer behavior.						
C5	To create awareness on the consumer decision-making process.						
SYLLABUS							
UNIT	Details						
I	Introduction: Nature and scope of Marketing Research – Marketing Research as an aid to marketing decision making – Scientific method – Research designs – Exploratory, descriptive and conclusive – Secondary and Primary Data Collection Methods – Questionnaire Construction Procedure.						
II	Sampling: Sampling Techniques – Sample Size Determination per survey Application of Marketing Research: Motivation Research – Advertising Research – Product Research.						
III	Models of Consumer Behaviour: Nicosia Model - Howard-Sheth Model – Engel-Blackwell-Miniard Model, Environment influences on Consumer: Culture – Social Class – Social Groups – Family– Personal Influence and Opinion Leadership.						
IV	Individual Determinants of Consumer Behaviour: Motivation and Involvement – Information Processing – Learning – Personality and Self Concept – Attitude Theories and Change. Consumer Decision Processes: Problem Recognition – Search and Evaluation – Purchasing – Post-purchase Behaviour.						
V	Multivariate analysis: Discriminant analysis, Factor analysis, Conjoint analysis, Cluster analysis - Multidimensional scaling and Multiple Regression - Model Building, Data Visualization Tools – Usage of forecasting techniques - Time Series Analysis, ARIMA.						
Course Outcomes							
Course Outcomes	On completion of this course, students will;					Program Outcomes	
CO1	Understand the basic concepts of marketing research.					PO4,PO7	
CO2	Understand the complexity of sampling techniques and its implications on market research.					PO4, PO6	
CO3	Have insights on models of consumer behavior and helps them to develop models.					PO6,PO7	
CO4	Possess knowledge on determinants of consumer behavior.					PO6	
CO5	Have insights on consumer decision process.					PO2, PO6,PO7	
Reading List							
1.	Suja R. Nair , Consumer Behaviour & Marketing Research, Himalaya Publishing, 2015						

2.	S. Sumathi, P. Saravanavel, Consumer Behaviour & Marketing Research , S.Chand,2003
3.	Rajendra Nargundkar ,Marketing Research: Text and Cases .Tata Mc Graw Hill , 2017
4.	G.C.Beri, Marketing Research ,Tata Mc Graw Hill,2013
References Books	
1.	Leon Schiffman, and Joseph L. Wisenblit., Consumer Behavior, 11 th Edition, Pearson, 2015.
2.	Naresh K.Malhotra and Satyabhusan., Marketing Research, 7 th Edition, Pearson, 2019.
3.	Barbara G Tabachnick and Linda S Fidell, Using Multivariate Statistics, 7 th Edition, Pearson. 2020.
4.	Majumdar, Ramanuj, Consumer Behaviour: Insights from Indian Market, PHI Learning, 2020.
5.	S. Ramesh Kumar., Consumer Behaviour: The Indian Context (Concepts and Cases), Pearson Education, 2 rd Edition, 2021.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				M			S	
CO 2				M		S		
CO 3						S	S	
CO 4						M		
CO 5		S				M	M	

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EB33		3	0	0	3

Advertising Management and Sales Promotion		
Course Objectives		
C1	To introduce students to advertising fundamentals	
C2	To impart knowledge on advertising media and budget.	
C3	To orient students on advertising agencies and its operations.	
C4	To make students understand sales promotion campaigns.	
C5	To enable students understand the relevance of sales promotion	
SYLLABUS		
UNIT	Details	
I	Advertising: Advertising, objectives, task and process, market segmentation and target audience – Message and copy development.	
II	Media: Mass Media - Selection, Planning and Scheduling – Social Media Advertising - Web Advertising – Integrated programme and budget planning.	
III	Implementation: Implementing the programme coordination and control – Advertising agencies – Organization and operation.	
IV	Sales Promotion: Why and When Sales promotion activities, Consumer and sales channel oriented – planning, budgeting and implementing and controlling campaigns.	
V	Control: Measurement of effectiveness – Ethics, Economics and Social Relevance.	
SCourse Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Possess knowledge and good understanding on the fundamentals of advertising	PO4, PO7
CO2	Have good understanding and knowledge on advertising media and budget	PO2, PO4, PO7
CO3	Have good orientation on advertising agencies and its operations.	PO5, PO7
CO4	Understand sales promotion campaigns.	PO4, PO5, PO6
CO5	Understand the relevance of sales promotion	PO4, PO6, PO7
Reading List		
1.	S A Chunawalla, Advertising Management and Sales Promotion, Himalaya Publishing, 2015	
2.	Vv Rathna & S L Guptha, Advertising and Sales Promotion Management, Sultan Chand, 2011	
3.	S H H Kazmi & Satish Batra, Advertising and Sales Promotion Management, Excel Books, 2008	
4.	Mishra M N ,Sales Promotion and Advertising Management , Mishra M N, Himalaya Publishing 2015	
References Books		
1.	Advertising and Promotion: An Integrated Marketing Communications Perspective (SIE) by George E Belch, Michael A Belch, Keyoor Purani, 12 th edition, McGraw Hill Education, 2021	

2.	Advertising, Promotion, and other aspects of Integrated Marketing Communications (Mindtap Course List) by Terence Shimp and J. Craig Andrews, South-Western College Publishing, 2017.
3.	Percy, L. and Rosenbaum-Elliot, R., Strategic Advertising Management, 4 th Edition, Oxford University Press, 2012.
4.	Shrimp, T.A., Integrated Marketing Communications in Advertising and Promotion, 8 th Edition, Cengage Learning India, 2012.
5.	Belch, G.E., Belch, M. and Purani, K., Advertising and Promotion, 7 th Edition, Tata McGraw-Hill Education, 2009.
6.	Marshall, P., Ultimate Guide to Facebook Advertising, Tata McGraw-Hill Education, 2011.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				M			S	
CO 2		S					S	
CO 3					M		S	
CO 4				S	S	M		
CO 5				M		M	M	

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EB34			3	0	0	3

Sales and Distribution Management

Course Objectives

C1	To introduce students to sales management and its related software
C2	To impart knowledge on sales performance strategies and tactics.
C3	To acquaint students with sales forecasting techniques, sales quotas and sales force planning
C4	To provide inputs on sales force staffing, training and sales audit.
C5	To orient students on role of distribution in sales management

SYLLABUS

UNIT

Details

I	Introduction, Nature, Concepts and Scope - Organization Framework of The Field Sales Force - Sales force Automation - Types of Field Sales Organizations – Career in Field Sales Management. Field – Emerging trend in Sales Management - Sales Manager – His Tasks and Responsibilities – Relation with Salesman and Relationships with top Management – Coordinating and Controlling the Marketing Mix. Operating Environment for Field Sales Force. Software application in Sales management. Sales Management Process.
II	Information and Planning: Qualities and Role-Hierarchy of Objectives and Goals, Concept of Strategies and Tactics. Development of Sales Performance Standards – Relationship of Performance Standards to Sales Development Function, its Purpose and Types, Review of Training and Staffing Programmes.
III	Sales Forecasting – Methods and Procedural Steps in Forecasting - Sales Budgeting - Allocation of Field Sales Resources. Design Sales Territories, Procedure for Designing – Determining Manpower Requirements, Recruiting, Methods and The Selection System. Sales Quotas, Types of Sales Quotas, its Purpose and Managerial Evaluation. Man Power Planning – Tasks, Skill, Qualification.
IV	Staffing – Responsibilities, tools and Methods of Selection. Motivational and Compensation Procedures for Sales Force – Method of Financial Incentives and its Purpose – Designing A Compensation Plan. Evaluation of Performance and Control. Salesmanship – Sales Positions – Theories of Selling – Understanding Consumer Behavior- Training and Development of Sales force. Sales Training Process, Designing Training Content- Training for Different sales personnel, Training Feedback- Sales Audit and Analysis – Control of Sales Efforts and Costs.
V	Distribution: Role of Distribution in the Marketing Mix Distribution center network, suppliers milk run, supply tracking, network configuration, quality control monitoring; Role and Functions. Transport and Handling: Economics of Transportation, Determining Optimum Mode of Transport. Organization, Machines, Procedures and Documentation- Policies; Role of Transport; Transport in emergencies; safety and security of goods- Dealer Network: Role of Middlemen/Dealer in Marketing and Distribution- Channel Information System- Designing a Channel information system. Dealer Functions at Wholesale and Retail Level – National and International Channel of Distribution- Strategic Plan of Network – Location, Selection - Appointment and Termination of Dealers - Morale and Motivation.

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand sales management and its related software	PO4, PO6
CO2	Know sales performance strategies and tactics.	PO1,PO2, PO6
CO3	Understand sales forecasting techniques, sales quotas and sales force planning	PO4, PO6,PO7
CO4	Know the concepts of sales force staffing, training and sales audit.	PO5, PO6
CO5	Have knowledge on the role of distribution in sales management	PO6,PO7

Reading List

1.	Dr.S.S.Guptha, Sales and Distribution Management – Text and Cases an Indian Perspective,Laxmi Publications Pvt Ltd; 2018
2.	Pingali Venugopal ,Sales and Distribution Management: An Indian Perspective, Sage, 2008
3.	Ramendra Singh , Sales And Distribution Management,Vikas Publishing , 2016

References Books

1.	Still, R.R., Sales Management: Decision Strategy and Cases, 5th Edition, Pearson, 2011.
2.	Tapan K Panda, Sunil Sahadev, Sales Management, Sales and Distribution Management ISBN: 9780199499045, Oxford University Press, 2019.
3.	Pingali Venugopal Sales and Distribution Management: An Indian Perspective, SAGE Publications, 2008.
4.	Cron, W.L. and DeCarlo, T.E., Sales Management: Concepts and Cases, 10 th Edition, Wiley India Pvt. Ltd., 2011.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				M		S		
CO 2	M	S				S		
CO 3				M		S	M	
CO 4					M	S	M	
CO 5						M	M	

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EB35		3	0	0	3

Digital Marketing		
Course Objectives		
C1	Understand the digital marketing space and acquire knowledge on digital marketing strategy	
C2	To learn and comprehend on SEO and SEM	
C3	To acquire knowledge on the various channels of SMM	
C4	To learn, understand, and evaluate Search analytics and Web analytics	
C5	To create awareness and understanding on google analytics	
SYLLABUS		
UNIT	Details	
I	Digital Marketing Strategy: Digital vs. Traditional marketing- Online marketing space - Significance of digital marketing - Online marketing mix - E-products - STP - E-price - E-Promotion - Affiliate marketing - Online tools for Content Marketing – Market influence analytics in Digital Eco System.	
II	SEO: Keyword strategy – SEO strategy – SEO success factors – On page and Off page techniques - Search Engine Marketing (SEM) – Working of Search Engine – SEM Components.	
III	Social Media Marketing: Social Media Channels – Email marketing – SMS marketing - Social Media Strategy - Web PR and Online reputation management - Adwords - PPC Advertising - Video SEO - Conversion Optimization Monitoring - trends analysis – dashboards - segmentation - Navigation analysis (funnel reports, heat maps, etc.).	
IV	Search and Web Analytics: Search analytics Current trends & challenges - web analytics & Web 2.0, multi-channel marketing management, web mining & predictive analytics - Understanding the key fabric of the Web - Sources of data: clickstream data, online surveys, usability research - Clickstream data collection techniques - web server log analysis - page tagging - Web metrics and Key Performance Indicators (KPIs): simple views, visitor counts, measuring content, engagement, conversions, etc. Framework for mapping business needs to web analytics tasks - Data collection architecture- Introduction to OLAP, Web data exploration and reporting - Introduction to Splunk.	
V	Google Analytics: Key features and capabilities of Google analytics - how Google analytics works - implementing Google analytics - getting up and running with Google analytics - navigating Google analytics - using Google analytics reports - Google metrics - using visitor data to drive website improvement - focusing on key performance indicators- integrating Google analytics with third-party applications.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	To examine and explore the role and importance of digital marketing in today’s rapidly changing business environment.	P01, PO3, PO7
CO2	To focusses on how digital marketing can be utilised	PO1, PO2, PO7,

	by organisations and how its effectiveness can measured.	PO8
CO3	To know the key elements of a digital marketing strategy	PO1, PO3, PO6
CO4	To study how the effectiveness of a digital marketing campaign can be measured	PO2, PO5, PO7
CO5	To demonstrate advanced practical skills in common digital marketing tools such as SEO, SEM, Social media and Blogs.	PO1, PO3, PO8

Reading List

1.	M Bala, D Verma - ... (2018). A Critical Review of Digital Marketing ..., 2018 - papers.ssrn.com
2.	Digital marketing: global strategies from the world's leading experts YJ Wind, V Mahajan - 2002 - books.google.com
3.	Digital marketing: A practical approach A Charlesworth - 2014 - taylorfrancis.com
4.	Modern trends in the development of digital marketing NI Arkhipova, MT Gurieva - RSUH/RGGU Bulletin. Series ..., 2018 - ideas.repec.org

References Books

1.	Rob Stokes, (2014), e-marketing: The Essential Guide to Digital Marketing, 5thedition, Quirk Education.
2.	Dave Chaffey, Fiona Ellis-Chadwick, Richard Mayer, Kevin Johnston, (2012), Internet Marketing: Strategy, Implementation and Practice, Prentice Hall.Liana Evans, (2010), Social Media Marketing: Strategies for Engaging in Facebook, Twitter & Other Social Media, Que Publishing.
3.	Vandana Ahuja, (2015), Digital Marketing, 1stedition, Oxford University Press.
4.	Avinash Kaushik, (2009), Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity.
5.	Rob Stokes, (2014), e-marketing: The Essential Guide to Digital Marketing, 5thedition, Quirk Education.
6.	Rob Stokes, (2014), e-marketing: The Essential Guide to Digital Marketing, 5thedition, Quirk Education.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S		M				S	
CO 2	S	S					S	S
CO 3	M		S			S		
CO 4		S			M		S	
CO 5	S		S					S

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EB36		3	0	0	3

New Product Strategies		
Course Objectives		
C1	To familiarize the students to the basic concepts of New Product Strategy	
C2	To provide insights on Generation of new product ideas and identifying new market opportunities	
C3	To throw light on Selecting Market opportunity and Designing new market offers	
C4	To elucidate on Brand identity development	
C5	To hypothesize and implement new product Entry Strategies	
SYLLABUS		
UNIT	Details	
I	Basics of New Product Strategy: New Product Strategy-decisions- consumer behavior adoption and diffusion of innovations; characteristics, purpose, risk in new products; PLC.	
II	Idea Generation and Development: Generation of new product ideas and identifying new market opportunities, New Product Planning Process-stage gate system and its application.	
III	The Product offer: Selecting Market opportunity and Designing new market offers-Concept Generation and Evaluation, Developing and Testing Physical offers.	
IV	New Product Brand Development and Pricing Strategies: Importance of Brand decisions and Brand identity development; Pricing of a new product, Pre-test Marketing.	
V	New Product Launch: Entry Strategies - Pre-launch, during launch and Post launch preparations.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be familiar with the basic concepts of New Product Strategy	PO1, PO3, PO7
CO2	Be well versed in Generation of new product ideas and identifying new market opportunities	PO1, PO2, PO7, PO8
CO3	Select Market opportunities and Designing new market offers	PO1, PO3, PO6
CO4	Develop Brand identity development	PO2, PO5, PO7
CO5	Hypothesize and implement new product Entry Strategies	PO1, PO3, PO8
Reading List		
1.	Product Strategy & Roadmaps, Kindle Edition, 2017	
2.	Roman Picher, Strategize: Product Strategy and Product Roadmap Practices for the Digital Age, Kindle Edition, 2016	
3.	Journal of Product Innovation, 2004 - Wiley Online Library	
4.	Industrial Marketing Management, 2009 - Elsevier	
References Books		

1.	Ulrich, Karl, Eppinger, Steven, (2012), Product Design and Development, 5th edition, McGraw-Hill.
2.	Crawford, Merle, Di Benedetto, Anthony, (2014), New Products Management, 11 th edition, McGraw-Hill.
3.	Robert G.Cooper, (2011), Winning at New Products, Creating Value through Innovation, 4 th edition, Basic Book, Perseus Books Group.
4.	Bettencourt, Lance, (2010), Service Innovation: How to Go from Customer Needs to Breakthrough Services, McGraw-Hill.
5.	Jaime Levy (2021), UX Strategy: Product Strategy Techniques for Devising Innovative Digital Solutions, O'Reilly Media, Inc.
6.	Ulrich, Karl, Eppinger, Steven, (2012), Product Design and Development, 5th edition, McGraw-Hill.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3		2				3	
CO 2	3	3					3	3
CO 3	2		3					3
CO 4		3			2		3	
CO 5	3		3					3

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EB37			3	0	0	3

Strategic Marketing		
Course Objectives		
C1	To learn fundamentals of strategic marketing	
C2	To have understanding about external environmental analysis	
C3	To know about strategic marketing advantage	
C4	To have insights about market resource allocation and customer value	
C5	To get familiar about implementation and contemporary issues in marketing strategy	
SYLLABUS		
UNIT	Details	
I	Introduction to Strategic Marketing: Fundamentals of Marketing Strategy - Market scope - competitive advantage - strategic target and strategic advantage - consumer and business markets.	
II	External environmental analysis: Political, economic, socio cultural, technological forces and strategic uncertainty in marketing. Analysis of effects Scenario analysis and forecasting for marketing.	
III	Strategic marketing advantage: Strategic marketing group analysis – Types of Strategic marketing group - Strategic marketing group mapping - positional advantage and sources of advantage in marketing – Creating and Challenging Competitive Advantage – Creating Corporate Advantage.	
IV	Marketing Resource allocation and customer value: Meaning – Types and Principles of Resource allocation models – Allocation between advertising and sales promotion – Allocation to new media - Allocation across markets and countries – Allocation to future research issues - Portfolio methods used for product market combination for different SBUs.	
V	Implementation issues in marketing strategy and Contemporary Issues: Marketing mix policies, control, implementation and marketing organization issues. Effect of current digital era on marketing strategy.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcome
CO1	Understand fundamentals of strategic marketing	PO1, PO3, PO7
CO2	Learn and understand about external environmental analysis	PO1, PO2, PO7, PO8
CO3	Having knowledge about strategic marketing advantage	PO1, PO3, PO6
CO4	Derive insights about market resource allocation and customer value	PO2, PO5, PO7
CO5	Familiar about implementation and contemporary issues in marketing strategy	PO1, PO3, PO8
Reading List		
1.	D. W. Cravens, N Piercy, Strategic marketing, academia.edu, 2006	
2.	RMS Wilson, C Gilligan Strategic Marketing Management, taylorfrancis.com,	

	2012
3.	Strategic marketing and marketing strategy: domain, definition, fundamental issues and foundational premises R Varadarajan - Journal of the Academy of Marketing Science, 2010 – Springer
4.	Journal of Strategic Marketing, Taylor & Francis,
References Books	
1.	Ferrell, O. C., & Speh, T. W. (2017). Marketing Strategy, Loose-Leaf Version. Cengage Learning.
2.	West, D. C., Ford, J., & Ibrahim, E. (2015). Strategic marketing: creating competitive advantage. Oxford University Press, USA.
3.	Andaleeb, S. S., & Hasan, K. (Eds.). (2016). Strategic marketing management in Asia: case studies and lessons across industries. Emerald Group Publishing Limited.
4.	Abratt, R., & Bendixen, M. (2018). Strategic Marketing: Concepts and Cases. Routledge
5.	Morgan, R. E. (2016). Strategic marketing: New horizons in theory and research. J. Rudd, M. Jaakkola, & G. W. Marshall (Eds.). Emerald Group Publishing Limited.
6.	Ferrell, O. C., & Speh, T. W. (2017). Marketing Strategy, Loose-Leaf Version. Cengage Learning.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3		2				3	
CO 2	3	3					3	3
CO 3	2		3					3
CO 4		3			2		3	
CO 5	3		3					3

3-Strong 2-Medium 1-Low

**ELECTIVE
HUMAN RESOURCE
MANAGEMENT**

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EC32		3	0	0	3

Human Resources Development		
Course Objectives		
C1	To understand the requirements of HRD Professional in the present content with the developmental perspective of HRD.	
C2	To analyse and explore the models and factors influencing employee behavior and Learning.	
C3	To explore the developing needs of Human capacity and its impact of HRD initiatives.	
C4	To understand the training need & explore the technique for development.	
C5	To explore the recent trends in career planning & development.	
UNIT	Details	
I	Introduction: Definition, Scope and objectives - Evolution of HRD - Developmental Perspective of HRD - HRD at macro and micro levels: Outcomes of HRD in the National and Organizational contexts. Qualities and Competencies required in a HRD professional. Importance of HRD in the Present Context. Development of HRD Movement in India. Difference between HRM and HRD Organisation of HRD Function.	
II	Human Resource Development System: HRD Mechanisms – Climate and Culture – Influences of Employee Behaviour – Model of Employee Behaviour – External and Internal Factors Influencing Employee Behaviour. Learning and HRD: Learning Principles – Maximizing Learning – Individual Differences in the Learning Process – Learning Strategies and Styles – Recent Developments in Instructional and Cognitive Psychology.	
III	Developing Human Capacity: Aptitude - Knowledge - Values - Skills of Human Relations - Responsiveness - Loyalty and Commitment - Transparency - Leadership Development. Evaluating HRD: Human Resource Accounting - HR Audit and Benchmarking - Impact Assessment of HRD initiatives on the bottom-line of an organization.	
IV	Training and Development: Meaning and Scope of training - education and development; Training need analysis - Types of training Internal and external – On - job Training & Job shadowing, SGTA- Outbound Training - Attitudinal training - Principles Involved in Selection of Training Method – Techniques of Training Different Levels - Training effectiveness.	
V	Career Planning and Development: Definition - objectives – importance – career development –Career path defining- principles of theories career planning – steps involved – succession planning. Recent Trends in HRD: Training for trainers and HRD professionals – Goal-directed work system behavior- Dynamics of HR & Employee Engagement- Sustainable Human Development- Promoting Research in HRD.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Understand the need of the HRD professionals.	PO1, PO8
CO2	Integrate the concept and practical implication of learning & behavior.	PO3, PO5
CO3	Understand the developing need of Human capacity.	PO3, PO5

CO4	Understand Training need & its development.	PO1, PO2, PO4
CO5	Have a better understanding of career planning & development.	PO6, PO7, PO8
Reading List		
1.	Brian Becker, Mark Huselid, Dave Ulrich, 'The HR Scorecard', Harvard Business School Press.	
2.	Kirsten & Martin Edwards, 'Predictive HR Analytics: Mastering the HR Metric', Kogan Page.	
3.	KirsWayne Cascio, John Boudreau, 'Investing in people. Financial Impact of Human Resource Initiatives'.	
4.	Tomas Chamorro-Premuzic, 'The Talent Delusion'.	
References Books		
1.	Gibb, S., Human Resource Development: Foundations, Process, Context, 3 rd Edition, Palgrave Macmillan, 2011.	
2.	McGuire, D. and Jorgensen, K., Human Resource Development, Sage South Asia, 2011.	
3.	Noe, R. and Deo, A., Employee Training and Development, 5 th Edition, Tata McGraw-Hill Education, 2012.	
4.	Rishipal, Training and Development Methods, S.Chand, 2011.	
5.	Saks, A., Performance Management through Training and Development, Cengage Learning, 2010.	
6.	Werner, J.M. and DeSimone, R.L., Human Resource Development, 5 th Edition, Cengage Learning, 2012.	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M							M
CO 2			S		S			
CO 3			M		M			
CO 4	M	M		M				
CO 5						M	M	M

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EC33		3	0	0	3

Industrial and Labour Relations		
Course Objectives		
C1	To familiarize the students to the basic concepts of Industrial Relations in order to aid in understanding how an industry functions.	
C2	To provide insights on Industrial Harmony and Conflicts	
C3	To throw light on Labour Relations, Joint consultation	
C4	To explicate on Trade Union, Problems and role of Indian Trade Unions.	
C5	To elucidate on Collective Bargaining, Tripartite Machinery	
UNIT	Details	
I	Industrial Relations: The changing concepts of Industrial relations- Factors affecting employee stability. Application on Psychology to Industrial Relations. Codes of Conduct.	
II	Industrial Harmony and Conflict: Harmonious relations in industry- importance and means; cause of industrial disputes- Machinery for settling of disputes- Negotiation- Conciliation- Mediation- Arbitration and Adjudication- Strikes- Lock-outs- Lay-off and Retrenchment- Code of Discipline- Grievance procedure-Labour management co-operation; Worker's participation in management.	
III	Labour Relations: Changing concept of management labour relations- Statute laws- Tripartite conventions- development of the idea of social justice- limitation of management prerogatives increasing labour responsibility in productivity. Joint Consultation: Principal types- Attitude of trade unions and management- Joint consultation in India.	
IV	Trade Unions: Trade Unions and their growth- economic- social and political conditions leading to the development of trade unionism- Theories of trade unionism- Aim and objectives of trade unions- Structure and governing of trade unions. Problems and Role of Indian Trade Unions: Recognition and leadership- Finances and Membership- Compulsory versus free membership- Political activities- Welfare- Legislation- Majority and Minority unions- Social responsibilities- positive role in economic and social development.	
V	Collective Bargaining: Meaning- Scope- Subject matter and parties- Methods and tactics- Administrations of collective bargaining agreements- Charter of Demands & Counter Demands- Fair and unfair labour practice. Tripartite Machinery: At the center and in the states- I.L.O. – Its functions and role in labour movement – Industrial health and safety- Industrial legislations.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Generalize with the basic concepts of Industrial Relations.	PO2, PO6
CO2	Enumerate insights on Industrial Harmony and Conflicts.	PO4, PO8
CO3	Have insights on Labor Relations, Joint Consultation	PO8
CO4	Summarize best practices of Trade Union, Problems and role of Indian Trade Unions	PO1, PO5
CO5	Demonstrate policies for Collective Bargaining,	PO1, PO3, PO5

	Tripartite Machinery.	
Reading List		
1.	Campbell Balfour, 'Industrial Relations in the common market'	
2.	Michael Poole, 'Theories of Trade unionism'	
3.	Srikanth Goparaju, 'Industrial Relations in Modern India'	
4.	Glenn Diesen, 'Great Power Politics in the fourth Industrial Revolution'	
References Books		
1.	Tripathi PC, Gupta C B & Kapoor N D., Industrial Relations and Labour Laws., 6 th Edition 2020.	
2.	Sen, R., Industrial Relations: Text and Cases, 2 nd Edition, Macmillan PublishersIndia, 2009.	
3.	Monappa, Nambudri and Selvaraj, Industrial Relations and Labour Laws, 2 nd Edition, Tata McGraw-Hill, 2012.	
4.	PRN Sinha, and Sinha Indu Bala, Industrial Relations, Trade Unions and Labour Legislation, Pearson, 3 rd Edition, 2017.	
5.	Sivarethnamohan R, Industrial Relations and Labour Welfare, PHI Learning, 1 st Edition 2010.	
6.	VenkataRatnam, C. S., Industrial Relations, Oxford University Press, 2 nd Edition, 2017.	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		M				M		
CO 2				M				M
CO 3								S
CO 4	M				S			
CO 5	M		M		S			

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EC34		3	0	0	3

Career Management		
Course Objectives		
C1	To comprehend the dimensions of career planning and career development, career management.	
C2	To demonstrate techniques of self-assessment and changing landscapes of career management.	
C3	To discuss and debate on contemporary issues in career management, Career Anchors, and solutions for working families.	
C4	To introspect and design Process of Career planning and career development, predict and construct Career Road Maps.	
C5	To summarize and select appropriate Learning and Development for Career & Organizational growth	
UNIT	Details	
I	Introduction to Career Management: Meaning and overview of career, career planning, career development and career management – Differences between Career Management, Career Development and Career Planning. Objectives and importance of career management.	
II	Self-Assessment and Career Management: Self-Assessment and Career Management - Understanding the new career - Changing landscape of careers, Protean career, Career and identity, Understanding lifestyle and personal vision. Managing your career: Skills assessment and peer coaching.	
III	Contemporary Issues in Career Management: Contemporary issues in Career Management - Developing Career and Work-life implications- Work, gender and dual career couples. Lifespan career development, Career Anchors, Fast track Careers Vs Slow track careers, Mid Life career blues. Career challenges and solutions for working families.	
IV	Career Management System in Organization: Career Management from Organizational Point of View - Career Planning Vs Succession Planning, Process of Career planning and career development. Career management strategies. Career Management Systems. Career guidance and counseling. Managers Role in Career Management. Career Road Maps.	
V	Role of Learning in Career Growth: Learning and Development for Career & Organizational growth; Strategies of getting organizations into learning mode; Expanding your Horizons. Learning Culture - Learning Management Systems.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Comprehend fairly the dimensions of career planning and career development, career management.	PO4, PO6
CO2	Demonstrate techniques of self-assessment and changing landscapes of career management.	PO2, PO8
CO3	Debate and conclude the contemporary issues in career management, Career Anchors, and solutions for working families.	PO3, PO6
CO4	Introspect and design Process of Career planning and career development, predict and construct Career	PO1, PO8

	Road Maps.	
CO5	Summarize and select appropriate Learning and Development for Career & Organizational growth	PO1, PO3, PO6
Reading List		
1.	Ben Horowitz, <i>'The Hard Thing About Hard Things: Building A Business When There Are No Easy Answers'</i> .	
2.	Angela Duckworth, <i>'Grit: The Power Of Passion and Perseverance'</i> .	
3.	Elaine Welteroth, <i>'More Than Enough: Claiming Space For Who You Are (No Matter What They Say)'</i> .	
4.	Amy Cuddy, <i>'Presence: Bringing Your Boldest Self To Your Biggest Challenges'</i> .	
References Books		
1.	Bill Burnett, Dave Evans, <i>Designing Your Life: How to Build a Well-Lived, Joyful Life</i> , Knopf Publisher, 1st edition 2016.	
2.	John Lees, <i>Career Road Map</i> , Acorn Books Ltd, 1st edition 2016.	
3.	Greenhaus, J.H., Callanan, G. A., and Godshalk, V.M. 2009, <i>Career Management 3rd Edition</i> , The Dryden Press, Harcourt College Publishers	
4.	Harrington, Brad and Hall, Douglas T. (2008). <i>Career management and work / life integration: Using Self-Assessment to Navigate Contemporary Careers</i> , 1st edition Sage Pub.	
5.	Dr. Gandham Sri Rama Krishna, Dr. N.G.S. Prasad, Miss Ch. Maheswari Rambai, <i>Encyclopedia of Personality Development and Career Management</i> , 1st Edition 2016 Himalaya publishing house Pvt. Ltd.	
6.	Jonothan P West, <i>Career Planning, Development, and Management: An Annotated Bibliography</i> Routledge, 1st edition 2017.	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				S		M		
CO 2		M						M
CO 3			S			M		
CO 4	M							M
CO 5	M		M			S		

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EC35		3	0	0	3

Emotional Intelligence and Managerial Effectiveness		
Course Objectives		
C1	To familiarize the students to the basic concepts of Emotional Intelligence	
C2	To provide insights on Emotional Competencies	
C3	To throw light on Emotional literacy	
C4	To elucidate on significance of Emotional Intelligence	
C5	To create awareness and importance of Emotional Learning in organizations	
UNIT	Details	
I	Introduction to Emotional Intelligence: Emotional Brain, Theories of Emotion, Emotional Intelligence, concept and its evolution, Differences between emotional quotient and intelligent quotient.	
II	Emotional Competencies: The emotional competency framework- Self-awareness, self-regulation, motivation, social awareness (empathy) and Social skill (relationship management), Measuring Emotional Intelligence- The emotional competency inventory.	
III	Emotional literacy: Emotional intelligence and emotional literacy, Managing aggression and depression, Emotional literacy training- developing emotional skill (awareness), cognitive skills and behavioural skill.	
IV	Emotional Intelligence at work place: The role of EI in leadership, EI and Leadership styles, Need of EI in Building Teams.	
V	Emotional Learning in organizations: Training of EI in organization, developing emotional competencies through relationship at work and implementing EI programs.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Recognize and apply basic concepts of Emotional Intelligence	PO4, PO6, PO7
CO2	Enumerate and chart Emotional Competencies	PO3, PO6, PO8
CO3	Annotate and signify Emotional literacy	PO6, PO7
CO4	Be aware of using Emotional Intelligence tools	PO1, PO7, PO8
CO5	Hypothesize and assimilate importance of Emotional Learning in organizations	PO1, PO6, PO7
Reading List		
1.	Goleman, Richard Boyatzis, Annie McKee, 'Primal Leadership'.	
2.	Travis Bradberry, Greaves, 'Emotional Intelligence 2.0'	
3.	Colleen Stanley, 'Emotional intelligence for sales success: Connect with customers and get results'	
4.	David R. Caruso, Peter Salovey, 'The Emotionally Intelligent Manager'.	
References Books		
1.	Daniel Goleman, Emotional Intelligence, Bloomsbury Publishing India Private Limited, 25 th Anniversary Edition 2020.	
2.	Rajagopalan Purushothaman, Emotional Intelligence, SAGE Essentials, 2021.	
3.	Dalip Singh ,Emotional Intelligence at Work :A Professional Guide, SAGE, 1 st Edition 2015.	

4.	M S Battacharya, Emotional Intelligence, Excel Publications, 1 st Edition 2007.	
5.	Deepa R, Unearthing your Emotional Intelligence, Notion Press, 1st Edition, 2020.	
6.	Sumner Redstone ,Peter Knoble ,A Passion to Win: An Autobiography , Simon & Schuster, 1 st Edition 2001.	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	40 Marks
	Assignments/mini project/practical demonstrations	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	60 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				S		S	M	
CO 2			M			S		S
CO 3						S	M	
CO 4	M						M	S
CO 5	M					S	M	

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EC36		3	0	0	3

Talent Management		
Course Objectives		
C1	To have a clear understanding of the concept of talent management and its role	
C2	To acquire knowledge on talent planning	
C3	To obtain knowledge on talent acquisition and retention	
C4	To understand the concept of competency mapping and models of competency mapping	
C5	To understand the methodology to be followed in competency mapping	
UNIT	Details	
I	<p>Introduction to Talent Management: Definition, Meaning of Talent Management, Objectives & Role of Talent Management in building the sustainable competitive advantage to a firm, Key Processes of Talent Management, Benefits of Talent Management, Talent vs. knowledge people, Source of Talent, Consequences of failure in managing talent , Tools for Managing Talent.</p> <p>Building blocks of talent management: competencies – performance management, conducting performance reviews, Appraising executive talent, selecting the right appraisal.</p>	
II	<p>Talent Planning – Understanding the needs and mind set of employees, Succession management process, Integrating succession planning and career planning, designing succession planning program, talent development budget, contingency plan for talent; building a reservoir of talent, compensation management within the context of talent management.</p>	
III	<p>Talent Acquisition and Retention – Talent Acquisition- Defining Talent Acquisition, Develop high potential employees, High performance workforce, Importance of Talent Development Process, Steps in developing talent. Talent Retention: SMR Model (Satisfy, Motivate and Reward), Employee Retention Programs, Career Planning and Development, Best practices in employee retention.</p>	
IV	<p>Competency Mapping: Concepts and definition of competency; types of competencies, Features of competency, approaches to mapping methods, Competency mapping procedures and steps , 5- level competency model, Developing competency models from raw data- data recording, analyzing the data, content analysis of verbal expression, validating the competency models, how competencies relate to career development and organizational goals.</p>	
V	<p>Methodology of Competency Mapping: Competency models people capability maturity model, developing competency framework, competency profiling, competency mapping tools, use of psychological testing in competency mapping , competency-based interviewing, assessment of competencies through 360 degree feedback, BEI, CIT, validation of competencies.</p>	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Have a clear understanding the concept of talent management and its role	PO2,PO4,PO5
CO2	Have knowledge on talent planning	PO1,PO4
CO3	Have knowledge of talent acquisition and retention	PO3,PO5,PO8

CO4	Have an understanding of the concept of competency mapping and models of competency mapping	PO1,PO6
CO5	Have an understanding the methodology to be followed in competency mapping	PO1,PO7
Reading List		
1.	Talent management, William J Rothwell	
2.	Talent Management for the 21 st century, P Cappelli-HBR	
3.	Strategic Talent Management, Robert J Greene	
4.	Reinventing Talent Management, Edward E Lawler	
References Books		
1.	Seema Sanghi, The Handbook of Competency Mapping, Sage Publications, 3rd Edition, 2016	
2.	Lance A. Berger, The Talent Management Handbook, Making Culture a Competitive Advantage by Acquiring, Identifying, Developing, and Promoting the Best People Tata McGraw Hill, 3rd Edition, 2018.	
3.	Edward J Cripe, Competency Development Guide, Workitect Inc., 1st Edition, 2012.	
4.	Lyle M. Spencer, Signe M. Spencer, Competence at work: Models for Superior Performance, John Wiley Publishing, 1st Edition 2008.	
5.	Rao T.V., Performance Management: Toward Organizational Excellence, SAGE, 2nd Edition, 2015.	
6.	Sumati Ray Anindya Basu Roy, Competency Based Human Resource Management, SAGE, 1st Edition, 2019.	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		M		S	M			
CO 2	M			M				
CO 3			M		S			S
CO 4	M					M		
CO 5	S						M	

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EC37		3	0	0	3

Stress Management		
Course Objectives		
C1	To understand the concept of stress management	
C2	To understand the impact of stress	
C3	To analyse the stress reduction techniques	
C4	To study the strategies to cope up with stress	
C5	To develop resilience to stress	
UNIT	Details	
I	Introduction to Stress Management: Introduction to stress: Meaning, Definition, Eustress, Distress, Stressor-emotional, intellectual, environmental, occupational/educational performance, social, physical, and spiritual stressors- Types of stress: Acute stress, Episodic Acute stress and chronic stress, Sources of stress, signs and Symptoms,	
II	Impact of Stress: Physiological Impact of stress, Psychological Impact of stress, Social Impact of stress, Types of intervention, The General Adaptation Syndrome - Fight or flight response, Stress warning signal	
III	Stress Reduction Techniques: Challenging Stressful Thinking, Problem Solving and Time Management, Psychological and Spiritual Relaxation Methods, Physical Methods of Stress Reduction, Preparing for the Future: College and Occupational Stress	
IV	Coping Strategies: Coping Mechanisms: Appraisal focused, Emotional focused and Problem focused - Stress problem solving Sequence - ABCDE problem solving Model	
V	Developing Resilience to Stress: Understanding stress level, Role of Personality Pattern, Self Esteem, Locus of Control, Role of Thoughts Beliefs and Emotions, Life Situation Intrapersonal: Assertiveness, Time Management	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Have a clear understanding on the concept of stress management	PO3
CO2	Illustrate the impact of stress and predict Stress warning signals	PO2
CO3	Develop ability to analyse the stress reduction techniques	PO1, PO4
CO4	Acquire the ability to identify the strategies to cope up with stress	PO5,PO6
CO5	Develop resilience strategies to stress	PO7,PO8
Reading List		
1.	Family stress management: A contextual approach, P Boss, CM Bryant, JA Mancini	
2.	Preventive Stress Management in Organizations, Thomas A. Wright, PhD, Joyce A. Adkins, PhD, Debra L. Nelson	
3.	Stress Management, Richard Pettinger	
4.	Stress and stress management, Crampton, Suzanne M; Hodge, John W; Mishra, Jitendra M; Price, Steve.	
References Books		

1.	Kajal A. Sharma, Cary L. Cooper, D.M. Pestonjee, Organizational Stress Around the World Research and Practice, Routledge, 1 st Edition, 2022.
2.	Rachel Lewis, Joanna Yarker, Emma Donaldson-Feilder, Preventing Stress in Organizations: How to Develop Positive Managers, Wiley Blackwell, 1 st Edition, 2011.
3.	Joe Martin - Managing Stress in the Workplace How to Get Rid of Stress at Work and Live a Longer Life, 1 st Edition, 2014.
4.	Emily Nagoski , Amelia Nagoski , Burnout: The Secret to Unlocking the Stress Cycle, Ballantine Books, 1 st Edition, 2019.
5.	Kelly McGonigal, The Upside of Stress: Why Stress Is Good for You, and How to Get Good at It, Avery Publishers, 1 st Edition 2016.
6.	Ashley Weinberg, Valerie Sutherland, Organizational Stress Management: A Strategic Approach, Palgrave Macmillan, 5 th Edition 2010.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1			M					
CO 2		M						
CO 3	M			S				
CO 4					M	M		
CO 5							M	M

S-Strong M-Medium L-Low

**ELECTIVE
LOGISTICS AND SUPPLY
CHAIN MANAGEMENT**

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260ED32		3	0	0	3

Supply Chain Management		
Course Objectives		
C1	To provide an in-depth understanding of various frameworks on the concepts of Supply Chain management	
C2	To analyze and evaluate the insights on Supply chain synergies	
C3	To examine the dimensions on Sales & Operation Planning	
C4	To appraise on the overview on Customer value and supply chain management	
C5	To appraise the various elements of supply chain analytics	
UNIT	Details	
I	Introduction to Supply Chain: Historical perspective Understanding Supply Chain key issues in supply chain management Objectives, importance, Decision phases - Examples of supply chains Supply chain strategies, The supply chain becomes value chain Supply chain as a competitive weapon	
II	Supply chain synergies: Collaborate with supply chain partners Supply Chain Drivers and Design Drivers of supply chain performance: Framework for structuring Facilities, including warehouse, Inventory, Transportation, Information, Sourcing, and Pricing – Yield management /Revenue management	
III	Sales and Operations Planning: Demand management Demand forecasting, Aggregate Planning and Managing Supply, Demand and Inventory Aggregate Planning in a Supply Chain: role, aggregate planning problems, strategies, role of IT, Implementation Responding to predictable variability in supply chain – Types of supply chains-creating responsive supply chains lean and agile supply chain their characteristics.	
IV	Leadership and Control: Customer value and supply chain management: Dimensions of customer value-value added services –customer value measures Push-pull boundary –mass customization and supply chain management outsource - Third and Fourth - Party Logistics providers – managing risk in supply chains Creating a sustainable supply chain.	
V	Supply chain analytics: Use of computer software in supply chain problems - Electronic commerce – emerging mega trends supply chain of the future –seeking structural flexibility–The multi-channel revolution 2020 vision.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the basic concepts of Supply Chain management.	PO4, PO6, PO8
CO2	Be able to apprehend, analyze and evaluate the insights on Supply chain synergies.	PO1, PO2
CO3	Be able to learn and examine the insights on Sales & Operation Planning.	PO5, PO6, PO7
CO4	Be able to classify, appraise and assess the Customer value and supply chain management.	PO4, PO5
CO5	Be able to appraise, and evaluate on the various	PO3, PO8

	elements of supply chain analytics.	
Reading List		
1.	Supply chain management and advanced planning, Springer.	
2.	Supply chain management: An international journal, Emerald.	
3.	Industrial marketing management, Elsevier.	
4.	Journal of Business logistics, Wiley online.	
References Books		
1.	The Supply Chain Revolution, Suman sarkar,2017, Amacom	
2.	Supply Chain Metrics that Matter, Lora M. Cecere , 2014,wiley publication.	
3.	Supply Chain Strategy, Second Edition Unleash the Power of Business Integration to Maximize Financial, Service, and Operations Performance, Edward Frazelle, 2017,McGraw hill.	
4.	Managing Supply Chain Operations, Lei Lei , 2017, World scientific publications	
5.	Essentials of Supply Chain Management, Michael H. Hugos ,2018,wiley publication	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				M		M		M
CO 2	M	S						
CO 3		S			M	M	M	
CO 4				S	S		S	
CO 5			S					S

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260ED33			3	0	0	3

Principles and Practice of Logistics Management		
Course Objectives		
C1	To provide an in-depth understanding of various frameworks on the concepts & functions of logistics.	
C2	To analyze and evaluate the activities of logistics & Inventory	
C3	To examine the dimensions of transportation warehousing and distribution	
C4	To appraise on the overview of operational need on effective logistic performance.	
C5	To appraise the various elements of logistics cost and need for integration.	
UNIT	Details	
I	Concepts of Logistics – Evolution – Nature and Importance – Components of Logistics Management – Competitive Advantages of Logistics – Functions of Logistics management – principles – Logistics Network – Integrated Logistics system.	
II	Elements of Logistics and Inventory carrying – Warehousing – Material handling – Order processing – Transportation – Demand Forecasting – Impact of Forecast on Logistics and Performance measurements.	
III	Transportation – participants in Transportation Decisions – Modes of Transportation – Factors influencing Transport economics – documents in Transport Decision Making Warehousing/Distribution – Functions of Warehouse – benefits of Warehouse – Service – Warehousing Alternatives – Warehouse site selection – Factors while initiating Warehouse Operations – Warehouse Management System.	
IV	Packing and Materials Handling – Functions of packaging – Communication – Packaging cost – Types of Packaging Material – Unitization – Containerization – Designing a package factors affecting choice of packaging materials.	
V	Organization for effective logistics performance – centralized and decentralized structures – stages of functional aggregation in organization, financial issues in logistics performance – Measures – Steps in ABC costing – Financial Gap Analysis integrated Logistics – Need for Integration – Activity Centers in Integrated Logistics Role of 3PL and 4PL – Principles of LIS.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of evolution and functions of logistics management.	PO1, PO2
CO2	Be able to apprehend, analyze and evaluate the basic principles of logistics, warehousing and material handling	PO1, PO2, PO3, PO8
CO3	Be able to learn and examine the process of transportation, distribution, packaging etc	PO5, PO6, PO7
CO4	Be able to classify, appraise and assess the knowledge on integrated logistics and linguistic information	PO4, PO5

	system.	
CO5	Be able to appraise, and evaluate on the various elements of logistics cost and need for integration in logistics facilities.	PO3, PO8
Reading List		
1.	Journal of Logistics Management, ingenta.	
2.	Periodicals of Engineering and Natural Sciences	
3.	The International Journal of Logistics Management, emerald.	
4.	Advances in Logistics and Supply Chain Management, springer.	
References Books		
1.	1st Edition Logistics Principles and Practice By Hessel Visser, 2007, Routledge.	
2.	Logistics and Supply Chain Management by Saikumari V. (Author), Purushothaman S (Author), Sultan Chand.	
3.	Logistics Management 1St Edn 2014 Edition by GANAPATHI AND NANDI, OXFORD	
4.	Textbook of Logistics and Supply Chain Management Agarwal D K, Trinity publications, 2018.	
5.	Logistics Management 3rd ED Paperback,2012 by V.V Sople ,Pearson publication.	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S						
CO 2	M	S	S					S
CO 3					M	M	M	
CO 4				S	S			
CO 5			S					S

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260ED34		3	0	0	3

Inventory & Warehousing Management		
Course Objectives		
C1	To provide an in-depth understanding of Inventory Management and its impact on Logistics	
C2	To analyze and evaluate the activities of various models, tools and techniques of Inventory control and inventory management	
C3	To examine the dimensions of knowledge of various inventory ranking methods, and how to use technology in inventory control	
C4	To appraise on the overview of basics of warehouse management, its location, layout and principles of warehouse design	
C5	To appraise the various elements on knowledge about the standardization, codification, safety and security of inventory and the role of Information technology in warehouse management	
UNIT	Details	
I	Introduction to Inventory – Definition, principles, role, functions and importance of Inventory, Types of Inventory, Inventory Policy, Costs Associated with Inventory, Inventory and Profitability, Impact of Inventory on total logical cost – Inventory management – objectives / importance, symptoms of poor inventory management, Improving effectiveness of inventory management.	
II	Inventory Control and models – Importance and scope of Inventory control, Selective Inventory control, Inventory Models – Economic Lot size, EOQ, Economic Batch Quantity [EBQ], ROL – reorder level, P model, Q model, two bin system, fair share allocation model, MRP, ABC analysis, Just in Time (JIT). Modern methods Kanban, DRP and ERP.	
III	Inventory Methods – Inventory ranking methods and Quadrant technique, FIFO, LIFO, Weighted average method, Inventory under certainly and uncertainly, Risk Management, Work in progress inventories, Finished Goods Inventories, Spare parts inventories, Use of Computers in Inventory Management – RFID, EDI, Satellite tracking system.	
IV	Warehouse Management – Definition, Principles, Roles, Importance of Warehouses, Need for Warehousing, Warehouse selection and planning, functions and operations of a warehouse, Warehouse location, Area of Warehouse, Factors affecting warehousing cost, Warehouse layout, Design principles.	
V	Planning – codification and standardization of the Materials, Incoming Materials Receipts, Retrieval and Transaction Processing System, Security and Loss Prevention, Consumption Based Planning – MRP and lot sizing procedure, Forecasting parameter and result, planned order planning file consolidation, Break bulk, Cross docking, Mixing, Assembly – competitive advantage, production support warehouse – ERP, Role of IT in warehousing.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of Inventory Management and its impact on Logistics.	PO1, PO4, PO6, PO8

CO2	Be able to apprehend, analyze and evaluate the basic principles of various models, tools and techniques of Inventory control and inventory management.	PO3, PO4
CO3	Be able to learn and examine the process of various inventory ranking methods, and how to use technology in inventory control.	PO5, PO6, PO7
CO4	Be able to classify, appraise and assess the basics of warehouse management its location, layout and principles of warehouse design.	PO4, PO5
CO5	Be able to appraise, and evaluate on the various elements of standardization, codification, safety and security of inventory and the role of Information technology in warehouse management	PO3, PO8

Reading List

1.	International Journal of Supply Chain and Inventory Management, Inderscience.
2.	International Journal of Logistics Systems and Management, Inderscience.
3.	Journal of Operations Management, wiley.
4.	International Journal of Logistics Research and Applications, Taylor and Francis

References Books

1.	Basics of Warehouse and Inventory Management: (The pillars of business Logistics) INDIA SPECIFIC EDITION 2022, by Villivalam Rangachari Rangarajan, Notion Press
2.	Inventory Management: Principles and Practices Paperback 2008, by P. Narayan (Author), Jaya Subramanian (Author), Excel books
3.	Best Practice in Inventory Management Hardcover, 1997 by Tony Wild (Author), Publisher A Butterworth-Heinemann Title.
4.	Hands-On Inventory Management (Resource Management) Hardcover 2007, Ed C. Mercado, Auer Bach Publications.
5.	Inventory Management, 2006, Chandra Bose, Prentice Hall India Learning Private Limited.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M			M		M		M
CO 2			M	S				
CO 3					M	M	M	
CO 4				S	S			
CO 5			M					S

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EE35		3	0	0	3

Distribution Management		
Course Objectives		
C1	To provide an in-depth understanding of logistics operating areas and their interrelationship.	
C2	To analyze and evaluate the activities of planning and decision making and process steps.	
C3	To examine the dimensions of organizing structure in distribution.	
C4	To appraise on the overview of distribution organization and its leadership and Control	
C5	To appraise the various elements of Business Ethics of the organization.	
UNIT	Details	
I	Introduction to Distribution Distribution – Definition – Need for physical distribution – functions of distribution – marketing forces affecting distribution. The distribution concept – System perspective. Physical distribution trends in India. Transportation: Scope – principles of transportation function – relationship of transportation to other business functions.	
II	Planning & Decision Making: Steps in Planning Process – Scope and Limitations –Short Term and Long Term Planning – Flexibility in Planning – Characteristics of aSound Plan – Management By Objectives (MBO). Strategic Management ProcessDecision MakingProcessandTechniques. Business Models	
III	Nature of Organizing: Organization Structure and Design - Authority Relationships –DelegationofAuthorityandDecentralization– InterdepartmentalCoordinator–emerging Trends in corporate Structure, Strategy and Culture – Impact of TechnologyonOrganizationaldesign– Mechanisticvs.AdoptiveStructures– FormalandInformalOrganization.Spanofcontrol– ProsandConsofNarrowandWideSpansofControl–OptimumSpan - ManagingChangeandInnovation.	
IV	Leadership and Control: Leadership: Approaches to Leadership andCommunication. Control:ConceptofControl– ApplicationoftheProcessofControlatDifferentLevelsofManagement(top,middleand firstline).PerformanceStandards–MeasurementsofPerformance – Remedial Action - An Integrated Control system in an Organization –Management by Exception (MBE)	
V	Business Ethics: Importance of Business Ethics – Ethical Issues and Dilemmas inBusiness - Ethical Decision Making and Ethical Leadership – Ethics Audit - BusinessEthicsand-CSRModels.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of logistics operating areas and their interrelationship.	PO4, PO6, PO8
CO2	Be able to apprehend, analyze and evaluate the basic	PO1, PO2

	principles of planning and decision making and process steps.	
CO3	Be able to learn and examine the process of organizing structure in distribution.	PO5, PO6, PO7
CO4	Be able to classify, appraise and assess the structure of distribution organization and its leadership and Control	PO4, PO5, PO7
CO5	Be able to appraise, and evaluate on the various elements of Business Ethics of the organization.	PO3, PO8
Reading List		
1.	Supply chain management and advanced planning, Springer.	
2.	Supply chain management: An international journal, Emerald.	
3.	Industrial marketing management, Elsevier.	
4.	Journal of Business logistics, Wiley online.	
References Books		
1.	D K Agrawal. (2007). Distribution and Logistics Management: A Strategic Marketing Approach: Macmillan publishers. India.	
2.	Kapoor Satish K & Kansal Purva (2003) Basics of Distribution Management: A Logistical Approach: Prentice HALL of India.	
3.	Alan Ruston, Phil Crouches, Peter Baker (2014) The Handbook of Logistics and Distribution Management: Kogan page India New Delhi.	
4.	Basics of distribution management: a logistics approach by Purva Kansal and Satish K. Kapoor, 2003.	
5.	The strategy of distribution management, by Martin Christopher , 1985	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				M		M		M
CO 2	M	S						
CO 3					M	M	M	
CO 4				S	S		S	
CO 5			S					S

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260ED36			3	0	0	3

Logistics Infrastructure		
Course Objectives		
C1	To provide an in-depth understanding of salient logistics infrastructure and environment.	
C2	To analyze and evaluate the activities of technical infrastructure and web.	
C3	To examine the dimensions modes of transportation and the infrastructure.	
C4	To appraise on the overview of storage operations and control.	
C5	To appraise the various elements of Infrastructure and Layout Of Container Terminals	
UNIT	Details	
I	Infrastructure: Salient Features - Importance - Types - Commercialization of Infrastructure - Infrastructure and Environment - Infrastructure and the poor-Policy framework -Indian Scenario - Phases of project development - Slow progress.	
II	Technology Infrastructure :Internet and World Wide Web, internet protocols-FTP, intranet and extranet, Cloud Service Models – SAAS, PAAS, IAAS, Cloud Deployment Models – Public Cloud, Private Cloud, Hybrid Cloud, Auto-Scaling in the Cloud, Internet information publishing technology-basics of webserver hardware and software.	
III	Transportation Selection – Tradeoff – modes of transportation – models for transportation and distribution – factors affecting network effectiveness– 3PLadvantages – Indian transport infrastructure – IT solutions–EDI, e-Commerce, e-Procurement – Bar Coding and RFID technology	
IV	Storehouse Operations and Control: Introduction, Objectives, Storehouse Operations and its Objectives, Daily Activities of Stores, Organizing a Store, Store Location and Layout, Selecting appropriate storage system, Centralisation, Decentralisation and variety reduction of stores, Store Housekeeping, Stores Accounting	
V	Infrastructure and Layout Of Container Terminals: Infrastructure and layout of container terminals - Berth and quay characteristics- Apron width, quay crane rails - Container yard size, layout and markings Container Freight Station (CFS) -Gates, offices, maintenance facilities, fencing and traffic control. Types and purpose of equipment used in container terminals - Ship to shore handling equipment – Yard equipment for transfer, storage and delivery - CFS and other terminal equipment, Terminal automation.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of the salient logistics infrastructure and environment.	PO4, PO6, PO8
CO2	Be able to apprehend, analyze and evaluate the basic principles of technical infrastructure and web.	PO1, PO2
CO3	Be able to learn and examine the process modes of	PO5, PO6, PO7

	transportation and the infrastructure.	
CO4	Be able to classify, appraise and assess the storage operations and control.	PO4, PO5
CO5	Be able to appraise, and evaluate on the various elements of Infrastructure and Layout Of Container Terminals	PO3, PO8

Reading List

1.	https://www.projectmanager.com/blog/purchase-management
2.	Supply chain management: An international journal, Emerald.
3.	Industrial marketing management, Elsevier.
4.	https://www.procurementexpress.com/purchase-orders/purchasing-management/

References Books

1.	David Simchi, Levi, Philip Kaminsky, Ravi Shankar. (2010). Designing & Managing the Supply Chain:TataMcGrawHill. 14 th Edition JOSHI R. N. (2013).
2.	Public Private Partnership in Infrastructure: Perspectives, Principles and Practices: VisionBooks. NewDelhi.K. Hariharan. (2007).
3.	Containerization, Multimodal Transport and Infrastructure Development in India: Shroff Publishers and distributors Pvt. Ltd. 5th Edition.
4.	Lean Logistics: High-velocity Logistics Infrastructure and C-5 Galaxy Timothy L. Ramey,1999.
5.	The fundamentals of military logistics: a primer of the logistics infrastructure,2005.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				M		M		M
CO 2	M	S						
CO 3		S			M	M	M	
CO 4				S	S			
CO 5			S					S

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260ED37		3	0	0	3

Packaging and Material Handling	
Course Objectives	
C1	To provide an in-depth understanding of packaging materials and design.
C2	To analyze and evaluate the activities of Functions and Essentials of Packaging.
C3	To examine the dimensions of consumer packaging Identification codes, bar codes, and electronic data interchange.
C4	To appraise on the overview of the Packing Considerations: Protection, Convenience, Environment, Use/Re- use- Cost and Competition.
C5	To appraise the various elements of Eco friendly Packaging for Exports- Scientific Packaging-Standardization in Packaging.
UNIT	Details
I	Packaging/Packing Materials & Components: Various Materials/Metals Flexible, Folding, Insulated, Corrugated Packing Materials-Packing materials: Paper, Wood, Adhesive, Aluminum foil, Cushioning-stuff, Packaging gas, Pallet, Paperboard, Plastic wrap, Shrink wrap, Screw cap, Slip sheet- Security printing- Stretch wrap – Time temperature indicator- Tinplate. Packaging Industry Process and Machining: Packaging Demands of Consumer goods Industry- Packaging Demands of Industrial Users-Technology Trends in Packaging Industry – Aseptic processing - Authentication-Automatic identification and data capture - Blow fill seal - Blow molding -Containerization -Electronic article surveillance -Graphic Design - Induction sealing -Plastic welding -Printing
II	Packaging: Meaning, Functions and Essentials of Packing- Packaging: Meaning, Functions and Essentials of Packaging- Difference between Packing and Packaging- Packing for Storage- Packing for Overseas Shipment-Packing for Inland Transportation- Packaging for Product content Protection-Test of packaging: Mechanical, Climatic & Lab test- International Care labeling code - Packaging cost
III	Packaging Types: Primary, Secondary and Tertiary- Requirements of Consumer Packaging, Channel Member Packaging and Transport Packaging - Shrink packaging – Identification codes, bar codes, and electronic data interchange (EDI)- Universal Product Code- GS1 Standards- package labels- Symbols used on packages and labels. Heavy, Medium and small Packaging- Active packaging-Child-resistant packaging Pilfer/Tamper Evident/Proof Packaging-Product-Packaging compatibility- Pharma Packaging- Food Packaging- Electronic goods Packaging- FMCG packaging- Heavy engineering Goods/Equipment Packaging.
IV	Packing Considerations: Protection, Convenience, Environment, Use/Re- use- Cost and Competition – Packing as a systems approach to Logistics- Transport/Storage Requirements- Physical, Chemical Environmental, Biological Nature of the Products Packing as Protection Against Hazards- Package design considerations: Structural design, marketing, shelf life, quality assurance, logistics, legal, regulatory, graphic design, end-use, environmental

	factors- Packaging for Marketing and Visual Appeal-Biodegradation -Recycling: Glass, Plastic & Paper-Reuse- Sustainable packaging - Waste management.	
V	Packaging Economics: Packaging Cost Vs Product cost- Cost Reduction in Packaging. Packing for Inventory Control, Value Analysis- Packing and Value Engineering, Packaging Laws-Consumer Protection in Food Packaging, Marking and Labeling, Eco friendly Packaging for Exports- Scientific Packaging-Standardization in Packaging. Quality assurance-Radio- frequency identification -Track and trace -Vacuum forming Verification and validation - Barcode printer - Barcode reader -Bottling line -Carton machine- Check weighed -Conveyor system -Heat gun - Heat sealer - Industrial robot Injection molding machine -Logistics automation	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of types of packaging materials and design.	PO1, PO6, PO8
CO2	Be able to apprehend, analyze and evaluate the basic principles of Functions and Essentials of Packaging.	PO3, PO4
CO3	Be able to learn and examine the process of consumer packaging Identification codes, bar codes, and electronic data interchange.	PO5, PO6, PO7
CO4	Be able to classify, appraise and assess the packing Considerations: Protection, Convenience, Environment, Use/Re- use- Cost and Competition.	PO4, PO5
CO5	Be able to appraise, and evaluate on the various elements of Eco friendly Packaging for Exports- Scientific Packaging-Standardization in Packaging.	PO3, PO8
Reading List		
1.	Supply chain management: An international journal, Emerald.	
2.	Industrial marketing management, Elsevier.	
3.	https://in.sagepub.com/en-in/sas/export-and-import-management/book276434	
4.	https://www.ettintl.com/blog/Why-Export-Import-Management-Course-Is-Important.html	
References Books		
1.	Calver G. (2003). What Is Packaging Design: Rot vision.	
2.	Dean D. A. (2000). Pharmaceutical Packaging Technology: Taylor & Francis.	
3.	McKinley A. H. (2004) Transport Packaging: IoPP.	
4.	Robertson G. L. (2005). Food Packaging.	
5.	Introduction to Materials Management Eighth Edition By Pearson, 2017.	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		M				M		M
CO 2			S	S				
CO 3					M	M	M	
CO 4				S	S			
CO 5			S					S

S-Strong M-Medium L-Low

**ELECTIVE
HOSPITAL MANAGEMENT**

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EE32			3	0	0	3

Health Policy and Health Care System		
Course Objectives		
C1	To provide an in-depth understanding of various frameworks on social determinants of health and broad concepts of Health scenarios in India.	
C2	To understand the activities of health agencies in India and the functions of international health organizations in the health care sector.	
C3	To illuminate the dimensions of public health policy, their structure, funding, governance, and their integration into the healthcare system.	
C4	To understand the overview of the Health Care Sector in India and assess the healthcare delivery system in the Hospitals.	
C5	To provide an overview of the various elements of Medical Tourism and to realize the potential of government policy on medical tourism in India.	
UNIT	Details	
I	Determinants of Health; Life Style – Socio – Economic conditions – Heredity – Environment – Health and Family Welfare Services – Other Factors – Health Scenario of India.	
II	Organizations for Health; Voluntary health agencies in India – Indian Red Cross Society – Indian Council for child welfare – Tuberculosis Association of India – RAI – Rockefeller Foundation – Ford Foundation - CARE - International organizations – WHO – UNICEF – UNDP.	
III	Health Policy; Meaning – Need – National health policy – features – National health programmers in India – Health planning – Planning under Five Year Plans – Plan Outlays. – National Population Policy.	
IV	Health care; concept of health care – Levels; Primary, Secondary, Tertiary – Health for all by 2000 A.D. – Health care system in India – Structure of Government Machinery – Private, Government, Corporate Hospitals.	
V	Medical Tourism; Role of Medical Tourism, Methods to attract Foreign Medical; Tourists, Facilities available for foreign patients, Role of travel Agencies, Govt. Policy on Medical Tourism.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand broad concepts of public health and role of healthcare in Human Development, Economic Development and Inclusive Growth.	P01, P05
CO2	Be able to apprehend basic principles of international health organizations in order to give them a better understanding of the wider context of health systems and public health across various countries.	P04, P08
CO3	Be able to learn the process of public health policy making and plans in healthcare system in India.	P04, P08

CO4	Be able to classify the health care the system at primary, secondary and national level and government machinery setup in India.	P06, P08
CO5	Have better understanding of medical tourism marketing, regulatory laws & Ethical issues for Medical Tourism.	P04, P06
Reading List		
1.	https://alraziuni.edu.ye/uploads/pdf/An-Introduction-to-Community-Health.pdf	
2.	https://www.who.int/docs/default-source/primary-health/vision.pdf	
3.	https://ncert.nic.in/textbook/pdf/gess302.pdf	
4.	https://www.researchgate.net/publication/25109436_Health_Policy_An_Introduction_to_Process_and_Power	
Reference Books		
1.	Robbins, S and Coulter, M, 11 th Edition, Management, Prentice Hall, 11 th edition, January 2012	
2.	Shaikh Ubaid, Disaster Management, Technical publications, 1 st edition, 2020	
3.	Koontz, H. and Weihrich, H., Essentials of Management: An International Perspective, 11 th Edition, Tata McGraw Hill Education Private Ltd., July 2020	
4.	Moniz Cynthia D(2018), Health Care Policy and Practice, fifth edition, Taylor & Francis.	
	ParkK,TextbookonHygieneandPreventiveMedicine,Banarsidas,Bhanoy	
5.	ParkTextbook of Preventive and Social Medicine 23rd edition (parkpsm)(English,Hardcover,K.PARK),2015	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussions, Debating or Presentations	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2				3			
CO 2				2				3
CO 3				3				2

CO 4						2		3
CO 5				S	3	M	2	

3-Strong

2-Medium

1-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EE33			3	0	0	3

Hospital Planning and Administration		
Course Objectives		
C1	To make the students understand the concept of hospital administration.	
C2	To provide insights on the location layout of hospitals.	
C3	To highlight on effective analysis of hospital utilization.	
C4	To throw light on critical, administration and service zone.	
C5	To understand different standards maintained in hospital.	
UNIT	Details	
I	Hospital:Classification–Changingroleofhospitals– Roleofhospitaladministration – Hospital system – Need for scientificplanning and design ofhospitals.	
II	Planning: Principles of Planning – Planning process – Size of the hospital – Size selection – Location Layout – Hospital architect – Selection of architect – Equipping a hospital – Graphics and design.	
III	Technical analysis: assessment the extent need for the hospital services – Demand and need – Factors influencing hospital utilization – Bed planning – Project cost – Land requirements – Space requirements – hospital drawings and documents.	
IV	Hospital Design: Building requirement – Entrance and ambulatory zone – diagnostic zone – Intermediate zone – Critical zone – Service zone – Administrative zone.	
V	Facilities Planning: Transport – Food Services – Communication – Information System – Minor facilities – others. Standard in Hospital: General Standards – Voluntary and mandatory Standards – Mechanical Standards – Electrical Standards – Standard for centralized medical gas system – Biomedical waste handling.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the concept of hospital administration.	P01,P04
CO2	Have insights on the location layout of hospitals.	P02,P06
CO3	Know the effective analysis of hospital utilization.	P02,P05
CO4	Have knowledge on critical administration & service zone.	P01,P08
CO5	Understands the different standards maintained in hospitals.	P07,P08
Reading List		
1.	https://www.pdfdrive.com/hospital-planning-and-administration-e25041502.html	
2.	https://www.researchgate.net/publication/259389319_hospital_administration	
3.	https://www.vpmthane.org/ad/Uploads/Hospital_Admin.pdf	

4.	http://202.91.76.90:81/fdScript/RootOfEBooks/E%20Book%20Collection%202021%20-%20A/MANAGEMENT/OBM752%20-%20Hospital%20Management%20(Ripped%20from%20Amazon%20Kindle%20eBooks%20by%20Sai%20Seena).pdf	
Reference Books		
1.	Shi, L. & Singh, A. D., 2009. Delivering Health Care in America, 4th ed., Jones & Bartlett Publishers.	
2.	Paradkar, R. A., 2008. Hospital and Clinical Pharmacy, 1st ed., Pragati Books Pvt.Ltd.	
3.	Ruggiero, S. J., 2008. Staffing patterns in hospital pharmacy; four case studies, 2nd ed., Duquesne University Press.	
4.	Schneider, J. M., 2010. Introduction to Public Health, 3rd ed., Jones and Bartlett Publishers, Inc.	
5.	Miller, M. K., 2006. Planning, Design, And Construction of Health Care Facilities, 1st ed., Joint Commission Resources.	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussions, Debating or Presentations	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2			3				
CO 2		2				3		
CO 3		2			3	3		
CO 4	2							3
CO 5							2	3
	3-Strong			2-Medium			1-Low	

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EE34			3	0	0	3

Hospital Records Management			
Course Objectives			
C1	To help the students in using of Information technology in Healthcare industry.		
C2	To acquaint the students with Hospital records maintenance systems.		
C3	To enhance the students with knowledge of latest trends in record maintenance.		
C4	To provide the students with insights on challenges in record maintenance.		
C5	To deliver students about the significance of statutory compliance in record administration.		
UNIT	Details	No. of Hours	Course Objectives
I	Hospital Records; Meaning – Functions – Importance of medical records to Patients, Doctors, Hospitals, Public Health, Press, LIC, Police – court of Law, Education and Research.		
II	Records Management; Registers, Forms; Meaning and importance – Principles of records keeping – Merits and limitations – Principles of records keeping – Merits and limitations – latest trends in record maintenance – Electronic forms of records maintenance		
III	Types – Out - patient record, in-patient records, causality, emergency, surgery, obstetrics and gynaecology, paediatrics, investigation and diagnosis.		
IV	Records Organization and Management; Classification of records – Bases for Classification – Indexing and filling of records – Problems associated with medical records.		
V	Medical Registers; Meaning - Types - Purpose – Advantages – Principles of designing records – Registers in various departments – Common issues. Medical Forms and Reports; Meaning – types and significance – Principles of designing – Statutory registers and reports to be maintained – Specimens.		
Total		45	
Course Outcomes			
Course Outcomes	On completion of this course, students will;	Program Outcomes	
CO1	Learn using of Information technology in Healthcare industry.	P01, P02	
CO2	Be able to acquire knowledge with respect to Hospital records maintenance systems.	P02, P08	
CO3	Be able to enhance their knowledge of latest trends in record maintenance.	P06, P08	
CO4	Get familiarized with the challenges in record maintenance.	P02, P03	
CO5	Know about the significance of statutory compliance in record administration.	P02, P07	

Reading List		
1.	https://www.researchgate.net/publication/343577236_HEALTH_RECORD_MANAGEMENT_SYSTEM_IN_PUBLIC_HOSPITALS_-AN_ANALYSIS	
2.	https://www.researchgate.net/publication/228740128_Electronic_Medical_Records_Management_Systems_An_Overview	
3.	http://www.irmt.org/documents/educ_training/public_sector_rec/IRMT_hospital_records.pdf	
4.	https://www.jlab.org/ir/records/handbook/records_handbook.pdf	
Reference Books		
1.	Rajendra Pal and Korlahalli J S, Essential of Business Communication, Sultan Chand and Sons, New Delhi	
2.	Prasanth Ghosh K, Office Management, Sultan Chand and Sons, New Delhi.	
3.	Francis CM and Mario C de Souza, Hospital Administration, 3 rd Ed. Jaypee Brothers, New Delhi	
4.	George, M A, The Hospital Administrator, Jaypee Brothers, New Delhi.	
5.	DC Joshi, Mamta Joshi, Hospital Administration, Jaypee brothers, 1 st edition.	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussions, Debating or Presentations	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	3						
CO 2		2						3
CO 3						2		3
CO 4		2	3					
CO 5		2					2	

3 - Strong

2 - Medium

1 - Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EE35			3	0	0	3

Hospital Core Services		
Course Objectives		
C1	To familiarize the students to the basic concepts of Hospital Services	
C2	To provide insights on Clinical Services	
C3	To throw light on importance of Non-Clinical Services	
C4	To discuss on Nursing services	
C5	To create awareness Hospital General Services and Hospital Information System	
UNIT	Details	
I	Hospital Services: Meaning – Types – Clinical – Non-Clinical – Nursing and Administrative Services, Departments in the Hospital Management.	
II	Clinical Services: Part I - Meaning – Importance- Types – Overview of each service. Clinical Services: Part II – Types Anesthesia – Internal medicine- Cardiology – Dermatology – Endocrinology – Gastroenterology – Nephrology – Neurology – Oncology – Orthopedics – Plastic Surgery – General Pediatrics – Urology – Obstetrics and Gynecology – Neonatology – Physiotherapy.	
III	Non-Clinical Services: Blood Bank Management, Meaning – Importance – Types – Blood Bank, Non-Clinical Services: Diagnostic Services (Laboratory Services): Clinical bio-chemistry – Clinical pathology – Clinical hematology – Histopathology – Microbiology-Immunology, Non-Clinical Services: Radiology and Imaging Services – Nuclear medicine – Radiotherapy, Non-Clinical Services: Pharmacy – Staff health – Medical staff organization and community health.	
IV	Nursing Services: Objectives – Nursing administration – Duty of nursing officers – Nursing and support staff in the ward – Nursing by-laws, rules, policies and procedures – Nursing meetings, Nursing Audit: Determining nursing complement in hospital – Health education.	
V	Hospital Administrative Services: Hospital administration – Hospital administrator – Duties of hospital administrator – Teaching – Training services (in-service education, attached medical college or paramedical sciences etc.), Hospital General Services: General and medical purchase – General stores, Hospital Information System: Computer and hospital information system.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be familiar with the basic concepts of Hospital Services	PO4, PO6, PO8
CO2	Compare and use appropriate Clinical Services	PO4, PO6
CO3	Categorize Non-Clinical Services, Medical staff organization and community health.	PO4, PO6, PO8
CO4	Summarize and manage Nursing services	PO4, PO6, PO8
CO5	Contrast and use Hospital General Services and	PO4, PO6, PO7

Hospital Information System		
Reading List		
1.	Kumar R and Goel S L, Hospital Managerial Services, Deep and Deep Publications, 2004,	
2.	Goel S L, Primary Health Care Management, Deep and Deep Publications, 2001	
3.	Journal of Hospital Medicine, Society of Hospital Medicine.	
4.	Journal of Hospital Infection, Elsevier.	
References Books		
1.	S.L.Geol, R.Kumar, Hospital Core Services, Hospital administration in the 21 st century, Deep & Deep Publication, 2004.	
2.	Gurol-Urganci Ipek, Understanding Health Services 2 nd edition, Open University Press.	
3.	S. L. Goel, &R. Kumar, Hospital Supportive Services, Deep & Deep Publication, 2004.	
4.	Joseph Tan, Handbook of Research on Emerging Perspectives on Healthcare Information Systems and Informatics (Advances in Healthcare Information Systems and administration) 1st Edition, IGI Global, 2018.	
5.	Lawrence F. Wolper, Health Care Administration: Managing Organized Delivery Systems, 5th Edition. Jones and Bartlett Publishers, Inc., 2010.	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				2		3		3
CO 2				2		3		
CO 3				2		3		3
CO 4				2		2		3

CO 5				2		3	2	
3 - Strong			2 - Medium			1 - Low		

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EE36			3	0	0	3

Hospital Support Services		
Course Objectives		
C1	To familiarize the students to the basic concepts of Hospital Support Services	
C2	To provide insights on Documentation and various services related to Emergency	
C3	To demonstrate importance of Laboratory safety and management	
C4	To elucidate on Dietary Services and Hospital Diets	
C5	To summarize on occupational hazards and Holistic Approach To Health	
UNIT	Details	
I	Basics of Hospital Support Services: Principles and methods of organizing, clinical and support services for hospitals. Role of supportive services / departments in the hospital management Nursing Care and Ward Management.	
II	Laboratories and Rules: Duties and responsibilities – Documentation and records Emergency Services: Ambulance service – First aid measures. Meaning-Importance of various services relate to Emergency Laboratories for Investigation: Laboratory rules – Conduct – Housekeeping.	
III	Laundry and Linen Services: Safety in the laboratory – Blood bank management Linen and Laundry: Meaning – Importance – Type of service. Laundry arrangements – Washing materials – Washing arrangements.	
IV	General Kitchen Equipment Store: Dietary Services and Hospital Diets: Important and function Equipment – Store – Day store – Visual arrangements General kitchen – Special diet kitchen –Food distribution.	
V	Holistic Approach to Health: Occupational Hazards –Physical Hazards, Chemical hazards, Biological hazards, Psycho-social Hazards, Prevention and Control Hazards. Evolution of Health Care delivery system– Changing trends in evolution of health care delivery system.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be familiar with the basic concepts of Hospital Support Services	P01, P02,P03
CO2	Compile and manage Documentation and various services related to Emergency	P03, P05,P06
CO3	Understand importance of Laboratory safety and management	P02,P04,P05,P08
CO4	Moderate Dietary Services and Hospital Diets	P03, P04, P08
CO5	Reflect concepts on occupational hazards and Holistic Approach To Health	P03, P06, P07,P08
Reading List		
1.	https://www.jaypeedigital.com/book/9789352501328	

2.	https://www.researchgate.net/publication/259389319_hospital_administration	
3.	https://www.academia.edu/38166165/Healthcare and Hospital Management Edited book Excel	
4.	https://www.scribd.com/document/460337396/Hospital-Support-Services-pdf	
Reference Books		
1.	Natrajan Sangeetha, Hospital support service, Excel Books, 2010.	
2.	S. L. Goel & R Kumar, Hospital support service, Deep & Deep Publication, 2004..	
3.	Francis CM & Mario C de. Souza, Hospital Administration, 3rd ed., Jaypee Brothers, 2019.	
4.	George, MA, The Hospital Administrator, Jaypee Brothers, N. Delhi, 2003.	
5.	Hospital Medical International Pvt. Ltd., Hospital Administration, Office Journal of I.H.A.	
6.	Llewellyn Davies R, & Macaulay H.M.C, Hospital Planning and Administration, Monograph series, Geneva, W.H.O, Jaypee Brothers, 1966.	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussions, Debating or Presentations	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	3					
CO 2			2		2	3		
CO 3		2		3	2			3
CO 4			2	3				3
CO 5			2			3	3	3

3 - Strong

2 - Medium

1 - Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EE37			3	0	0	3

Quality Assurance In Healthcare		
Course Objectives		
C1	To familiarize the students to the basic concepts of quality in Healthcare	
C2	To provide insights on Quality planning for Health service organization	
C3	To throw light on Tools of evaluating quality in medical care	
C4	To elucidate on Quality Assurance	
C5	To discuss on Quality Circle & Recognition	
UNIT	Details	
I	Quality-meaning, concept, importance-Quality terminologies-quality philosophies-Deming's 14 points, Juran & Crosby.	
II	Quality planning for service organization-Customer satisfaction-cost of quality, determinants of quality in medical care-norms for medical staff-Medical Audit. Medical Audit Committee.	
III	Tools of evaluating quality in medical care-Aspects of medical care that need evaluation-TQM concept- ISO 9000 Series, its implication on hospitals; Quality control techniques-Elective Competence, Bench marking.	
IV	Quality Assurance-major functions of Quality Assurance-patient care evaluation- Utilisation review, Continuous medical Education, Continuous Monitoring and Credentialing-Documentation Process-Communication System.	
V	Quality improvement-Problem solving-Employee Participation-instruction & measurement-Quality Circle-Quality Recognition-Quality Awards.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be familiar with the basic concepts of quality in Healthcare	P01, P02
CO2	Implement Quality planning for Health service organization	P03, P04, P08
CO3	Use Tools of evaluating quality in medical care	P03, P05, P06, P08
CO4	Plan Quality Assurance and audit the processes	P05, P06, P08
CO5	Form Quality Circles & Recognize improvements	P03, P05, P08
Reading List		
1.	https://www.jaypeedigital.com/book/9789350909652	
2.	https://www.moh.gov.gh/wp-content/uploads/2016/02/Healthcare-Quality-Assurance-Subdistrict.pdf	
3.	https://www.researchgate.net/publication/353807287 Text book of Quality management	
4.	https://www.pdfdrive.com/an-introduction-to-quality-assurance-in-health-care-e184351049.html	
Reference Books		

1.	Avedis Donabedian, An Introduction to Quality Assurance in Health care, OUS Publisher, 2003.
2.	Gyani J Girdhar, Handbook Of Healthcare Quality & Patient Safety, 2 nd Edition, Association of Health Care Providers 2017.
3.	Robert C Lloyd, Quality Health Care: A Guide to Developing and Using Indicators 2nd Edition, Jones & Bartlett Learning; 2nd edition 2017.
4.	Richard H. Egdahl, Paul M. Gertman , Quality Assurance in Health care, Imprint unknown, 1979.
5.	<u>Roger Ellis</u> , Quality Assurance of Healthcare: A Hand Book, CRC Press, 1993.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	3						
CO 2			2	2				2
CO 3			2		2	3		3
CO 4					2	2		3
CO 5			2		2			3

3 - Strong **2 – Medium** **1 - Low**

**ELECTIVE
SYSTEMS MANAGEMENT**

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EF32			3	0	0	3

Data Base Management System		
Course Objectives		
C1	To provide insights to the database concepts and modeling.	
C2	To throw light on RDBMS and basic structure of SQL.	
C3	To familiarize on integrity & domain constraints and normalization using functional, multivalued, join dependencies.	
C4	To create awareness and importance of object oriented data model.	
C5	To elucidate on database system architectures.	
SYLLABUS		
UNIT	Details	
I	Introduction – Data Models – Database languages – Transaction – Storage management – Database administrator – Users – overall system structure – Entity – Relationship Model – Basic concepts – Mapping constraints – keys – E - R Diagram – Weak Entity Sets – reduction of E- R Diagram to tables.	
II	Relational Model – structure – relational algebra – extended operations – Modifications on a database – views – SQL – basic structure – set operations – aggregate functions – Nested Sub queries – derived relations, views.	
III	Integrity constraints – Domain constraints – referential integrity – assertions – triggers – functional dependencies – relational database design – decomposition – normalization using functional, multivalued, Join dependencies– Domain – Key Normal form – alternative approaches.	
IV	Object Oriented data Model – Languages – Object Relational databases: Nested Relations – Complex types and object Orientation – Querying with complex types – creation of complex values and objects – comparison.	
V	Database System Architectures : Centralized Systems, Client server systems, Distributed systems, Parallel databases – introduction –inter query –intra query, intra-operation –interoperation parallelism –distributed databases –distributed data storage–network transparency –Query processing –Transaction model–Commit protocols –coordinator selection –concurrency control –deadlock handling –multi database systems.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Summarise the database concepts and modeling.	P02, P06
CO2	Recall the concept of RDBMS and basic structure of SQL.	P01, P06
CO3	Generalise on integrity & domain constraints and normalization using functional, multivalued, join dependencies.	P01, P05, P06
CO4	Formulate one's understanding on object oriented	P01, P06

	data model.	
CO5	Criticise and compare the database system architectures.	P02, P05, P06
Reading List		
1.	T. William Olle, Database management system, Encyclopedia of Computer Science	
2.	Journal of Intelligent Information Systems - Integrating Artificial Intelligence and Database Technologies, Springer	
3.	Knowledge and Information Systems, Springer	
4.	Journal of Network and Systems Management, Springer	
TEXT BOOKS		
1.	C.J. Date, A.Kannan, S.SwamiNadhan, An Introduction to Database systems, , Pearson, 8 th Edition, 2003	
2	Paneerselvam, R; Database Management Systems; PHI; 2018	
3	SatinderBal Gupta; Aditya Mittal; Introduction to Database Management; Laxmi Publication; 2009	
4	Raghu Ramakrishnan;JohannesGehrke; Database management systems; third edition; McGraw Hill; 2000	
5	Rajiv Chopra; Database management sytems: A Practical approach; 5 th edition; S Chand and company; 2008	
References Books		
1.	A Silberschatz, H Korth, S Sudarshan, “Database System and Concepts ”, McGraw-Hill, 6 th Edition, 2013	
2.	Raghurama Krishnan, Johannes Gehrke, Data base Management Systems, McGraw-Hill 3 rd Edition, 2014.	
3.	ElmasriNavathe, Fundamentals of Database Systems, Pearson Education, 7 th Edition, 2015	
4.	Rob, Coronel, “Database Systems”, Seventh Edition, Cengage Learning, 2006.	
	Total	100 Marks

CO – PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		S				S		
CO 2	M					S		
CO 3	M				S	M		
CO 4	S					M		
CO 5		S			S	M		

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EF33			3	0	0	3

System Analysis and Design		
Course Objectives		
C1	To familiarize the students on the fundamentals of system analysis and design.	
C2	To provide insights on computer-assisted tools and types of automated tools.	
C3	To throw light on review and selection fact-finding techniques.	
C4	To elucidate on the essentials of design designing effective output.	
C5	To create awareness and importance on software design & documentation and case studies on various domains.	
SYLLABUS		
UNIT	Details	
I	System Analysis Fundamentals: Introduction to System, System Analysis and Design, Need for System Analysis and Design, Role of the System Analyst System Development Strategies: SDLC, Structured Analysis Development Method, System Prototype Method.	
II	Case Tools: Benefits of Computer-Assisted Tools, Categories of Automated Tools, Case Components Organizations as System: Interrelatedness and Interdependence of System, System Process, Boundaries, System Feedback, Managing Project.	
III	Review and Selection Fact-Finding Techniques: Interview, Questionnaire, Record Review, Observation Data Flow Diagram: Advantages, Notations, Rules, Leveling, Logical and Physical DFD. Data Dictionary: Importance, Data Elements, Describing Process Specification Structured Decisions: Decision Tree, Decision Tables, Structured English.	
IV	The Essentials of Design Designing Effective Output: Objectives, Types of Output, Method, Factors to consider - Designing Effective Input: Objectives, Guideline for Form design, Screen and Web Forms, Designing User Interface: Objectives, Types of user interface, Designing Accurate Data – Entry Procedures: Objectives, Effective coding, Data-Entry Method, Ensuring data quality through input validation	
V	Quality Assurance through Software Engineering - Design of Software, Software design and documentation: Structured Flowcharts, HIPO, Warnier /Orr Diagrams Managing Quality Assurance: Level of Assurance, Level of Test Implementation of Information System: Training Strategies, Conversion, Post Implementation Review -Case Studies - Financial Accounting System - Payroll System – Library System - Inventory System - Online Banking System - Railway Reservation system(Input, Output, DFD)	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes

CO1	Recall the fundamentals of system analysis and design.	P01, P02
CO2	Describe the computer-assisted tools and types of automated tools.	P02, P06
CO3	Analyse the review and selection of fact-finding techniques.	P01, P04
CO4	Formulate the essentials of designing effective output.	P02, P06
CO5	Organise your understanding on software design & documentation and case studies on various domains.	P01, P06
Reading List		
1.	Finite Elements in Analysis and Design, Elsevier	
2.	Formal Methods in System Design, Springer	
3.	Journal of Systems and Software, Elsevier	
4.	Telecommunication Systems - Modelling, Analysis, Design and Management, Springer	
Text book		
1	V Rajaraman; Analysis and Design of Information Systems; PHI; 2018	
2	J B Dixit; Structured system Analysis and Design ; Laxmi Publications; 2007	
3	AruneshGoyal; System Analysis and Design ; PBI Learning; 2011	
4	Dr V k Jain; System Analysis and Design handbook; Dreamtech Press; 2000	
5	Preeti Gupta; Structured System Analysis and Design; Firewall Media; 2005	
References Books		
1.	Hoffer J. A, George J.F, Valacich J.S, Modern Systems Analysis and Design, Pearson Education, 6 th Edition, 2011	
2.	Alan Dennis and Barbara Wixom, Roberta M. Roth, Systems Analysis and Design, Wiley, 2018.	
3.	Whitten J. L, Bentley L. D, Systems Analysis and Design Methods, McGraw Hill, 2005.	
4.	Kenneth E. Kendall, Julie E. Kendall, Systems Analysis and Design, Pearson	
5.	Elias M. Awad, System Analysis and Design, Galgotia Publications Pvt. Ltd, 2010	

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S					S		
CO 2		S				S		
CO 3	M			S				
CO 4		M				M		
CO 5	S					S		

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE		23260EF34		3	0	0	3

Decision Support System		
Course Objectives		
C1	To provide insights on components and characteristics of DSS.	
C2	To throw light on modeling process, model directory and model base management system.	
C3	To familiarize on data structure and data base languages.	
C4	To create awareness and importance of dialog management, user interface and	
C5	To elucidate on development of decision support system.	
SYLLABUS		
UNIT	Details	
I	Introduction: Decision concept – Steps – Decision Support System – Components – Characteristics – Classifications and Applications.	
II	Model Management: Model – Modeling Process – Types of Models – Optimization – Simulation – Heuristic: Descriptive – Predictive Model Base – Modeling Languages – Model Directory, Model Base Management System – Model Execution, Integration and Command Processing – Model Packages.	
III	Data Management System: Data Base – Sources of Data – Data Directory – Data Structure and Data Base Languages – Query Facility – Data Management System – DBMS as DSS Development Tool.	
IV	Dialog Management: User Interface – Graphics – Multimedia – Visual Interactive Modeling – Natural language processing – Speech Recognition and Understanding – Issues in User interface.	
V	Development of Decision Support System: Development Process – Software and Hardware; Data Acquisition – Model Acquisition – Dialog development – Integration – Testing and Validation – Training and Implementation.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Have insights on components and characteristics of DSS.	P01, P02
CO2	Possess knowledge on DSS architecture; approaches to development; and models in DSS.	P02, P04
CO3	Possess knowledge on Group DSS and Executive Information Systems (EIS).	P01, P05
CO4	Have better understanding on AI and expert	P02, P06

CO5	Learn and understand on development of decision support system.	P01, P06
Reading List		
1.	Decision Support Systems and Electronic Commerce, Elsevier	
2.	Decision Support Systems, Science Direct	
3.	Decision Sciences – Wiley Online Library	
4.	Soft Computing - A Fusion of Foundations, Methodologies and Applications Springer	
Text Books		
1	Sitansu S Mitra; Decision Support Systems: Tools and Techniques; Wiley; 1986	
2	Ramanathan Sugumarar; John Degroote; Spatial Decision Support System: Principles and Practices; Taylor and Francis; 2011	
3	V S Janakiraman; Sarukesi, K; Decision Support Systems; PHI; 2008	
4	B Ravindranath; Decision Support Systems and Data Warehouses; NewAge International; 2003	
References Books		
1.	Efraim Turban, Jay E. Aronson, Ting-Peng Liang, Ramesh Sharda, Decision Support & Business Intelligent Systems, Pearson Education, 8 th Edition, 2007	
2.	Mallach, Efrem G, Decision Support & data Warehouse Systems –McGraw-Hill, 2002	
3.	Marakas, George. M, Decision Support Systems in the 21st century – Pearson Education, 1999	
4.	Daniel J Power, Decision Support Systems – Concepts and Resources for Managers: Quorum Books, 2002	
5.	Efraim Turban, Ramesh Sharda, DursunDelen, Business Intelligence and Analytics – Systems for decision support, Pearson, 2018	

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	M						
CO 2		S		S				
CO 3	M				S			
CO 4		M				S		
CO 5	S					M		

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EF35			3	0	0	3

Internet of Things (IoT)		
Course Objectives		
C1	To provide insights to the students on the basic concepts of IoT	
C2	To throw light on the various models related to IoT architecture.	
C3	To familiarize on the design and building blocks of IoT.	
C4	To create awareness and importance of data analytics tools for IoT.	
C5	To elucidate on IoT related case-studies and real world applications.	
SYLLABUS		
UNIT	Details	
I	Introduction: Evolution of Internet of Things - Physical Design of IoT - Logical Design of IoT - IoT Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific to IoTs.	
II	IoT Architecture: ETSI, IETF, OGC architectures - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture.	
III	Building IoT: IoT Systems - Logical Design using Python - IoT Physical Devices and Endpoints: What is an IoT Device - Basic building blocks of an IoT device - Exemplary Device: Raspberry Pi - Programming Raspberry Pi with Python - Other IoT Devices.	
IV	IoT Data Platform: Data Analytics for IoT: Introduction - Apache Hadoop - Using Hadoop Map Reduce for Batch Data Analysis - Apache Oozie - Apache Spark - Tools for IoT - Introduction - Chef: Setting up Chef.	
V	Case Studies and Real-World Applications: Real world design constraints - IoT Physical Servers & Cloud Offerings - Case Studies Illustrating IoT Design: Introduction - Asset management – Smart Cities - Environment - Productivity Applications.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Infer the basic concepts of IoT.	P04, P06
CO2	Comparison on the various models related to IoT architecture.	P02, P04, P05
CO3	Recall the design and building blocks of IoT.	P01, P02, P06, P07
CO4	Assess the importance of data analytics tools for IoT.	P02, P06, P07

CO5	Analyse the IoT related case-studies and real world applications.	P01,P02,P03,P06, P07
Reading List		
1.	Internet of Things – Science Direct	
2.	International Journal of Internet of Things and Cyber-Assurance, Inderscience	
3.	S Li, LD Xu, S Zhao, The internet of things: a survey, , Information systems frontiers, Springer	
4.	F Wortmann, K Flüchter ,Internet of things - Business & Information Systems Engineering, Springer	
	Text Books	
1.	ArshdeepBahga, Vijay Madiseti, - Internet of Things – A hands-on approach, University Press, 2015	
2	DrKamleshLakhwani; DrHemant Kumar Gianey; Joseph KoftWireko; Internet of Things; BPB Publications; 2020	
3	Sunil Cheruvu; Anil Kumar; Ned Smith; Demystufying Internet of Things Security: Successful IoT; Apress; 2019	
4	RajkumarBuyya; Amir VahidDastjerdi; IoT: Principles and Paradigms; Elsevier; 2016	
5	AbhikChaudhry; Internet of things, for things and by things; Taylor and Francis; 2019	
References Books		
2.	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Thingsl, Springer, 2011.	
3.	Honbo Zhou, —The Internet of Things in the Cloud: A Middleware Perspectivel, CRC Press, 2012.	
4.	Jan Holler, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, StefaAvesand. David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a	
5.	Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocolsl, Wiley, 2012	
6.	Adrian McEwen and Hakim Cassimally, “Designing the Internet of Things”, John Wiley & Sons, 2013.	

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1				S		S		
CO 2		M		S	S			
CO 3	S	S				M	M	
CO 4		M				S	S	
CO 5	S	S	S			M	S	

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EF36			3	0	0	3

Software Project and Quality management	
Course Objectives	
C1	To comprehend and reflect on overview of project planning, project evaluation, project analysis and technical planning, software estimation
C2	To elaborate and critically analyze Resource scheduling and management, CMM, key process indicators, process monitoring and control.
C3	To generate and align Critical Chain Project Management, Test Maturity Model & Six Sigma and collate reports.
C4	To evaluate existing Adaptive Project Framework and build quality models based on Six Sigma & Lean Process Model.
C5	To contrast Software configuration management processes and audit quality standardisations.
SYLLABUS	
UNIT	Details
I	Introduction: Project Overview - Traditional Project Management - Scoping the Project - Identifying Project Activities-An overview of project planning, project evaluation, project analysis and technical planning, software estimation. Organizational quality goals, policy, quality plans, certification, accreditation, process measurements, audits.
II	Requirements: Estimating Duration, Resource Requirements and Cost - Constructing and Analyzing the Project Network Diagram - Finalizing the Schedule and Cost Based on Resource Availability - Organizing and Conducting the Joint Project Planning Session. Capability Maturity Model: CMM & CMMI, goals, commitment, ability, measurement & verification, maturity levels, key process areas, key process indicators, process monitoring and control.
III	Project Teams: Recruiting Organizing and Managing the Project Team - Monitoring and Controlling Progress - Closing out the Projects - Critical Chain Project Management - Activity planning, project schedules, sequencing and scheduling projects. Test Maturity Model & Six Sigma: Overview, Key Process Areas, TPI framework of test quality, levels of maturity, assessment, analysis, reporting.
IV	Framework: Introduction to the Adaptive Project Framework - Version Scope - Cycle Plan - Cycle Build - Client Checkpoint - Post-Version Review - network planning model, shortening project duration, Identifying critical activities. Six Sigma & Lean Process Model: quality criteria, quality metrics, frameworks, process wastages, operational processes, guidelines and templates
V	Standardisations: Variations to APF- Software configuration management, Basic functions, Responsibilities, standards configuration management, prototyping,

	models of prototyping. Organizational Considerations - Project Portfolio Management - Project Support Office Case study - PRINCE Project management standards. Audits: ISO, CMM, People CMM, TMM, Six Sigma.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Comprehend and reflect on overview of project planning, project evaluation, project analysis and technical planning, software estimation	P01, P02, P06, P07
CO2	Critically analyze Resource scheduling and management, CMM, key process indicators, process monitoring and control.	P05, P06, P07
CO3	Generate and align Critical Chain Project Management, Test Maturity Model & Six Sigma and collate reports.	P01, P02, P06
CO4	Evaluate existing Adaptive Project Framework and build quality models based on Six Sigma & Lean Process Model.	P01, P02, P05, P06
CO5	Contrast and conclude Software configuration management processes and audit quality standardisations.	P04, P05, P07, P08
References Books		
1.	Richard L. Chamberlain, Planning Quality Project Management of (EMR/EHR) Software Products (HIMSS Book Series), CRC Press, 1 st Edition 2017.	
2.	Ronald Cummings - John, Owais Peer, Leading Quality: How Great Leaders Deliver High Quality Software and Accelerate Growth, ROI Press, 1 st Edition 2019.	
3.	Greg Caldwell, Lean Mastery: 8 Books in 1 - Master Lean Six Sigma & Build a Lean Enterprise, Accelerate Tasks with Scrum and Agile Project Management, Optimize with Kanban, and Adopt The Kaizen Mindset, Greg Caldwell Publishing, 1 st Edition 2020.	
4.	Tom C. Witt, IT Best Practices: Management, Teams, Quality, Performance, and Projects, CRC Press, 1 st Edition 2018.	
5.	Linda Westfall, The Certified Software Quality Engineer Handbook, ASQ Quality Press, 2 nd Edition, 2017.	
6.	Stephan Goericke, The Future of Software Quality Assurance, 1 st 2020, Springer Open.	

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	M				M	S	
CO 2					S	M	S	
CO 3	M	S				S		

CO 4	S	M			S	S		
CO 5				S	M		S	S

S-Strong M-Medium L-Low

SEM	THREE	NATURE	ELECTIVE	L	P	T	C
COURSE CODE	23260EF37			3	0	0	3

Data Warehousing	
Course Objectives	
C1	To provide insights to the characteristics and architecture of data warehouse.
C2	To throw light on the fundamentals, classification and major issues in data mining.
C3	To familiarize on APRIORI principle & Algorithm and Association rule
C4	To create awareness and importance of classification techniques, decision tree and
C5	To elucidate on the various clustering techniques.
SYLLABUS	
UNIT	Details
I	Data warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.
II	Data Mining: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration & Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.
III	Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.
IV	Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers , Classification techniques, Decision Trees- Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics, prediction: Accuracy and Error measures, Evaluating the accuracy of a classifier or a predictor, Ensemble methods.

V	Clustering: Clustering Overview, A Categorization of Major Clustering Methods, partitioning methods, hierarchical methods, , partitioning clustering-k-means algorithm, pam algorithm; hierarchical clustering-agglomerative methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Key Issues in Hierarchical Clustering, Strengths and Weakness, Outlier Detection.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Have insights to the characteristics and architecture of data warehouse.	P05, P06, P07
CO2	Possess knowledge on the fundamentals, classification and major issues in data mining.	P01, P02, P06
CO3	Possess knowledge on APRIORI principle & Algorithm and Association rule generation.	P01, P02, P06, P07
CO4	Have better understanding on classification techniques, decision tree and Bayesian Belief Networks.	P01, P05. P06
CO5	Learn and understand the various clustering techniques.	P04, P05, P07,
Reading List		
1.	Data Mining and Knowledge Discovery, Springer	
2.	International Journal of Information Management, Science Direct	
3.	BH Wixom, HJ Watson, An empirical investigation of the factors affecting data warehousing success, MIS quarterly, JSTOR	
Text Books		
1.	P Chandra, MK Gupta, Comprehensive survey on data warehousing research, International Journal of Information Technology, Springer	
2.	PaulrajPonniah, Data warehousing Fundamentals, Wiley Publications. 2 nd Edition, 2012	
3	Parteek Bhatia; Data mining and data warehousing; Principles and Practical applications; Cambridge University Press; 2019	
4	Arshad khan; Data warehousing 101 : Concepts and Implementation; iUniverse; 2003	
5	Prabhu CSR; Data warehousing: Concepts, Techniques and Products; PHI Universal; 2008	
References Books		
1.	George M. Marakas, Modern Data Warehousing, Mining and Visualization, Pearson Publications. 3 rd Impression, 2009	
2.	Jaiwei Ham and MichelineKamber, Data Mining concepts and techniques, Kauffmann Publishers, 2006	
3.	W.H.Inmon, Building the Data Warehouse, 4th edition Wiley India Pvt. Ltd, 2005.	
4.	Michel Berry and Gordon Linoff, Data mining techniques for Marketing, Sales and Customer support, John Wiley, 2011	

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
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CO 1					S	M	S	
CO 2	M	S				M		
CO 3	S	S				S	M	
CO 4	S				S	S		
CO 5				S	M		S	

S-Strong M-Medium L-Low

SEMESTER IV

SEM	THREE	NATURE	CORE	L	P	T	C
COURSE CODE	23260AEC41			4	0	1	4

Information Systems for Business	
Course Objectives	
C1	To enable students to understand the fundamentals of information system and its role of information in managerial decision making
C2	To throw light on fundamentals of information systems like TPS, DSS, and EIS.
C3	To manage system applications and data to best support functional areas of business
C4	To provide insights in securely managing database and information using the process of
C5	To elucidate the need and importance of ERP, its selection and implementation in workplace
SYLLABUS	
UNIT	Details
I	Introduction to information system - The management, structure and activities - Information needs and sources - Types of management decisions and information need. System classification Elements of system, input, output, process and feedback.
II	Transaction Processing information system, Office Automation System (OAS) - Knowledge workers System (KWS); MIS; Information system for managers, Intelligence information system - Decision support system - Executive information systems.
III	Functional Management Information System: Production / Operations Information system, Marketing Information Systems, Accounting Information system, Financial Information system, Human resource Information system.
IV	System Analysis and Design: The work of a system analyst - SDLC - System design - AGILE Model - Waterfall Model - Spiral Model - Iterative and Incremental Model - RAD Model - Requirement analysis - Data flow diagram, relationship diagram, design - Implementation - Evaluation and maintenance of MIS, Database System: Overview of Database - Components - advantages and disadvantages of database; Data Warehousing and Data Mining; Business Intelligence; Artificial Intelligence; Expert System; Big Data; Cyber Safety and Security - Cryptography; RSA Model of Encryption; Data Science - Block Chain Technology; E-commerce and E-Business models; IOT - RFID.
V	Enterprise Resource Planning (ERP) System, Benefits of the ERP, ERP how different from conventional packages, Need for ERP, ERP components, Selection of

	ERPPackage, ERP implementation, Customer Relationship management. Organisation & Types, Decision Making, Data & information, Characteristics & Classification of information, Cost & value of information, various channels of information and MIS; Information system audit and control – E-Governance.	
Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Learn the importance of data and information in managerial decision making.	PO1, PO2, PO6
CO2	Possess on the various IS and the its relevance to Organizational environment	PO3, PO5, PO8,
CO3	Understand the application of IS on the various functions like Accounting, Finance, Marketing, Operations and HR	PO1, PO3, PO5, PO8
CO4	To study the various models and new technologies	PO1, PO2, PO6, PO7
CO5	Be exposed on the importance of selecting the appropriate ERP and its implementation	PO1, PO2, PO5, PO8
Reading List		
1.	Information Systems for Business and Beyond – opentextbooks.site.	
2.	Management Information Systems: Managing the Digital firm – www.textbooks.com	
3.	Information systems Journal – Wiley Online Library.	
4.	Information Systems management in Business and development organisations – Harekrishna Misra – PHI Learning.	
References Books		
1.	Azam, M., Management Information System, McGraw Hill Education, 2012	
2.	Laudon, K., Laudon, J. and Dass, R., Management Information Systems – Managing the Digital Firm, 11 th Edition, Pearson, 2010.	
3.	Murdick, R.G., Ross, J.E. and Claggett, J.R., Information Systems for Modern Management, 3 rd Edition, PHI, 2011.	
4.	O'Brien, J.A., Morakas, G.M. and Behl, R., Management Information Systems, 9 th Edition, Tata McGraw-Hill Education, 2009.	
5.	Saunders, C.S. and Pearson, K.E., Managing and Using Information Systems, 3 rd Edition, Wiley India Pvt. Ltd., 2009.	
6.	Stair, R. and Reynolds, G., Information Systems, 10 th Edition, Cengage Learning, 2012.	

Sl. No	Course Objectives	No. of Hours
1	C1	12
2	C2	12
3	C3	12
4	C4	12
5	C5	12
	Total	60

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	2				3		
CO 2			3		3			3
CO 3	2		3		2			3
CO 4	3	3				2	3	

CO 5	3	2			2			3
		3-Strong		2-Medium		1-Low		

SEM	THREE	NATURE	PROJECT	L	P	T	C
COURSE CODE		23260PRW42		0	0	0	20

ProjectWork



**PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

B.COM. – REGULATION 2023

SEMESTER - I					
Course Code	Course Title	L	T	P	C
23110AEC11 / 23111AEC11 / 23132AEC11 / 23135AEC11 23111AEC12	Tamil – I/ Advanced English –I/ Hindi – I/ French – I	3	1	0	3
	English-I	3	1	0	3
23161AEC13	Financial Accounting -I	3	1	0	3
23161AEC14	Principles of Management	3	1	0	3
23161GEC15	Business Communication	3	1	0	3
23161GEC16	Business Economics	3	1	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23161SEC17	Managerial Skill Development	2	0	0	2
23161SEC18	Foundation course	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					
231AECCINC	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	0	0	0	1
	Total	24	6	0	25
SEMESTER - II					
23110AEC21 / 23111AEC21 / 23132AEC21 / 23135AEC21 23111AEC22	Tamil – I/ Advanced English –I/ Hindi – I/ French – I	3	1	0	3
	English-I	3	1	0	3
23161AEC23	Financial Accounting - II	4	1	0	3
23161AEC24	Business Law	4	1	0	3
23161GEC25	Business Environment	3	0	0	3
23161GEC26	Insurance and Risk	3	0	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23161SEC27	E-Business	2	0	0	2
23161SEC28	Elements of Insurance	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					
231AECCCMS	Communication Skills	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioural Etiquette	0	0	0	1
	Total	26	4	0	25

SEMESTER - III					
23110AEC31 / 23111AEC31 / 23132AEC31 / 23135AEC31	Tamil – I/ Advanced English –I/ Hindi – I/ French – I	3	1	0	3
23111AEC32	English-I	3	1	0	3
23161AEC33	Corporate accounting - I	4	1	0	3
23161AEC34	Company Law	4	1	0	3
23161GEC35	International Trade	3	0	0	3
23161GEC36	Principles of Marketing	3	0	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23161SEC37	Intellectual Property Rights	2	0	0	1
23161SEC38	Tally. ERP 9	1	0	1	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					
23160RMC39	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	0	0	0	1
	Total	25	4	1	24
SEMESTER - IV					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC45	Tamil-IV/Advanced English-IV/Hindi-IV/French-IV	3	0	0	3
23135AEC31	English-IV	3	0	0	3
23161AEC43	Corporate Accounting -II	4	0	0	3
23161AEC44	Business Mathematics & Statistics	4	0	0	3
23161GEC45	Consumerism & Consumer Protection	4	0	0	3
23161GEC46	E-Commerce	4	0	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23161SEC47	Information Technology Concepts	2	0	0	2
23161SEC48	Salesmanship	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC4)					
23161BRC49	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	0	0	2
AUDIT COURSE					
231LCSCLS	Leadership and Management Skills	0	0	0	1
	Total	30	0	0	27
SEMESTER - V					
23161AEC51	Cost Accounting -I	5	1	0	4

23161AEC52	Banking Law and Practice	5	1	0	4
23161AEC53	Income Tax Law and Practice I	5	1	0	4
23161AEC54	Auditing and Corporate Governance	4	0	0	3
23161DSC55-	Discipline Specific Elective	3	0	0	3
23161DSC56-	Discipline Specific Elective	3	0	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23161SEC57	Summer Internship /Industrial Training	0	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC5)					
231AECCVED	Value Education	2	0	0	2
AUDIT COURSE					
231ACLSPSL	Professional Skills	0	0	0	1
	Total	27	3	0	26
SEMESTER - VI					
23161AEC61	Cost Accounting -II	6	1	0	3
23161AEC62	Management Accounting	6	2	0	3
23161AEC63	Income Tax Law & Practice -II	6	2	0	3
23161DSC64-	Discipline Specific Elective	4	0	0	3
23161PRW65	Project Viva	0	0	0	4
SKILL ENHANCEMENT COURSE (SEC)					
23161SEC66	General awareness for Competitive Examinations	2	0	0	1
23161EXACT	Extension activity	0	0	0	1
AUDIT COURSE					
231ACSIKWS	Indian knowledge System	0	0	0	2
	Total	24	6	0	20
Total Credits - Programme					140
Total Credits - Audit Course					07

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER	COURSE CODE	COURSE TITLE
V	23161DSC55 -	Entrepreneurial Development
		Indirect Taxation
V	23161DSC56 -	Human Resource Management
		Disaster Management
VI	23161DSC64 -	Financial Management
		Computer Application in Business

B.COM CREDIT DISTRIBUTION

SEM	AEC	GEC	DSC	SECC	AECC	Audit	Research	Total
I	12	06	-	04	02	01	-	25
II	12	06	-	04	02	01	-	25
III	12	06	-	03	02	01	-	24
IV	12	06	-	04	04	01	-	27
V	15	-	06	02	02	01	-	26
VI	09	-	03	02	-	02	04	20
Total	72	24	09	19	12	07	04	147

	EMPLOYABILITY
	ENTERPRENURSHIP
	SKILL DEVELOPMENT

5. ଭୂମିକାଗ୍ରହଣ--ଭୂମିକାଗ୍ରହଣ

ଭୂମିକା-2 ଭୂମିକାଗ୍ରହଣ

- 1. ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ
- 2. ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ
- 3. ଭୂମିକାଗ୍ରହଣ-ଭୂମିକା, ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ
- 4. ଭୂମି. ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ

ଭୂମିକା-3 ଭୂମିକାଗ୍ରହଣ

1. ଭୂମିକାଗ୍ରହଣ
ଭୂ

- 2. ଭୂମିକାଗ୍ରହଣ
- 3. ଭୂମିକାଗ୍ରହଣ

ଭୂମିକା-4 ଭୂମିକାଗ୍ରହଣ

- 1. ଭୂମିକାଗ୍ରହଣ-ଭୂମି. ଭୂମିକାଗ୍ରହଣ
- 2. ଭୂମିକାଗ୍ରହଣ- ଭୂମି. ଭୂମିକାଗ୍ରହଣ
- 3. ଭୂମିକା--ଭୂମିକା

ଭୂମିକା-5 ଭୂମିକାଗ୍ରହଣ

- 1. ଭୂମିକା
- 2. ଭୂମିକା
- 3. ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ

ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ, ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ

ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ, ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ

ଭୂମିକାଗ୍ରହଣ
ଭୂମିକା:

- 1. ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ- ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ
- 2. ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ-ଭୂମିକାଗ୍ରହଣ

3. இயற்கை அறிவு- இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு

4. இயற்கை அறிவு- இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு

5. இயற்கை அறிவு- இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு இயற்கை அறிவு
 இயற்கை அறிவு-www.tamilvu.org

www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

CourseCode	CourseTitle	L	T	P	C
23111AEC12	English-I	3	1	0	3

Objective:

1. To enable learner to acquire the linguistic competence necessarily required in various life situations.
2. To help them understand the written text and able to use skimming, scanning skills
3. To assist them in creative thinking abilities
4. To enable them become better readers and writers
5. To assist them in developing correct reading habits, silently, extensively and intensively

Outcome:

- i. Read and comprehend literature
- ii. Appreciate the different types of poetry and prose

UNIT-I

Poetry

- 1.1 A Patch of Land-Subramania Bharati
- 1.3 A Nation's Strength-Ralph Waldo Emerson
- 1.4 Love Cycle-Chinua Achebe

UNIT-II

Prose

- 2.1 JRD-Harish Bhat
- 2.2 Us and Them-David Sedaris From Dress Your Family in Corduroy and Denim

UNIT-III

Short Stories

- 3.1 The Faltering Pendulum-
Bhabani Bhattacharya
- 3.2 How I Taught my Grandmother to Read-Sudha Murthy
- 3.3 The Gold Frame-

R.K.Laxman UNIT-IV

Language Competency

- 4.1 Vocabulary: Synonyms, Antonyms,
Word Formation
- 4.2 Appropriate use
of Articles and Parts of Speech
- 4.3 Error correction

UNIT-V

English for Workplace

- 5.1 Self-introduction, Greetings
- 5.2 Introducing others
- 5.3 Listening for General and Specific Information
- 5.4 Listening to and Giving Instructions/

Textbooks(LatestEditions)	
1	SteelHawkandotherstoriesbyBhattacharya, Bhabani, NewDelhi:SahityaAkademi,1967
2	HowItaughtmyGrandmothertoReadandotherStories, Murthy,Sudha,PenguinBooks,India,2004
WebResources	
1	A patch of land by Subramania Bharati translated by Usha Rajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
2	TheSparrowbyPaulLaurence Dunbar https://poets.org/poem/sparrow-0
3	ANation’sStrengthbyEmerson https://poets.org/poem/nations-strength
4	LovecyclebyChinuaAchebe: https://www.best-poems.net/chinua-achebe/love-cycle.html
5	JRDbyHarishBhat https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories
6	UsandThembyDavid Sedaris From Dress Your Family in Corduroy and Denim https://legacy.npr.org/programs/morning/features/2004/jun/sedaris/usandthem.html
7	UnclePodgerHangsaPicture: http://rosyhunt.blogspot.com/2013/01/uncle-podger-hangs-picture.html
8	TheGoldFrame: https://fybaenglish.blogspot.com/2018/12/the-gold-frame-r-k-laxman.html

CourseOutcomes

Oncompletionofthiscourse,studentswill;

- **CO1-**Developandintegratetheuseofthefourlanguageskills i.e.Reading, Listening,SpeakingandWriting
- **CO2-** Understandthetotalcontentandunderlyingmeaninginthecontext.
- **CO3-** Formthehabitofreadingforpleasureandforinformation
- **CO4-**Comprehendmaterialotherthantheprescribedtext
- **CO5-** Developthelinguisticcompetencethatenablesthem,inthefuture,topresentthecultureandcivilizationoftheirnation.

**SEMESTER-I
B.COM**

COURSECODE	COURSE TITLE	L	T	P	C
23161SEC13	Financial Accounting I	5	0	0	4

OBJECTIVES

- To understand the basic accounting concepts and standards.
- To know the basis for calculating business profits.
- To familiarize with the accounting treatment of depreciation.
- To learn the methods of calculating profit for single entry system.
- To gain knowledge on the accounting treatment of insurance claims.

UNIT-I

Fundamentals of Financial Accounting

Financial Accounting – Meaning, Definition, Objectives, Basic Accounting Concepts and Conventions -Journal, Ledger Accounts– Subsidiary Books — Trial Balance - Classification of Errors – Rectification of Errors– Preparation of Suspense Account– Need and Preparation- Bank Reconciliation Statement

UNIT-II

Final Accounts

Final Accounts of Sole Trading Concern- Capital and Revenue Expenditure and Receipts– Preparation of Trading, Profit and Loss Account and Balance Sheet with Adjustments.

UNIT- III

Depreciation and Bills of Exchange

Depreciation-Meaning–Objectives–Accounting Treatments-Types-Straight Line Method–Diminishing Balance method–Conversion method. Annuity Method–Depreciation Fund Method–Insurance Policy Method
– Revaluation Method– Depletion Method – Sum of Digits Method – Machine Hour Rate Method .**Bills of Exchange** – Definition – Specimens – Discounting of Bills – Endorsement of Bill – Collection –Noting–Renewal–Retirement of Bill under rebate–Insolvency of Acceptor–Accommodation.

UNIT-IV

Accounting from Incomplete Records

Incomplete Records -Meaning and Features -Limitations -Difference between Incomplete Records and Double Entry System - Methods of Calculation of Profit - Statement of Affairs Method – Preparation of final statements by Conversion method. Average Due Date and Account Current

UNIT-V

Royalty and Insurance of Claims

Meaning–Minimum Rent–Short Working–Recoupment of Short Working–Lessor and Lessee–Sublease – Accounting Treatment.

Course Outcomes

- CO1 Remember the concept of rectification of errors and Bank reconciliation statements
- CO2 Apply the knowledge in preparing detailed accounts of sole trading concerns
- CO3 Analyse the various methods of providing depreciation
- CO4 Evaluate the methods of calculation of profit
- CO5 Determine the royalty accounting treatment and claims from insurance companies in case of loss of stock.

Textbooks	
1.	S.P. Jain and K. L. Narang Financial Accounting- I, Kalyani Publishers, New Delhi.
2.	S.N. Maheshwari, Financial Accounting, Vikas Publications, Noida.
3.	Shukla Grewal and Gupta, "Advanced Accounts", volume 1, S. Chand and Sons, New Delhi.
4.	Radhaswamy and R.L. Gupta: Advanced Accounting, Sultan Chand, New Delhi.
5.	R.L. Gupta and V.K. Gupta, "Financial Accounting", Sultan Chand, New Delhi.
Reference Books	
1.	Dr. Arulanandan and Raman: Advanced Accountancy, Himalaya Publications, Mumbai.
2.	Tulsian, Advanced Accounting, Tata McGraw Hills, Noida.
3.	Charumathi and Vinayagam, Financial Accounting, S. Chand and Sons, New Delhi.
4.	Goyal and Tiwari, Financial Accounting, Taxmann Publications, New Delhi.
5.	Robert N Anthony, David Hawkins, Kenneth A. Merchant, Accounting: Text and Cases. McGraw-Hill Education, Noida.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2.	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3.	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	2	3	3	3	2	2	2	3	2	2
TOTAL	15	10	15	15	13	11	10	10	15	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	2	3	2	2

3- Strong, 2-Medium, 1-Low

Course title	Units	Hours allotment
Financial Accounting	I	15
	II	15
	III	15
	IV	15
	V	15

COURSECODE	COURSE TITLE	L	T	P	C
23161SEC14	PRINCIPLES OF MANAGEMENT	5	0	0	4

UNIT- I

Introduction to Management

Meaning-Definitions-Nature and Scope-Level of Management-Importance-
 Management Vs. Administration
 -Management: Science or Art-Evolution of Management Thoughts-F.W. Taylor, Henry Fayol,
 Peter F. Drucker, Elton Mayo - Functions of Management - Trends and Challenges of Management.
 Managers -Qualification-Duties&Responsibilities

UNIT -II

Planning

Planning - Meaning - Definitions - Nature - Scope and Functions - Importance and Elements of
 Planning -Types - Planning Process - Tools and Techniques of Planning - Management by Objective
 (MBO). Decision Making: Meaning-Characteristics-Types -Steps in Decision Making-Forecasting.

UNIT-III

Organizing

Meaning - Definitions - Nature and Scope - Characteristics - Importance - Types - Formal
 and Informal Organization - Organization Chart - Organization Structure: Meaning and Types -
 Departmentalization-Authority and Responsibility-Centralization and Decentralization-
 Span of Management

UNIT-IV

Staffing

Introduction - Concept of Staffing- Staffing Process - Recruitment - Sources of Recruitment -
 Modern Recruitment Methods- Selection Procedure- Test-Interview- Training: Need-Types-Promotion-
 Management Games - Performance Appraisal - Meaning and Methods - 360 Performance Appraisal - Work
 from Home -Managing Work from Home [WFH].

UNIT- V

Directing

Motivation-Meaning-Theories-Communication-Types-Barrier to Communications-
 Measures to Overcome the Barriers. Leadership-Nature-Types and Theories of Leadership-Styles of Leadership
 - Qualities of a Good Leader-Successful Women Leaders. Supervision.

Co-ordination and Control

Co-ordination-Meaning-Techniques of Co-ordination. Control-Characteristics-Importance-
 Stages in the Control Process- Requisites of Effective Control and Controlling Techniques-Management
 by Exception [MBE].

OUTCOME

- To understand the basic management concepts and functions.
- To know the various techniques of planning and decision making
- To familiarize with the concepts of organization structure
- To gain knowledge about the various components of staffing
- To enable the students in understanding the control techniques of management

Course Outcomes	
CO1	Demonstrate the importance of principles of management.
CO2	Paraphrase the importance of planning and decision making in an organization.
CO3	Comprehend the concept of various authorities and responsibilities of an organization.
CO4	Enumerate the various methods of Performance appraisal
CO5	Demonstrate the notion of directing, co-ordination and control in the management.
Textbooks	
1	Gupta.C.B,-Principles of Management- L.M.Prasad,S.Chand&Sons Co.Ltd,New Delhi.
2	Dinkar Pagare, Principles of Management, Sultan Chand & Sons Publications, New Delhi.
3	P.C.Tripathi & P.N.Reddy, Principles of Management. Tata McGraw, Hill, Noida.
4	L.M.Prasad, Principles of Management, S.Chand & Sons Co. Ltd, New Delhi.
5	R.K.Sharma, Shashi K. Gupta, Rahul Sharma, Business Management, Kalyani Publications, New Delhi.
Reference Books	
1	KSundhar, Principles of Management, Vijay Nichole Imprints Limited, Chennai
2	Harold Koontz, Heinz Weirich, Essentials of Management, McGraw Hill, Sultan Chand and Sons, New Delhi.
3	Griffin, Management principles and applications, Cengage learning, India.
4	H.Mintzberg- The Nature of Managerial Work, Harper & Row, New York.
5	Eccles, R.G.& Nohria, N. Beyond the Hype: Rediscovering the Essence of Management. Boston The Harvard Business School Press, India.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	http://www.universityofcalicut.info/sy1/management
2	https://www.managementstudyguide.com/manpower-planning.htm
3	https://www.businessmanagementideas.com/notes/management-notes/coordination/coordination/21392

PRISTUNIVERSITY, THANJAVUR

COURSE CODE	COURSE TITLE	L	T	P	C
23161AEC15A	Business Communication	4	0	0	3

UNIT- I

Introduction to Business Communication

Definition –Meaning– Importance of Effective Communication–Modern Communication Methods–Barriers to Communication– E-Communication- Business Letters: Need - Functions– Essentials of Effective Business Letters–Layout

UNIT-II

Trade Enquiries

Trade Enquiries– Orders and their Execution– Credit and Status Enquiries– Complaints and Adjustments–Collection Letters–Sales Letters–Circular Letters

UNIT-III

Banking Correspondence

Banking Correspondence–Types–Structure of Banking Correspondence– Elements of a Good Banking Correspondence–Insurance–Meaning and Types–Insurance Correspondence– Difference between Life and General Insurance– Meaning of Fire Insurance–Kinds – Correspondence Relating to Marine Insurance–Agency Correspondence– Introduction –Kinds–Stages of Agent Correspondence–Terms of Agency Correspondence

UNIT-IV

Secretarial Correspondence

Company Secretarial Correspondence–Introduction–Duties of Secretary–Classification of Secretarial Correspondence– Specimen letters –Agenda and Minutes of Report writing– Introduction – Types of Reports–Preparation of Report Writing

UNIT- V

Application Letters

Application Letters–Preparation of Resume–Interview: Meaning– Objectives and Techniques of Various Types of Interviews–Public Speech– Characteristics of a Good Speech

OUTCOME

- To enable the student to know about the principles, objectives and importance of communication in commerce and trade.
- To develop the student to understand about trade enquiries.
- To make the student aware about various types of business correspondence.
- To develop the student to write business reports.
- To enable the learner to update with various types of interviews

Course Outcomes

CO1	Acquire the basic concept of business communication.
CO2	Exposed to effective business letter
CO3	Paraphrase the concept of various correspondences.
CO4	Prepare Secretarial Correspondence like agenda, minutes and various business reports.
CO5	Acquire the skill of preparing an effective resume

Textbooks

1	Rajendra Pal & J.S. Korlahalli, Essentials of Business Communication - Sultan Chand & Sons - New Delhi.
2	Gupta and Jain, Business Communication, Sahitya Bahvan Publication, New Delhi.
3	K.P. Singha, Business Communication, Taxmann, New Delhi.
4	R.S.N. Pillai and Bhagavathi. S, Commercial Correspondence, Chand Publications, New Delhi.
5	M. S. Ramesh and R. Pattenshetty, Effective Business English and Correspondence, S. Chand & Co, Publishers, New Delhi.

Reference Books

1	V.K. Jain and Om Prakash, Business Communication, S. Chand, New Delhi.
2	Rithika Motwani, Business Communication, Taxmann, New Delhi.
3	Shirley Taylor, Communication for Business - Pearson Publications - New Delhi.
4	Bovee, Thill, Schatzman, Business Communication Today - Pearson Education, Private Ltd - New Delhi.
5	Penrose, Rasbery, Myers, Advanced Business Communication, Bangalore.

NOTE: Latest Edition of Textbooks May be Used

Web Resources

1	https://accountingseekho.com/
2	https://www.testpreptraining.com/business-communications-practice-exam-questions
3	https://bachelors.online.nmims.edu/degree-programs

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	2	2	2	2	2	2
CO2	3	3	2	3	2	2	2	3	2	2	2
CO3	3	3	2	3	2	2	2	2	2	2	2
CO4	3	3	2	3	2	2	2	2	2	2	2
CO5	3	3	2	3	2	2	2	2	2	2	2
TOTAL	15	15	15	15	10	10	10	11	10	10	10
AVERAGE	3	3	3	3	2	2	2	2.2	2	2	2

3- Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
BusinessComm unication	I	12
	II	12
	III	12
	IV	12
	V	12

Course Code	Course Title	L	T	P	C
23161AEC15C	Business Economics	4	0	0	3

Course Objectives:

- To understand the approaches to economic analysis
- To know the various determinants of demand
- To gain knowledge on concept and features of consumer behavior
- To learn the laws of variable proportions
- To enable the student to understand the objectives and importance of pricing policy

Unit I:

Introduction to Economics

Introduction to Economics – Wealth, Welfare and Scarcity Views on Economics – Positive and Normative Economics - Definition – Scope and Importance of Business Economics - Concepts: Production Possibility frontiers–Opportunity Cost–Accounting Profit and Economic Profit– Incremental and Marginal Concepts –Time and Discounting Principles– Concept of Efficiency- Business Cycle:- Inflation, Depression, Recession, Recovery, Reflation and Deflation

Unit II:

Demand & Supply Functions

Meaning of Demand - Demand Analysis: Demand Determinants, Law of Demand and its Exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance. Demand Forecasting - Factors Governing Demand Forecasting- Methods of Demand Forecasting, Law of Supply and Determinants.

Unit III:

Consumer Behaviour

Consumer Behaviour– Meaning, Concepts and Features– Law of Diminishing Marginal Utility – Equi-Marginal Utility – Indifference Curve: Meaning, Definition, Assumptions, Significance and Properties– Consumer’s Equilibrium. Price, Income and Substitution Effects. Types of Goods: Normal, Inferior and Giffen Goods - Derivation of Individual Demand Curve and Market Demand Curve with the help of Indifference Curve.

Unit IV:

Theory of Production

Concept of Production- Production Functions: Linear and Non-Linear Homogeneous Production Functions - Law of Variable Proportion– Laws of Returns to Scale - Difference between Laws of variable proportion and returns to scale– Economies of Scale– Internal and External Economies– Internal and External Diseconomies- Producer’s equilibrium

Unit V:

Product Pricing

Price and Output Determination under Perfect Competition, Short Period and Long Period Price Determination, Objectives of Pricing Policy, its importance, Pricing Methods and Objectives– Price Determination under Monopoly, kind of Monopoly, Price Discrimination, Determination of Price in Monopoly – Monopolistic Competition– Price Discrimination, Equilibrium of Firm in Monopolistic Competition– Oligopoly– Meaning– features, “Kinked Demand” Curve

Course Outcomes	
CO1	Explain the positive and negative approaches in economic analysis
CO2	Understand the factors of demand forecasting
CO3	Know the assumptions and significance of indifference curve
CO4	Outline the internal and external economies of scale
CO5	Relate and apply the various methods of pricing
Textbooks	
1	H.L.Ahuja, Business Economics–Micro&Macro - Sultan Chand&Sons, New Delhi.
2	C.M.Chaudhary, Business Economics-RBSA Publishers-Jaipur-03.
3	Aryamala.T, Business Economics, Vijay Nocol, Chennai.
4	T.P.Jain, Business Economics, Global Publication Pvt.Ltd, Chennai.
5	D.M.Mithani, Business Economics, Himalaya Publishing House, Mumbai.
Reference Books	
1	S.Shankaran, Business Economics-Margham Publications, Chennai.
2	P.L.Mehta, Managerial Economics–Analysis, Problems & Cases, Sultan Chand&Sons, New Delhi.
3	Peter Mitchelson and Andrew Mann, Economics for Business-Thomas Nelson Australia
4	Ramsingh and Vinaykumar, Business Economics, Thakur Publication Pvt.Ltd, Chennai.
5	Saluram and Priyanka Jindal, Business Economics, CA Foundation Study material, Chennai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://youtube.com/channel/UC69_-P77nf5-rKrjcpVEsqQ
2	https://www.icsi.edu/
3	https://www.yourarticlelibrary.com/marketing/pricing/product-pricing-objectives-basis-and-factors/74160

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	1	2	2
CO2	3	2	3	3	2	2	2	2	2	2	2
CO3	3	2	3	3	2	2	2	2	2	2	2
CO4	3	2	2	3	2	2	2	2	2	2	2
CO5	3	2	3	3	2	2	2	2	2	2	2
TOTAL	15	10	13	14	11	10	10	10	10	10	10
AVERAGE	3	2	2.6	2.8	2.2	2	2	2	2	2	2

3- Strong, 2-Medium, 1-Low

Course title	Units	Hours allotment
Business Economics	I	12
	II	12
	III	12
	IV	12
	V	12

CourseCode	CourseTitle	L	T	P	C
231AECCINC	ManagerialSkillDevelopment	-	-	-	2

OBJECTIVES:

- And to be a good manager it is important to have skills like Planning and creating an effective strategy, good communication skills, decision making, leadership skills, problem-solving skills, time management, conceptual skills, controlling, motivating, and leading the team, etc.

UNIT-I

Introduction to skills & personal skills Importance of competent managers, skills of effective managers, developing self-awareness on the issues of emotional intelligence, self learning styles, values, attitude towards change, learning of skills and applications of skills.

UNIT-II

Problem solving and building relationship: Problem solving, creativity, innovation, steps of analytical problem solving, limitations of analytical problem solving, impediments of creativity, multiple approaches to creativity, conceptual blocks, and conceptual block bursting. Skills development and application for above areas.

UNIT-III

Building relationship Skills for developing positive interpersonal communication, importance of supportive communication, coaching and counseling, defensiveness and disconfirmation, principles of supportive communications. Personal interview management. Skill analysis and application on above areas.

UNIT-IV

Team building: Developing teams and team work, advantages of team, leading team, team membership. Skill development and skill application.

UNIT-V

Empowering and delegating: Meaning of empowerment, dimensions of empowerment, how to develop empowerment, inhibitors of empowerment, delegating works. Skills development and skill application on above areas.

COURSE OUTCOMES:

- Making sound decisions in the workplace is essential in a managerial role. Effective managerial skills that help professionals make important choices include the ability to analyze and identify problems, challenges and opportunities and develop approaches that can solve problems or generate positive outcomes.

Course Code	Course Title	L	T	P	C
231AECCINC	Indian constitution	2	-	-	2

Course Objectives:

- To make the students understand about the democratic rule and parliamentary administration
- To appreciate the salient features of the Indian constitution
- To know the fundamental rights and constitutional remedies
- To make familiar with powers and positions of the union executive, union parliament and the supreme court
- To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Course outcome:

1. Democratic values and citizenship training are regained
2. Awareness on fundamental rights are established
3. The function of union government and state government are learnt
4. The power and functions of the judiciary are learnt thoroughly
5. Appreciation of democratic parliamentary rule is learnt

Unit I: The making of Indian constitution

The constitution assembly organization – character – works – salient features of the constitution – written and detailed constitution – socialism – secularism – democracy and republic.

Unit II: Fundamental rights and fundamental duties of the citizens

Right of equality – right of freedom – right against exploitation – right to freedom of religion – cultural and educational rights – right to constitutional remedies – fundamental duties .

Unit III: Directive principles of state policy

Socialistic principles – Gandhi an principles – liberal and general principles – differences between fundamental rights and directive principles

Unit IV: The union executive, union parliament and Supreme Court

Powers and positions of the president – qualification – method of election of president and vice president – prime minister – Rajya Sabha – Lok Sabha . the supreme court – high court – functions and position of supreme court and high court

Unit V: State council – elections system and parliamentary democracy in India

State council of ministers – chief minister – elections system in India – main features – election commission – features of Indian democracy.

References:

- 1) Palekar. s. a. Indian constitution government and politics, ABD publications, India
- 2) Aiyer, alladi krishnaswami, Constitution and fundamental rights 1955.
- 3) Markandan. k. c. directive Principles in the Indian constitution 1966.
- 4) Kashyap. Subashc, Our parliament, National book trust, New Delhi 1989

SEMESTER I

UNIVERSAL HUMAN VALUES UES

Course Code	Course Title	L	T	P	C
201ACLSUHV	Universal Human Values	-	-	-	2

Aim:

This course aims at making learners conscious about universal human values in an integral manner, without ignoring other aspects that are needed for learner's personality development.

Course Objectives:

The present course deals with meaning, purpose and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials.

Course Outcomes:

By the end of the course the learners will be able to:

1. Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.
2. Learn from case studies of lives of great and successful people who followed and practiced human values and achieved self-actualisation.
3. Become conscious practitioners of human values.
4. Realize their potential as human beings and conduct themselves properly in the waysof the world.

Unit I

- Introduction: What is love? Forms of love for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living
- Love and compassion and inter-relatedness
- Love, compassion, empathy, sympathy and non-violence
- Individuals who are remembered in history for practicing compassion and love.
- Narratives and anecdotes from history, literature including local folklore
- Practicing love and compassion: What will learners learn if they practice love and compassion? What will learners lose if they don't practice love and compassion?
- Sharing learner's individual and/or group experience(s)
- Simulated Situations
- Case studies

Unit II

- Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others)
- Individuals who are remembered in history for practicing this value
- Narratives and anecdotes from history, literature including local folklore
- Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?
- Learners' individual and/or group experience(s)
- Simulated situations
- Case studies

Unit III

- Introduction: What is non-violence? Its need. Love, compassion, empathy, sympathy for others as pre-requisites for non-violence
- Ahimsa as non-violence and non-killing
- Individuals and organisations that are known for their commitment to non-violence
- Narratives and anecdotes about non-violence from history, and literature including local folklore
- Practicing non-violence: What will learners learn/gain if they practice non-violence? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about non-violence
- Simulated situations
- Case studies

Unit IV

- Introduction: What is righteousness?
- Righteousness and *dharma*, Righteousness and Propriety
- Individuals who are remembered in history for practicing righteousness
- Narratives and anecdotes from history, literature including local folklore
- Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)
- Simulated situations
- Case studies

Unit V

- Introduction: What is peace? Its need, relation with harmony and balance
- Individuals and organisations that are known for their commitment to peace
- Narratives and Anecdotes about peace from history, and literature including local folklore
- Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about peace
- Simulated situations
- Case studies

Unit VI

- Introduction: What is service? Forms of service for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.
- Individuals who are remembered in history for practicing this value.
- Narratives and anecdotes dealing with instances of service from history, literature

Unit VII

- including local folklore
 - Practicing service: What will learners learn/gain if they practice service? What will learners lose if they don't practice it?
 - Sharing learners' individual and/or group experience(s) regarding service
 - Simulated situations
 - Case studies
-
- Introduction: What is renunciation? Renunciation and sacrifice. Self-restraint and ways of overcoming greed. Renunciation with action as true renunciation
 - Individuals who are remembered in history for practicing this value.
 - Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.
 - Practicing renunciation and sacrifice: What will learners learn/gain if they practice renunciation and sacrifice? What will learners lose if they don't practice it?
 - Sharing learners' individual and/or group experience(s)
 - Simulated situations
 - Case studies

இலக்கணம்:

1. இலக்கணம் - இலக்கணம்
2. இலக்கணம் இலக்கணம் இலக்கணம் - இலக்கணம் இலக்கணம் இலக்கணம்
3. இலக்கணம் இலக்கணம் இலக்கணம் - இலக்கணம் இலக்கணம் இலக்கணம், இலக்கணம் இலக்கணம்
4. இலக்கணம் இலக்கணம் இலக்கணம் - இலக்கணம் இலக்கணம் - இலக்கணம் இலக்கணம் இலக்கணம் - www.tamilvu.org, www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
20111AEC21	Advanced English-II	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To understand the format of e-mail, fax and memos
- To write itinerary, checklist, invitation, circular, instruction, recommendations
- To understand the impact of the biographies of famous people

Outcome:

- Develop technological skill
- Able to write in a variety of formats
- Read biographies and develop personality

UNIT-I

E-mail, Fax, Memos

UNIT-II

Itinerary, Checklist

UNIT-III

Invitation, Circular

UNIT-IV

Instruction, Recommendations

UNIT- V

Biographies of famous people: Mother Teresa- Madam Curie- Charles Chaplin- Vikram Sarabhai

Text Book

Author	Title of the book	Edition / Year	Publisher
Meenakshi Raman & Sangeetha Sharma	Technical Communication	2011	Oxford University Press
Rajendra Pal & J.S. Korlahalli	Business Communication	2015	Sultan

CourseCode	CourseTitle	L	T	P	C
23111AEC22	English-II	3	1	0	3

Objective:

- To introduce learner to the essential skills of communication in English To enable the student to appreciate literature
- To enable them use these skills effectively in academic and non-academic contexts
- To help them identify and eliminate common mistakes in writing and speaking
- To enable them use various business communication strategies and to use advanced vocabulary
- To familiarize them in writing descriptive essays and respond to arguments orally and in writing

UNIT– I

Poetry

- 1.1 Very Indian Poem in Indian English- Nissim Ezekiel
- 1.2 Still I Rise - Maya Angelou

1.3 On Killing a Tree -

Gieve Patel UNIT–II

Prose

- 2.1 If You Are Wrong Admit it- Dale Carnegie
- 2.2 Kindly Adjust Please - Shashi Tharoor
- 2.3 The Spoon-fed Age- W.R. Inge

UNIT–III

Fiction

Alchemist - Paulo Coelho

UNIT–IV

Language Competency

- 4.1 Homonyms, Homophones, Homographs Portmanteau words
- 4.2 Subject Verb Agreement

UNIT– V

English in the Workplace

- 5.1 Reading
for General and Specific information [charts, tables, schedules, graphs etc]
- 5.2 Reading news and weather reports
- 5.3 Writing paragraphs

5.4 Taking and making

notes Course Outcomes

- **CO1-** Learnt to introduce themselves and talk about everyday activities confidently
- **CO2-** Be able to write short paragraphs on people, places and events
- **CO3-** Identify the purpose of using various tenses and effectively employ them in speaking and writing
- **CO4-** Gain knowledge to write subjective and objective descriptions
- **CO5-** Identify and use their skill effectively in formal contexts

Text Books (Latest Editions)

1	The Alchemist-Paulo Coelho Harper-2005
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2	Descriptive English. <u>SP Bakshi, Richa Sharma</u> . 2019, Arihant Publications (India) Ltd.
3	The Reading Book: A Complete Guide to Teaching Reading. <u>Sheena Cameron, Louise Dempsey</u> , S&L Publishing, 2019.

4	SkimmingandScanningTechniques, <u>BarbaraSherman</u> , LibertyUniversityPress, 2014
5	BrilliantSpeedReading:Whateveryouneedtoread,however... <u>PhilChambers</u> ,Pearson,2013.
6	TheArcher, <u>PauloCoelho</u> .PenguinViking,2020.
WebResources	
1	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40_%20_2020103001102714.pdf
2	Still RisebyMayaAngelou https://www.poetryfoundation.org/poems/46446/still-i-rise
3	TheFlowerbyTennyson: https://www.poemhunter.com/poem/the-flower-2/
4	OnKillingatreebyGievePatel: https://www.poemhunter.com/poem/on-killing-a-tree/
5	Ifyouarewrong,admitit: https://www.tbr.fun/if-youre-wrong-admit-it/
6	KindlyAdjustplease -ShashiTharoor https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3IhtdXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKgiNKKwdkeSg3qWp-U/
7	TheSpoonFedAge: https://www.nrkacademy.com/2016/04/spoon-feeding-by-wringe.html
8	TheAlchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium ,

1 - LowMappingwithProgramme Specific Outcomes:

CO /PO	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	3	3	3	3	3

CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weighta ge	15	15	15	15	15
Weightedpercentage ofCourseContributiont oPos	3.0	3.0	3.0	3.0	3.0

SEMESTER-II
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COURSECODE	COURSE TITLE	L	T	P	C
23161SEC23	Financial Accounting II	4	1	1	4

OBJECTIVES

- The students are able to prepare different kinds of accounts such as Hire purchase and Instalments System
- To understand the allocation of expenses under departmental accounts
- To gain an understanding about partnership accounts relating to Admission and retirement
- Provides knowledge to the learners regarding Partnership Accounts relating to dissolution of firm
- To know the requirements of international accounting standards

Unit-I

Hire Purchase and Instalment System

Hire Purchase System – Accounting Treatment – Calculation of Interest – Default and Repossession – Hire Purchase Trading Account Instalment System – Calculation of Profit

Unit –II

Branch and Departmental Accounts

Branch – Dependent Branches: Accounting Aspects - Debtors system - Stock and Debtors system – Distinction between Wholesale Profit and Retail Profit – Independent Branches (Foreign Branches excluded) – Departmental Accounts: Basis of Allocation of Expenses – Inter-Departmental Transfer at Cost or Selling Price.

Unit-III

Partnership Accounts- I

Partnership Accounts: – Admission of a Partner – Treatment of Goodwill - Calculation of Hidden Goodwill – Retirement of a Partner – Death of a Partner.

Unit -IV

Partnership Accounts- II

Dissolution of Partnership - Methods – Settlement of Accounts Regarding Losses and Assets – Realization account – Treatment of Goodwill – Preparation of Balance Sheet - Insolvency of a Partner – One or more Partners insolvent – All Partners insolvent – Garner Vs Murray – Accounting Treatment – Piecemeal Distribution – Surplus Capital Method – Maximum Loss Method.

Unit-V

Accounting Standards for financial reporting

Objectives and Uses of Financial Statements for Users - Role of Accounting Standards - Development of Accounting Standards in India - Requirements of International Accounting Standards - Role of Developing IFRS - IFRS Adoption or Convergence in India - Implementation Plan in India - Ind AS - An Introduction - Difference between Ind AS and IFRS.

THEORY 20% & PROBLEMS 80%	
Course Outcomes	
CO1	To evaluate the Hire purchase accounts and Instalment systems
CO2	To prepare Branch accounts and Departmental Accounts
CO3	To understand the accounting treatment for admission and retirement in partnership
CO4	To know Settlement of accounts at the time of dissolution of a firm.

CO5	ToelaboratetheroleofIFRS
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Textbooks	
1	RadhaswamyandR.L.Gupta:AdvancedAccounting,SultanChand,NewDelhi.
2	M.C. ShuklaT.S.Grewal&S.C.Gupta,AdvanceAccounts, SChandPublishing, NewDelhi.
3	R.L.GuptaandV.K.Gupta,“FinancialAccounting”,SultanChand,NewDelhi.
4	SPJainandK. L.Narang:FinancialAccounting- I,KalyaniPublishers, NewDelhi.
5	T.S.Reddy&A.Murthy,FinancialAccounting,MargamPublishers,Chennai.
ReferenceBooks	
1	Dr.S.N.Maheswari:FinancialAccounting,VikasPublications,Noida.
2	Dr.Venkataraman&others(7lecturers):FinancialAccounting,VBH,Chennai.
3	Dr.ArulanandanandRaman:AdvancedAccountancy,Himalayapublications,Mumbai.
4	Tulsian,Advanced Accounting,TataMC.Grawhills,India.
5	CharumathiandVinayagam,FinancialAccounting,S.Chandandsons,NewDelhi.
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

**MAPPINGWITHPROGRAMMEOUTC
OMESANDPROGRAMMESPECIFICO
UTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	2	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	3	3	3	3	3	3	3	3	3	3
TOTAL	16	11	14	15	14	12	11	11	15	11	11
AVERAGE	3.2	2.2	2.8	3	2.8	2.4	2.2	2.2	3	2.2	2.2

3– Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
FinancialAccountingII	I	15
	II	15
	III	15
	IV	15
	V	15

SEMESTER-II
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COURSECODE	COURSE TITLE	L	T	P	C
23161SEC24	BusinessLaw	5	0	0	4

OBJECTIVES

- I. To know the nature and objectives of Mercantile law.
- II. To understand the essentials of valid contract
- III. To gain knowledge on performance contracts
- IV. To define the concepts of Bailment and pledge
- V. To understand the essentials of contract of sale

UNIT-I

Introduction

An introduction – Definition – Objectives of Law - Law: Meaning and its Significance, Mercantile Law: Meaning, Definition, Nature, Objectives, Sources, Problems of Mercantile Law.

UNIT-II

Element of Contract

Indian Contract Act 1872: Definition of Contract, Essentials of Valid Contract, Classification of Contract, Offer and Acceptance – Consideration – Capacity of Contract – Free Consent - Legality of Object – Contingent Contracts – Void Contract

UNIT-III

Performance Contract

Meaning of Performance, Offer to Perform, Devolution of Joint liabilities & Rights, Time and Place of Performance, Reciprocal Promises, Assignment of Contracts - Remedies for Breach of contract - Termination and Discharge of Contract - Quasi Contract.

UNIT-IV

Contract of Indemnity and Guarantee

Contract of Indemnity and Contract of Guarantee - Extent of Surety's Liability, Kinds of Guarantee, Rights of Surety, Discharge of Surety – Bailment and Pledge – Bailment – Concept – Essentials and Kind
- Classification of Bailments, Duties and Rights of Bailor and Bailee – Law of Pledge – Meaning – Essentials of Valid Pledge, Pledge and Lien, Rights of Pawner and Pawnee.

UNIT- V

Sale of Goods Act 1930:

Definition of Contract of Sale – Formation - Essentials of Contract of Sale - Conditions and Warranties - Transfer of Property – Contracts involving Sea Routes - Sale by Non-owners - Rights and duties of buyer - Rights of an Unpaid Seller

Course Outcome	
CO1	Explain the Objectives and significance of Mercantile law
CO2	Understand the clauses and exceptions of Indian Contract Act.
CO3	Explain concepts on performance, breach and discharge of contract.
CO4	Outline the contract of indemnity and guarantee
CO5	Explain the various provisions of Sale of Goods Act 1930
Textbooks	
1	N.D.Kapoor, Business Laws - Sultan Chand and Sons, New Delhi.
2	R.S.N.Pillai – Business Law, S.Chand, New Delhi.
3	MCKuchhal & Vivek Kuchhal, Business law, SChand Publishing, New Delhi

4	M.V.Dhandapani, Business Laws, Sultan Chand and Sons, New Delhi.
5	Shusma Aurora, Business Law, Taxmann, New Delhi.
Reference Books	
1	Preethi Agarwal, Business Law, CA foundation study material, Chennai.
2	Business Law by Saravanel, Sumathi, Anu, Himalaya Publications, Mumbai.
3	Kavya and Vidhyasagar, Business Law, Nithya Publication, New Delhi.
4	D. Geet, Business Law Nirali Prakashan Publication, Pune.
5	M.R. Sreenivasan, Business Laws, Margham Publications, Chennai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	www.cramerz.com www.digitalbusinesslawgroup.com
2	http://swcu.libguides.com/buslaw
3	http://libguides.slu.edu/businesslaw

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	2	2	2	2	2
CO2	3	2	3	3	2	2	2	2	2	2	2
CO3	3	2	2	3	2	2	2	2	2	2	2
CO4	3	2	3	3	2	2	2	2	2	2	2
CO5	3	2	3	3	2	2	2	2	2	2	2
TOTAL	15	10	13	15	10	10	10	10	10	10	10
AVERAGE	3	2	2.6	3	2	2	2	2	2	2	2

3- Strong, 2-Medium, 1-Low

Course title	Units	Hours allotment
Business Law	I	15
	II	15
	III	15
	IV	15
	V	15

SEMESTER-II

PRISTUNIVERSITY, THANJAVUR

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COURSECODE	COURSE TITLE	L	T	P	C
23161AEC25-A	Business Environment	4	0	0	3

OBJECTIVES

- To understand the nexus between environment and business
- To know the Political Environment in which the businesses operate.
- To gain an insight into Social Environment.
- To familiarize the concepts of an Economic Environment.
- To learn the trends in Global Environment.

UNIT- I

An Introduction

The Concept of Business Environment - Its Nature and Significance – Brief Overview of Political – Cultural – Legal – Economic and Social Environments and their Impact on Business and Strategic Decisions.

UNIT-II

Political Environment

Political Environment – Government and Business Relationship in India – Provisions of Indian Constitution Pertaining to Business.

UNIT-III

Social and Cultural Environment

Social and Cultural Environment – Impact of Foreign Culture – Castes and Communities – Linguistic and Religious Groups – Types of Social Organization – Social Responsibilities of Business.

UNIT-IV

Economic Environment

Economic Environment – Economic Systems and their Impact of Business – Macro Economic Parameters like GDP - Growth Rate Population – Urbanization - Fiscal Deficit – Plan Investment – Per Capita Income and their Impact on Business Decisions

UNIT-V

Technological Environment

Technological Environment – Meaning- Features OF Technology-Sources of Technology Dynamics- Transfer of Technology-Impact of Technology on Globalization- Status of Technology in India-Determinants of Technology Environment.

Course Outcomes	
CO1	Remember the nexus between environment and business.
CO2	Apply the knowledge of Political Environment in which the businesses operate.
CO3	Analyze the various aspects of Social Environment.
CO4	Evaluate the parameters in Economic Environment.
CO5	Create a conducive environment for businesses to operate globally.
Textbooks	
1	C.B. Gupta, Business Environment, Sulthan Chand & Sons, New Delhi

2	FrancisCherunilam,BusinessEnvironment,HimalayaPublishingHouse,Mumbai
3.	Dr.V.C.Sinha, BusinessEnvironment, SBPDPublishingHouse, UP.
4.	Aswathappa.K,EssentialsOfBusinessEnvironment,HimalayaPublishingHouse,Mumbai
5.	RosyJoshi, SangamKapoor&PriyaMahajan, BusinessEnvironment, KalyaniPublications, New Delhi
ReferenceBooks	
1.	Veenakeshavpailwar,BusinessEnvironment,PHILearningPvtLtd, NewDelhi
2.	Shaikhsaleem,BusinessEnvironment,Pearson,NewDelhi
3.	S.Sankaran,BusinessEnvironment,MarghamPublications,Chennai
4.	NamithaGopal,BusinessEnvironment, VijayNicoleImprintsLtd.,Chennai
5.	IanWorthington,ChrisBritton,EdThompson, TheBusinessEnvironment, FTPrenticeHall,NewJersey
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	www.mbaofficial.com
2	www.yourarticlelibrary.com
3	www.businesscasestudies.co.uk

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	2	2	3	2	3	3
CO2	3	2	2	3	3	2	3	3	2	3	3
CO3	3	2	3	3	3	2	3	3	2	3	3
CO4	3	2	3	3	3	2	2	3	2	3	3
CO5	3	2	3	3	3	2	3	3	3	3	3
TOTAL	15	10	14	15	15	10	13	15	11	15	15
AVERAGE	3	2	2.8	3	3	2	2.6	3	2.2	3	3

3–Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
BusinessEnvironment	I	12
	II	12
	III	12
	IV	12
	V	12

SEMESTER-II

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COURSECODE	COURSE TITLE	L	T	P	C
23161SEC25-B	Insurance and Risk Management	4	0	0	3

OBJECTIVES

- To know the concepts and principles of contract of insurance
- To understand the basic features of life insurance
- To gain knowledge on the principles of general insurance
- To examine the Insurance Regulatory and Development Authority 1999 (IRDA)
- To know the risk management process

UNIT- I

Introduction to Insurance

Definition of Insurance - Characteristics of Insurance – Principles of Contract of Insurance – General Concepts of Insurance – Insurance and Hedging – Types of Insurance – Insurance Intermediaries.

UNIT-II

Life Insurance

Life Insurance Business - Fundamental Principles of Life Insurance – Basic Features of Life Insurance Contracts - Life Insurance Products – Traditional and Unit Linked Policies – Individual and Group Policies - With and Without Profit Policies – Policies - Types of Life Insurance Policies..

UNIT-III

General Insurance

General Insurance Business - Fundamental Principles of General Insurance – Types - Fire Insurance - Marine Insurance – Motor Insurance – Personal Accident Insurance – Liability Insurance - Miscellaneous Insurance – Claims Settlement..

UNIT-IV

Risk Management

Risk Management – Objectives – Process – Identification, Evaluation, Retention and Risk Transfer – Risk Financing - Level of Risk Management – Corporate Risk Management – Management of Risk by Individual.

UNIT-

VIRDA

Act 199

9

Insurance Regulatory and Development Authority 1999 (IRDA) – Introduction – Purpose, Duties, Powers and Functions of IRDA – Operations of IRDA – Insurance Policyholders’ Protection under IRDA – Exposure/Prudential Norms - Summary Provisions of Related Acts.

Course Outcomes	
CO1	Identify the workings of insurance and hedging
CO2	Evaluate the types of insurance policies and settlement
CO3	Settle claims under various types of general insurance
CO4	Know the protection provided for insurance policyholders under IRDA

CO5	Evaluatetheassessmentandretentionofrisk
Textbooks	

1	Neeti Gupta, Anuj Gupta and Abha Chopra, Risk Management and Insurance, Kalyani Publishers, New Delhi.
2	Dr.N.Premavathy–ElementsofInsurance, SriVishnuPublications,Chennai.
3	M.N.Mishra&S.B.Mishra,InsurancePrinciplesandPractice,SChandPublishers,NewDelhi.
4	MichelCrouhy, TheEssentialsofRiskManagement, McGrawHill, Noida.
5	ThomasColeman, APracticalGuidetoRiskManagement,CFA, India.

ReferenceBooks	
1	JohnC.Hull,RiskManagementandFinancialInstitutions(WileyFinance),Johnwiley&sons,New Jersey.
2	P.K.Gupta,InsuranceandRiskManagement,HimalayaPublications,Mumbai.
3	Dr.Sunilkumar,InsuranceandRiskManagement,Golgiatipublishers,NewDelhi.
4	NaliniPravaTripathy, PrabirPaal,InsuranceTheory&Practice, PrenticeHallofIndia.
5	AnandGanguly–InsuranceManagement,NewAgeInternationalPublishers.

NOTE: Latest Edition of Textbooks May be Used

WebResources	
1	https://www.mcminnlaw.com/principles-of-insurance-contracts/
2	https://www.investopedia.com/terms/l/lifeinsurance.asp
3	https://www.irdai.gov.in/ADMINCMS/cms/frmGeneral_Layout.aspx?page=PageNo108&flag=1

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	2	2	2	2	2
CO2	3	2	3	2	2	2	2	2	2	2	2
CO3	3	2	3	2	2	2	2	2	2	2	2
CO4	3	2	3	2	2	2	2	2	2	2	2
CO5	3	2	3	2	2	2	2	2	2	2	2
TOTAL	15	10	15	10	10	10	10	10	10	10	10
AVERAGE	3	2	3	2	2	2	2	2	2	2	2

3– Strong, 2–Medium, 1–Low

Coursetitle	Units	Hoursallotment
InsuranceandRisk Management	I	12
	II	12
	III	12
	IV	12
	V	12

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COURSECODE	COURSE TITLE	L	T	P	C
23161SEC3	ElementsofInsurance	2	0	0	2

OBJECTIVES

- Tohighlighttheimportanceofinsuranceanditsbasicconcepts.
- Tomakethestudentsawareofvariousinsurance andtoimpactof economicdevelopment
- Toenablethestudentstopprepareprocedureregardingsettlementofpolicyclaims
- TounderstandthestudentsvariousPrinciplesoflifeInsurance,marine,fire,Medicalinsuranceetc.
- ToawarethestudentsknowPrinciplesoflifeinsuranceandvariouskinds

UNIT-I

INTRODUCTIONTOINSURANCE:

**Introductiontoinsurance:purposeandneedofinsurance–insuranceasasocialsecuritytool
–Insuranceandeconomicdevelopment–typesofinsurance.**

UNIT-II

LICENSEFORAGENT:

Procedure for becoming an agent: Pre-requisite for obtaining a license – duration of license – cancellationoflicense– revocation orsuspension/termination ofagentappointment–codeofconduct–unfairpractices.

UNIT-III

REGULATIONSFORAGENT:

Fundamentalsofagency-definitionofanagent–agentsregulations– insurance

intermediaries–agents’ compensation–IRDA.

UNIT -IV

FUNCTIONSOFAGENT:

Functions of the agent: proposal form and other forms for grant of cover – financial andmedical underwriting – material information – nomination and assignment – procedureregardingsettlementofpolicyclaims

UNIT-V

TYPESOFINSURANCE:

Fundamentals/Principlesoflifeinsurance/marine/fire/medical/generalinsurance:Contractsofvariouskinds–insurableinterest–Actuarialscience.

UNIT-VI

CURRENTCONTOURS:(ForContinuousInternalAssessment)

RecentTrends,assignmentsandSeminars

TEXT AND REFERENCE BOOKS: (Latest revised edition only)

1. Insurance by Dr.P.Periyasamy–Tata McGraw Hill
2. Fundamentals of Insurance by P.Periyasamy by Vijay Nicole Imprints (P) Ltd
3. Insurance in India by P.S.Palande, R.S.Shah.
4. Insurance principles and practices by Mishra M.N–S.Chand & Co.
5. Insurance Regulatory Development Act, 1999.

COURSE OUTCOME:

On successful completion of the subject the student acquired knowledge about

- Concept and conversion of elements of insurance
- Fundamentals of agency, Procedure for becoming an agent
- Knowledge about various methods of insurance policies.
- Calculation of Agent proposal form and other forms
- Know about procedure regarding settlement of policy claims.

SEMESTER II COMMUNICATIONS SKILLS

Course Code	Course Title	L	T	P	C
2311AECC2	Communication Skills	2	1	1	2

Course Objectives:

This course has been developed with the following objectives:

1. Identify common communication problems that may be holding learners back
2. Identify what their non-verbal messages are communicating to others
3. Understand role of communication in teaching-learning process
4. Learning to communicate through digital media
5. Understand the importance of empathetic listening
6. Explore communication beyond language.

Course Outcome:

By the end of this program, participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.

Unit I

- Techniques of effective listening
- Listening and comprehension
- Probing questions
- Barriers to listening

Unit II

- Pronunciation
- Enunciation
- Vocabulary
- Fluency
- Common Errors

Unit III

- Techniques of effective reading
- Gathering ideas and information from a given text
 - i. Identify the main claim of the text
 - ii. Identify the purpose of the text
 - iii. Identify the context of the text
 - iv. Identify the concepts mentioned
- Evaluating these ideas and information
 - i. Identify the arguments employed in the text
 - ii. Identify the theories employed or assumed in the text
- Interpret the text
 - i. To understand what a text says
 - ii. To understand what a text does
 - iii. To understand what a text means

Unit IV

- Clearly state the claims
- Avoid ambiguity, vagueness, unwanted generalizations and oversimplification of issues
- Provide background information
- Effectively argue the claim
- Provide evidence for the claims
- Use examples to explain concepts
- Follow convention
- Be properly sequenced
- Use proper signposting techniques
- Be well structured
 - i. Well-knit logical sequence
 - ii. Narrative sequence
 - iii. Category groupings
- Different modes of Writing-
 - i. E-mails
 - ii. Proposal writing for Higher Studies
 - iii. Recording the proceedings of meetings
 - iv. Any other mode of writing relevant for

learners Unit V

- Role of Digital literacy in professional life
- Trends and opportunities in using digital technology in the workplace
- Internet Basics
- Introduction to MS Office tools
 - i. Paint
 - ii. Office
 - iii. Excel
 - iv. Powerpoint

Unit VI

- Introduction to social media websites
- Advantages of social media
- Ethics and etiquettes of social media
- How to use Google search better
- Effectiveness of using Social Media
- Introduction to I Marketing

Unit VII

- Meaning of non-verbal communication
- Introduction to modes of non-verbal communication
- Breaking the misbeliefs
- Open and Closed Body language
- Eye Contact and Facial Expression
- Hand Gestures
- Do's and Don'ts
- Learning from experts
- Activities-Based Learning

Reference

1. Sen Madhuchanda (2010), *An Introduction to Critical Thinking*, Pearson, Delhi
2. Silvia P.J. (2007), *How to Read a Lot*, American Psychological Association, Washington DC

SEMESTER – III

Course Code	Course Title	L	T	P	C
23110AEC31	Tamil-III	4	0	0	2

23110AEC31

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Course Code	Course Title	L	T	P	C
20111AEC31	Advanced English-III	4	0	0	2

Aim:

- To improve the knowledge of English

Course Objective:

- To familiarize with the organs of speech and the description and classification of speech sounds
- To understand consonant cluster, syllable, word accent and intonation.
- To know how to interpret graphics
- To write slogans and advertisements

Course Outcome:

- Understand phonetics
- Develop writing skill
- Able to develop creative writing

UNIT-I

The organs of speech, Classification of speech sounds, Vowels and Diphthongs

UNIT-II

Consonants, Consonant cluster

UNIT-III

Syllable, Word accent, Intonation

UNIT-IV

Idiom, Interpretation of graphics

UNIT- V

Slogan writing, Writing advertisement

REFERENCE BOOKS:

Author	Title of the book	Edition/Year	Publisher
T.B. Balasubramaniyan	A text book of Phonetics for Indian Students	Reprint 2008	Macmillian
Meenakshi Sharma & Sangeetha Sharma	Technical Communication	2011	Oxford University Press

Course Code	Course Title	L	T	P	C
23111AEC32	English-III	0	0	0	3

Course Objective:

- To enhance the level of literary and aesthetic experience of students and to help them respond creatively.
- To sensitize them to the major issues in the society and the world.
- To provide them with an ability to build and enrich their communication skills
- To equip them to utilize the digital knowledge resource effectively for their chosen fields of study
- To help them think and write imaginatively and critically.

Course Outcome:

- Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives
- Be updated with basic informatic skills and attitudes relevant to the emerging knowledge society
- Produce grammatically and idiomatically correct language
- Gain knowledge in writing techniques to meet academic and professional needs
- Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.

UNIT- 1

Poetry:

- 1.1 The Voice of the Mountains- Mamang Dai
- 1.2 A Song of Hope- Oodgeroo Noonuccal
- 1.3 In an Artist's Studio- Christina Rossetti

UNIT-II

Scenes from Shakespeare:

- 2.1 Romeo & Juliet- The Balcony Scene
- 2.2 Macbeth- Banquet Scene
- 2.3 Julius Caesar- Murder Scene

UNIT-III

Speeches of Famous personalities

- 3.1 Yes, We Can- Barack Obama
- 3.2 You've Gotta Find What You Love- Steve Jobs

UNIT-IV

Language Competency

- 4.1 Writing letters and emails
- 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram, facebook]
- 4.3 Learning netiquette, email etiquette

UNIT- V

English for Workplace

- 5.1 Data Interpretation and Reporting
- 5.2 Data Presentation and analysis
- 5.3 Meeting Etiquettes- language, dress code, voice modulation. Online Meetings- Terms and expressions used
- 5.4 Conducting and participating in a meeting

TextBooks(LatestEditions)	
1	ArdenShakespeareComplete worksbyShakespeare(Author),William(Author), Bloomsbury,2011)
ReferencesBooks (LatestEditions, andthestyleasgivenbelowmustbestrictlyadheredto)	
1	<u>The Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DKPublishing,2015</u>
3	FamousSpeechesbyMahatma Gandhi,CreatespaceIndependentPublishingPlatform,2016
4	HowtoBuildaProfessionalDigitalProfileKindleEdition byJeanneKellyBernish,BernishCommunicationsAssociates, LLC;1stedition(May29,2012)
5	KeystoTeachingGrammartoEnglishLanguageLearners,SecondEd.: A Practical Handbook by <u>Keith S Folse</u> , Michigan TeacherTraining,2016.
6	RolePlay-TheoryandPractice. <u>KrysiMYardley-Matwiejczuk</u> ,SAGEpublicationsltd,1997

WebResources	
1	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3	Inanartist'sstudiobyChristinaRossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4	SitabyToruDutt: https://www.poetrynook.com/poem/s%E2%94%9C%C2%ABta
5	TrystwithDestiny: https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html#:~:text=Jawaharlal%20Nehru%2C%20delivering%20his%20Tryst%20with%20Destiny%20speech.&text=%22Long%20years%20ago%20we%20made,awake%20to%20life%20and%20freedom.
6	Yes, WeCan: https://www.englishspeecheschannel.com/english-speeches/barack-obama-speech/
7	You'vegottofindwhatyoulove: https://www.businessbusinessbusiness.com.au/steve-jobs-youve-got-to-find-what-you-love/#:~:text=Steve%20Jobs%2C%20in%20his%20commencement,emphasizes%20on%20believing%20in%20oneself.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium ,

1 - Low Mapping with Programme Specific Outcomes:

CO / PO	PSO 1	PS O2	PS O3	PS O4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Programme Specific Outcomes	3.0	3.0	3.0	3.0	3.0

SEMESTER-III

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COURSECODE	COURSE TITLE	L	T	P	C
23161AEC43	Corporate Accounting -II	4	0	0	3

OBJECTIVES

- To understand about the pro-rata allotment
- To know the provisions of companies, Act under Redemption of Preference shares and debentures
- To learn the form and contents of financial statements as per Schedule III of Companies Act 2013
- To examine the factors affecting goodwill of a company
- To identify the Significance of International financial reporting standard (IFRS)

UNIT- I

Issue of Shares

Issue of Shares-Forfeiture-Reissue-Pro-rata Allotment-Right Issue-Bonus Issue-Underwriting of Shares and Debentures-Underwriting Commission-Types of Underwriting

UNIT-II

Redemption of Preference Shares & Debentures

Redemption of Preference Shares-Provisions of Companies Act-Capital Redemption Reserve-Minimum Fresh Issue-Redemption at Premium. Debentures: Issue and Redemption-Meaning-Methods - In One Lot - in Instalment - Purchase in the Open Market includes Ex Interest and Cum Interest - Sinking Fund Investment Method

UNIT-III

Final Accounts

Introduction-Final Accounts-

Form and Contents of Financial Statements as Per Schedule III of Companies Act 2013 - Part I Form of Balance Sheet - Part II Form of Statement of Profit and Loss -Ascertaining profit for managerial remuneration. Profit prior to Incorporation.

UNIT-IV

Valuation of Goodwill & Shares

Valuation of Goodwill and Shares - Factors Affecting Goodwill - Methods of Valuation - Acquisition of Business

UNIT-V

Indian Accounting Standards

International Financial Reporting Standard (IFRS)-Meaning and its Applicability in India- Indian Accounting Standards-Meaning-Objectives-Significance-Accounting Standards in India- Procedures for Formulation of Standards - Ind AS - 1 Presentation of Financial Statement, Ind AS - 2 Valuation of Inventories, Ind AS - 7 Cash Flow Statement, Ind AS - 8 Accounting Policies, Changes in Accounting Estimate and Errors, Ind AS 12 Income Tax Indi AS - 16, Property Equipment Ind AS - 103, Business Combinations Ind AS 110, Consolidated Financial Statement.

Course Outcomes	
CO1	To understand the provisions for underwriting commission
CO2	To examine the provisions of issue and redemption of preference shares and debentures
CO3	To illustrate part, I and part II forms
CO4	To value shares and goodwill
CO5	To analyse INDAS 7,12,16
Textbooks	
1	S.P.Jain and N.L.Narang, Advanced Accounting Vol II, Kalyani Publication, New Delhi.

3	Broman, Corporate Accounting, Taxmann, New Delhi.
4	Shukla, Grewal and Gupta- Advanced Accounts Vol II, S. Chand, New Delhi.
5	M.C. Shukla, Advanced Accounting Vol I, S. Chand, New Delhi.
Reference Books	
1	T.S. Reddy, A. Murthy – Corporate Accounting – Margham Publication, Chennai.
2	D.S. Rawat & Nozer Shroff, Students Guide To Accounting Standards, Taxmann, New Delhi
3	Prof. Mukesh Bramhbut, Devi, Corporate Accounting I, Ahilya Publication, Madhya Pradesh
4	Anil Kumar, Rajesh Kumar, Corporate Accounting I, Himalaya Publishing house, Mumbai.
5	Prasanth Athma, Corporate Accounting I, Himalaya Publishing house, Mumbai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.tickertape.in/blog/issue-of-shares/
2	https://www.taxmann.com/bookstore/bookshop/bookfiles/chapter12valuationofgoodwillandshares.pdf
3	https://www.mca.gov.in/content/mca/global/en/acts-rules/ebooks/accounting-standards.html

**MAPPING WITH PROGRAMME OUTCOME
AND PROGRAMME SPECIFIC
OUTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	2	2	3	2	2
CO2	3	2	3	2	2	2	2	2	3	2	2
CO3	3	2	3	2	3	2	2	2	3	2	2
CO4	3	1	3	2	3	2	2	2	3	2	2
CO5	3	3	3	2	3	2	2	2	3	2	2
TOTAL	15	11	15	10	13	10	10	10	15	10	10
AVERAGE	3	2.2	3	2	2.6	2	2	2	3	2	2

3– Strong, 2–Medium, 1–Low

Course title	Units	Hours allotment
Corporate Accounting I	I	15
	II	15
	III	15
	IV	15
	V	15

SEMESTER-III

PRISTUNIVERSITY, THANJAVUR B.COM

COURSECODE	COURSE TITLE	L	T	P	C
23161AEC34	Company Law	4	1	0	3

OBJECTIVES

- To know Company Law 1956 and Companies Act 2013
- To have an understanding on the formation of a company
- To understand the requisites of meeting and resolution
- To gain knowledge on the procedure to appoint and remove Directors
- To familiarize with the various modes of winding up

UNIT- I

Introduction to Company Law

Companies Act 2013 – Definition of a Company, Characteristics of Company – Lifting or Piercing the Corporate Veil – Company Distinguished from Partnership and Limited Liabilities Partnerships – Classification of Companies – Based on Incorporation, Liability, Number of Members, Control.

UNIT-II

Formation of Company

Formation of a Company – Promoter – Fundamental Documents – Memorandum of Association – Contents – Alternation – Legal Effects – Articles of Association - Certificate of Incorporation – Prospectus – Contents – Kinds – Liabilities – Share Capital – Kinds – Issue – Alternation – Dividend – Debentures

UNIT-III

Meeting

Meeting and Resolution – Types – Requisites – Voting & Poll – Resolution – Ordinary, Special Audit & Auditors – Qualification, Disqualification, Appointment and Removal of an Auditor

UNIT-IV

Management & Administration

Management & Administration – Directors – Legal Position – Board of Directors – Appointment/Removal – Disqualification – Director Identification Number – Directorships – Powers – Duties – Board Committees – Related Party Transactions – Contract by One – Person Company – Insider Trading – Managing Director – Manager – Secretarial Audit – Administrative Aspects and Winding Up – National Company Law Tribunal (NCLT) – National Company Law Appellate Tribunal (NCLAT) – Special Courts.

UNIT- V

Winding up

Meaning – Modes – Compulsory Winding Up – Voluntary Winding Up – Consequences of Winding Up Order – Powers of Tribunal – Petition for Winding Up – Company Liquidator

Course Outcomes	
CO1	Understand the classification of companies under the act
CO2	Examine the contents of the Memorandum of Association & Articles of Association

CO3	KnowthequalificationanddisqualificationofAuditors
CO4	UnderstandtheworkingsofNationalCompanyLawAppellateTribunal(NCLAT)
CO5	Analysethemodesofwindingup
Textbooks	
1	N.D.Kapoor,BusinessLaws, SultanChandandSons,Chennai
2	R.S.N.Pillai– BusinessLaw,S.Chand,NewDelhi.
3	M.V.Dhandapani,BusinessLawsSultanChandandSons,Chennai
4	ShusmaAurora,BusinessLaw,Taxmann,NewDelhi
5	M.C.Kuchal,BusinessLaw,VikasPublication,Noida
ReferenceBooks	
1	Gaffoor&Thothadri, CompanyLaw,VijayNicholeImprintsLimited, Chennai
2	M.R.Sreenivasan,BusinessLaws,MarghamPublications,Chennai
3	KavyaAndVidhyasagar,BusinessLaw,NithyaPublication,Bhopal
4	S.D.Geet,BusinessLawNiraliPrakashanPublication,Pune
5	PreethiAgarwal,BusinessLaw,CAfoundationstudymaterial
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	https://www.mca.gov.in/content/mca/global/en/acts-rules/companies-act/companies-act-2013.html
2	https://vakilsearch.com/blog/explain-procedure-formation-company/
3	https://www.investopedia.com/terms/w/windingup.asp

**MAPPINGWITHPROGRAMMEOUTC
OMESANDPROGRAMMESPECIFICO
UTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	3	2	3	3	2	2
CO2	3	2	3	2	3	3	2	3	3	2	2
CO3	3	2	3	2	3	3	2	3	3	2	2
CO4	3	2	3	2	3	3	2	3	3	2	2
CO5	3	2	3	2	3	3	2	3	3	2	2
TOTAL	15	10	15	10	15	15	10	15	15	10	10
AVERAGE	3	2	3	2	3	3	2	3	3	2	2

3- Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
CompanyLaw	I	15
	II	15
	III	15
	IV	15
	V	15

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COURSECODE	COURSE TITLE	L	T	P	C
23161GEC35	International Trade	3	0	0	3

OBJECTIVES:

- To enable students familiarise with the basics of International Trade
- To know the various theories of international trade.
- To impart knowledge about balance of trade and exchange rates
- To gain knowledge about international institutions
- To gain insight on World Trade Organisation

UNIT- I

Introduction to International Trade – Meaning – Definition – Difference between Internal and International Trade – Importance of International Trade in the Global context

UNIT-II

Theories of International trade: Classical theories - Adam Smith's theory of Absolute Advantage – Ricardo's Comparative cost theory - Modern theories of International Trade - Haberler's Opportunity Cost theory – Heckscher – Ohlin's Modern theory – International trade and Factor Mobility Theory – Leontiff's Paradox-International trade and economic growth theory- Immiserating growth theory.

UNIT-III

Balance of Payments – Components of Balance of Payments - Current account, Capital account & Official settlement accounts - Disequilibrium in BOP - Methods of correcting Disequilibrium - Balance of Payment adjustment Theories- Marshall Lerner mechanism. Balance of Trade – Terms of Trade – Meaning – Definition – Difference between BOP and BOT.

UNIT-IV

International Economic Institutions- International Monetary System- Bretton Woods Conference – IMF- Objectives, Organizational structure – Membership – Quotas – Borrowing and Lending Programme of IMF – SDRs – India and IMF- World Bank and UNCTAD..

UNIT- V

World Trade Organisation (WTO) – Functions and Objectives – Agricultural Agreements – GATS - TRIPS – TRIMS

Course Outcomes	
CO1	Distinguish between the concept of internal and international trade.
CO2	Define the various theories of international trade.
CO3	Examine the balance of trade and exchange rates
CO4	Appraise the role of IMF and IBRD.
CO5	Define the workings of WTO and with special reference to India.
Textbooks	

1	FrancisCherunilam,InternationalTradeandExportManagement–HimalayaPublishing House-Mumbai–04.
2	Paul.R.KrugmanandMauriceObstfeld, InternationalEconomics(TheoryandPolicy)- PearsonEducationAsia-AddisonWesleyLongman(P)Ltd.-Delhi– 92.

3	Robert J. Carbaugh, International Economics- Thomson Information Publishing Group- Wadsworth Publishing Company-California.
4	H.G. Mannur, International Economics–Vikas Publishing House(P)Ltd–New Delhi-14.
5	Bimal Jaiswal & Richa Banerjee, Introduction To International Business, Himalaya Publication, Mumbai
Reference Books	
1	Dr. T. Aryamala, Vijay Nicole, International Trade, Chennai
2	Avadhani, V. A. International Financial Management, Himalaya Publications, Mumbai
3	Punam Agarwal and Jatinder Kaur, International Business, Kalyani Publications, New Delhi
4	S Sankaran, International Trade, Margham Publication, Chennai
5	CB Gupta, International Business, S Chand Publishing, New Delhi
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://opentext.wsu.edu/cpim/chapter/2-1-international-trade/
2	https://www.economicdiscussion.net/balance-of-payment/balance-of-payments-international-trade-economics/30644
3	https://www.wto.org/english/thewto_e/countries_e/india_e.htm

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	2	2	2	3	2
CO2	3	2	3	2	3	2	2	2	2	3	2
CO3	3	2	3	2	3	2	2	2	2	3	2
CO4	3	2	3	2	2	2	2	2	2	3	2
CO5	3	2	3	2	2	2	2	2	2	3	2
TOTAL	15	10	15	10	12	10	10	10	10	15	10
AVERAGE	3	2	3	2	2.4	2	2	2	2	3	2

3– Strong, 2-Medium, 1-Low

Course title	Units	Hours allotment
International Trade	I	12
	II	12
	III	12
	IV	12
	V	12

SEMESTER-III
PRISTUNIVERSITY, THANJAVUR
B.COM

COURSE CODE	COURSE TITLE	L	T	P	C
23161GEC36	Principles of Marketing	3	0	0	3

OBJECTIVES

- To know the concept and functions of marketing
- To understand the importance of market segmentation
- To examine the stages of new product development
- To gain knowledge on the various advertising medias
- To analyse the global market environment

UNIT- I

Introduction to Marketing

Meaning-Definition and Functions of Marketing- Evolution of Marketing Concepts- Marketing Orientation- Innovations in Modern Marketing. Marketing Management: Definitions-Functions - Role and Importance of Marketing - Classification of Markets - Niche Marketing - Characteristics of Niche Marketing-Local Marketing-Green Marketing.

UNIT-II-Market Segmentation

Concept-Benefits-Types- Geographic - Demographic - Psychographic-Behavioural-Marketing Mix -Definition - 4 P's of Marketing Mix - Introduction to Consumer Behavior -Purchase Decision-Post Purchase Behaviour-Consumer Buying Decision Process - Motives & Needs, Freud's Theory of Motivation

UNIT III-Product & Price

Definition - Product Mix - Introduction to Stages of New Product Development - Product Life Cycle - Sales Forecasting - Methods -Criteria for a Good Forecasting - Pricing-Objectives -Factors Influencing Pricing-Kinds of Pricing-Resale Price Maintenance.

UNIT IV-Promotions and Distributions

Communication Mix - Communication Process -Advertising-Media-Kinds of Advertising Media- Sales Promotion-Personal Selling-Classification of Salesmanship-Channel Members-Types-Channel of Distribution for Consumer Goods - Channels of Distribution for Industrial Goods.

UNIT V-Competitive Analysis and Strategies

Balancing Customer and Competitor Orientations-Global Market Environment-Social Responsibility and Marketing Ethics, Citizen and Publications to Regulate Marketing -Recent Trends in Marketing-A Basic Understanding of E-Marketing-E-Tailing-Consumerism-Market Research-MIS and Marketing Regulation

CO	Course Outcomes
CO1	Develop an understanding on the role and importance of marketing

CO2

Apply the 4 p's of marketing in their venture

CO3	Identifythe factorsdeterminingpricing
CO4	UsethedifferentChannelsofdistributionofindustrialgoods
CO5	UnderstandtheconceptofE-marketingandE-Tailing
Textbooks	
1	PhilipKotler, PrinciplesofMarketing:ASouthAsianPerspective, PearsonEducation. NewDelhi
2	Dr.C.B.Gupta&Dr.N.RajanNair,MarketingManagement,SultanChand&Sons, NewDelhi.
3	Dr.AmitKumar,PrinciplesOfMarketing,ShashibhawanPublishingHouse,Chennai
4	Dr.N. RajanNair, Marketing, SultanChand&Sons.NewDelhi
5	NeeruKapoorPrinciplesOfMarketing, PHI Learning,NewDelhi
ReferenceBooks	
1	ProfKavitaSharma, Dr SwatiAgarwal, PrinciplesofMarketingBook,Taxmann, newdelhi
2	Dr.J.Jayasankar,MarketingManagement,MarghamPublications,Chennai.
3	Assael,H.ConsumerBehaviourandMarketing Action,USA:PWS-Kent
4	Hoyer,W.D.AndMacinnis,D.J.,ConsumerBehaviour,USA:HoughtonMifflinCompany
5	BakerM,MarketingManagementAndStrategy,MacmillanBusiness,BloomburyPublishing, India
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	https://www.aha.io/roadmapping/guide/marketing/introduction
2	https://www.investopedia.com/terms/m/marketsegmentation.asp
3	https://www.shiprocket.in/blog/understanding-promotion-and-distribution-management/

**MAPPINGWITHPROGRAMMEOUTC
OMESANDPROGRAMMESPECIFICO
UTCUMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	2	2	2	3	2
CO2	3	2	3	2	3	2	2	2	2	3	2
CO3	3	2	3	2	3	2	2	2	2	3	2
CO4	3	2	3	2	2	2	2	2	2	3	2
CO5	3	2	3	2	2	2	2	2	2	3	2
TOTAL	15	10	15	10	12	10	10	10	10	15	10
AVERAGE	3	2	3	2	2.4	2	2	2	2	3	2

3- Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
PrinciplesofMarketing	I	12
	II	12
	III	12
	IV	12
	V	12

PRISTUNIVERSITY, THANJAVUR
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COURSE CODE	COURSETITLE	L	T	P	C
23161SEC4	InformationTechnologyConcepts	1	0	0	1

LEARNINGOBJECTIVES:

- To introduce Evolution, Classification and Applications of Computers
- To know Computer peripherals
- To learn about Software, Programming Language, Word Processing and Spread Sheets Presentation
- To study Data Communication and BDP
- To aware utility of computers at different places, computer security and internet

UNIT-I:

Introduction to Computers-
Definition, Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer.

UNIT-II:

Computer peripherals-

Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Soundcards, Speakers, storage units.

UNIT-III:

Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spreadsheets, Presentation, Graphics, DBMS/w.

UNIT-IV:

Data Communication and BDP: Communication Process, Data Transmission speed, Communication Types (modes), Data Transmission Media, Modem. Business Data Processing: Introduction, data storage hierarchy, Method of organizing data, File Types, File Organization.

UNIT-V:

Computers at Home, Education, Entertainment, Business, Science, Medicine and Engineering - Introduction to Computer Security - Computer Viruses, Bombs, Worms - WWW and Internet

UNIT–VICURRENTCONTOURS(ForContinuousInternalAssessmentOnly)

Recentdevelopmentsincomputerworld

REFERENCEBOOKS:

1. P.K.Sinha,ComputerFundamentals
2. Dr.S.V.SrinivasaVallabhan-Computer ApplicationsinBusiness,SultanChand,NewDelhi
3. AlexisLeonandMathewsLeonbyFundamentalsofInformation,Technology.VikasPublishingCompany,NewDelhi
4. DeepakBharhoke, Fundamentalsof InformationTechnology,ExcelPublications,NewDelhi.

LEARNINGOUTCOMES:

Onsuccessfulcompletionofthecourse,thestudentswillbeableto

- KnowEvolution,ClassificationandApplicationsofComputers
- UnderstandComputerperipherals
- HaveknowledgeonSoftware,ProgrammingLanguage,WordProcessingandSpreadSheetsPresentation
- DoDataCommunicationandBDP
- Awareutilityof computersatdifferentplaces,computersecurityandinternet

PRISTUNIVERSITY,THANJAVUR B.COM

COURSE CODE	COURSE TITLE	L	T	P	C
23161SEC5	Salesmanship	1	0	0	1

OBJECTIVE:

- Tomakethestudentsawareofsellingtechniquesandplanning
- ToenablethestudentstotypesofsalemanintheMarketingarea
- Tounderstandthestudentsinbuymotivesandbehaviours
- Toenablethestudentstoknowtheimportanceofonlinestoresandsalesopportunities.
- Toknowaboutvarioussellingtechniques.

UNIT–I INTRODUCTION:

Introduction to selling-meaning- definitions- importance- methods- qualities-functionsduties-responsibilities–typesofsales person–salescareers.

UNIT– II SELLINGPROCESS:

Selling process– steps-customerexpectations–understandingprospects-importance

sources-buyer motives and behaviour-transaction oriented selling-relationship selling.

UNIT-III SELLING TECHNIQUES:

Selling techniques-planning-setting objectives-approach techniques
-building rapport-product knowledge-product benefits-features-functions-
sales presentation demonstration-handling
objections-handling difficult customers-closing sales-after sales service

UNIT-IV-

Sales territory- sales targets/quotas- creating product strategies – understanding
selling terms and prices-retail store sales person-online stores and sales opportunities-
personal selling in the information age

UNIT-V SALES FORCE MANAGEMENT:

Sales force management- selection- training- motivation- compensation –
supervision and control- sales reports and knowledge management – evaluation-
selling expenses-sales team professionalism-ethics-personal grooming.

UNIT-VI CURRENT CONTOURS:(For Continuous Internal Assessment only):

Sales management focuses on the activities of first line field sales managers, course pack will enable students to understand supply chain management which has improved the efficiency in distribution.

TEXT AND REFERENCE BOOKS:

1. Sahu and Raut: Salesmanship and Sales Management, Vikas Publishing House, Chennai.
2. CL Tyagi & Arun Kumar: Sales Management, Atlantic Publishers
3. Sa Chunawalla: Sales Management, Himalayas Publications, New Delhi.
4. Sundar and Madhavan: Salesmanship and Sales Management, Vijay Nicole Imprints (P) Ltd, Chennai
5. PC Pardesi: Salesmanship and Sales Management, Nirali Prakashan

COURSE OUTCOMES:

On successful completion of the subject the student acquired knowledge about

- Concept and conversion of salesmanship
- Fundamentals of selling process and its activities
- Knowledge about various sales force management.
- To know how about selling techniques.
- knowledge about personal selling and sales team professionalism

SEMESTER-III

PRISTUNIVERSITY, THANJAVUR B.COM

COURSECODE	COURSE TITLE	L	T	P	C
231AECC3	Research Methodology	2	0	0	2

AIM

To create a basic appreciation towards research process and awareness of various research publications.

OBJECTIVES

- I. To understand the steps in research process and the suitable methods.
- II. To identify various research communications and their salient features.
- III. To carry out basic literature survey using the common data-bases.

PREREQUISITES:

Basic computer skills for working in window-environment & Conceptual knowledge on basic matrices.

UNIT- I

Research in Management: An Introduction – Definition, meaning and nature – Scope and objects of Research. Types of Research.

UNIT-II

Research Design – Defining Research Problem and Formulation of Hypothesis – Experimental Designs – Sampling and types of sampling.

UNIT-III

Research Process – Steps in the process of Research, Data Collection and Measurement: Sources of Secondary data – Methods of Primary data collection – Questionnaire Construction.

UNIT-IV

Data presentation and Analysis – Data Processing – Methods of Statistical analysis and interpretation of Data – Testing of Hypothesis and theory of inference – Correlation and Regression analysis.

UNIT- V

Report writing and Presentation – Steps in Report writing – Types of reports – Formats of Reports – Presentation of a Report.

OUTCOME:

- Able to carry out independent literature survey corresponding to the specific publication type and assess basic literary research tools.
- Familiarize participants with basic of research and the research process.
- Enable the participants in conducting research work and formulating research synopsis and report.
- Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.

- Have basic knowledge on qualitative research techniques
- Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis
- Have basic awareness of data analysis and hypothesis testing procedures

REFERENCE BOOKS

1. Rajendrapal and Korlahalli- Business Communication
2. M.S.Ramesh and Pattenshetty- Effective Business English & Correspondence
3. Sharma and Krishnamohan- Report writing Business Correspondence

Course Code	Course Title	L	T	P	C
231ENSTU1	Environmental Studies	1	0	0	1

UNIT-I

The Multidisciplinary Nature of Environmental Studies – Definition, Scope and Importance – Need for Public awareness- natural Resources: Renewable and Non – Renewable Resources- Forest Resources – Water Resources- Mineral Resources- Food Resources – Energy Resources – Land Resources.

Ecosystems- Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession- Food chains, food webs and ecological pyramids – Types of ecosystem – Forest ecosystem – Greenland ecosystem – Desert ecosystem – Aquatic ecosystems.

UNIT-III

Biodiversity and its Conservation – Definition- Genetic, Species and ecosystem diversity – Biogeographical classification of India – Values of biodiversity – Biodiversity at global, National and local levels – India as a mega – diversity nation – Hot-spots of biodiversity- Threats to biodiversity – Endangered and endemic species of India – Conservation of biodiversity.

UNIT-IV

Environmental Pollution – Definition – Air Pollution – Water pollution – Soil Pollution – Marine Pollution- Noise Pollution – Thermal Pollution – Nuclear hazards – Solid waste Management – Role of an individual in prevention of pollution – Disaster management.

UNIT-V

Social Issues and the Environment – From Unsustainable to Sustainable development- Urban problems related to energy – Water conservation, rainwater harvesting, watershed management – Environmental Ethics – Climate change greenhouse effect and global warming – Ozone depletion – Wasteland reclamation – Consumerism and waste products – Environmental Legislation – Issues involved in enforcement of environmental legislation – Public awareness- Human population and the environment.

OUTCOME:

- Master core concepts and methods from ecological and physical sciences and the

irapplicationinenvironmentalproblemsolving.

- Mastercoreconceptsandmethodsfromeconomic,political,andsocialanalysisastheypertaintothedesignandevaluationofenvironmentalpoliciesandinstitutions.

- Appreciate the ethical, cultural, and historical context of environmental issues and the links between human and natural systems. cross-
- Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

TEXTBOOK:

‘ENVIRONMENTAL STUDIES’, K. Kumarasamy, A. Alagappa Moses, M. vasanthy.

SEMESTER III

COMMUNICATIONSKILLS

CourseCode	CourseTitle	L	T	P	C
231ACLSOAN	Office Automation	0	0	0	1

CourseObjectives:

To provide an in-depth training in the use of office automation, internet and internet tools. The course also helps the candidate to get acquainted with IT.

CourseOutcomes:

After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with the internet.

UNIT I

Knowing the basics of Computers

UNIT II

Word Processing (MS Word)

UNIT III

Spread Sheet (MS XL)

UNIT IV

Presentation (MS PowerPoint)

UNIT V

Communicating with Internet

Reference:

1. Fundamentals of computers - V. Rajaraman - Prentice - Hall of India
2. Microsoft Office 2007 Bible - John Walkenbach, Herb Tyson, Faith Wempen, Cary N. Prague, Michael Rgroh, Peter G. Aitken, and Lisa A. Bucki - Wiley India pvt. ltd.
3. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
4. Computer Fundamentals - P.K. Sinha Publisher: BPB Publications
5. <https://en.wikipedia.org>
6. <https://wiki.openoffice.org/wiki/Documentation>
7. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

6. இலக்கணம்-இலக்கணம்.இலக்கணம்
7. இலக்கணம்-இலக்கணம்.இலக்கணம்.இலக்கணம்
8. இலக்கணம்-www.tamilvu.org,www.noolulagam.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

Course Code	Course Title	L	T	P	C
20111AEC41	AdvancedEnglish-IV	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To familiarize with the objectives and types of interview
- To know the types of questions and answering techniques

- To prepare reviews and proposals
- To learn the grammatical forms
- To understand the meaning of a poem and write the content
- To write for and against a topic
- To draw a flowchart
- To write definitions

Outcome:

- Develop writing skill
- Comprehend and describe poems
- Learn interviewing skills

UNIT-I

Interviews

Objectives, types, ten success factors, ten failure factors- Planning and preparation- Presentation- Type of questions- Answering techniques.

UNIT-II

Flowchart, Proposals

UNIT-III

Discourse markers, Review

UNITIV

Grammatical forms, Paraphrasing

UNIT-V

Definition, Writing for and against a topic.

REFERENCE BOOKS:

Author	Title of the book	Edition/Year	Publisher
Rajendra Pal & J.S. Korlahalli	Essentials of Business Communication	2015	Sultan Chand & Sons
Meenakshi Raman & Sangeetha Sharma	Technical Communication	2011	Oxford University Press
Wren & Martin	English Grammar & Composition	2009	S. Chand

CourseCode	CourseTitle	L	T	P	C
23111AEC42	English-IV	3	1	0	3

CourseObjective:

- To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage
- To enable them use receptive skills through reading and listening to acquire good exposure to language and literature
- To help them develop style in speech and writing and manipulate the tools of language for effective communication
- To provide exposure to plays, autobiographies and expose them to value based ideas
- To enhance their language skills especially in the areas of grammar and pronunciation..

CourseOutcome:

- Learnt to communicate effectively and appropriately in real life situation.
- Use English effectively for study purpose across the curriculum
- Develop interest in and appreciation of Literature
- Develop and integrate the use of the four language skills
- Enhance their language skills especially in the areas of grammar and pronunciation

UNIT-I

Life Writing

1.1 I am Malala-Malala Yousafzai- Chapter 1

1.2 My Inventions-Nikola Tesla -Chapter 2

UNIT-II

One Act Plays

2.1 The Zoo Story- Edward Albee

2.2 The Proposal-Anton Chekhov

UNIT-III

Interviews

3.1 Nelson Mandela's Interview with Larry King.

3.2 Rakesh Sharma's Interview with Indira
Gandhi from Space

3.3 Lionel Messi with Sid Lowe (Print)

UNIT-IV

Language Competency

4.1 Refuting, Arguing & Debating

4.2 Making Suggestions & Responding to Suggestions, Asking for
and Giving Advice or Help

4.3 Interviews (face to face, telephone and video conferencing)

UNIT-V

English for Workplace

5.1 Job Applications: Covering letters, CV and Resume

5.2 Creating a digital profile- LinkedIn

5.3 Filling Forms (Online & Manual): creation
of account, railway reservation, ATM, Credit/d
ebit card

5.4 Body Language - Practical Skills for Interviews

Text Books (Latest Editions)	
1	I Am Malala: The Girl Who Stood Up for Education and Was Shot by the Taliban by Malala Yousafzai, Christina Lamb, Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Writing Your Life: A Guide to Writing Autobiographies , Mary Borg, Taylor & Francis, 2021
2	One-act Plays for Acting Students: An Anthology of Short Norman A. Bert · 1987 ·

3

[TheOne-ActPlayCompanion:AGuidetoplays, playwrights...](#)
ColinDolley,Rex Walford·2015

4	HowtoBuildaProfessionalDigitalProfileKindleEdition byJeanneKellyBernish,BernishCommunicationsAssociates,LLC; 1st edition(May29,2012)
5	RolePlay-TheoryandPractice.KrysiaMYardley-Matwiejczuk, SAGEpublicationsltd, 1997
WebResources	
1	For Readers’ Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s (thelink to theperformance;referscriptsbyAaronSheperd)
2	http://BBClearnEnglish.com
3	http://onestopenglish.com
4	http://hearn-english-today.com
5	http://talkenglish.com
6	TheZooStory: http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pdf
7	TheProposal: https://www.one-act-plays.com/comedies/proposal.html
8	NelsonMandelawithLarryKing Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/kl.00.html
9	RakeshSharmawithIndiraGandhi Interview : https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-told-indira-gandhi-about-india-from-space-2204839
10	LionelMessiwithSidLowe Interview: https://www.worldsoccer.com/world-soccer-latest/lionel-messi-interview-part-one-338553

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

MappingwithProgrammeSpecificOutcomes:

CO /PO	PSO 1	PS O2	PS O3	PS O4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightag	15	15	15	15	15
Weighted percentage ofCourseContributiontoPo s	3.0	3.0	3.0	3.0	3.0

SEMESTER-IV

PRISTUNIVERSITY,THANJAVUR

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COURSECODE	COURSETITLE	L	T	P	C
23161AEC43	Corporate Accounting -II	4	0	0	3

OBJECTIVES:

- To know the types of amalgamation
- To gain an understanding about reconstruction
- To know Final statements of banking companies
- To understand the legal requirements of financial accounts
- To have an insight on modes of winding up of a company

UNIT-I**Amalgamation, Absorption & External Reconstruction**

Amalgamation, Absorption and External Reconstruction - Purchase Consideration - Lump sum Method, Net Assets Method, Net Payment Method, Intrinsic Value Method - Types of Amalgamation (Excluding Inter-Company Holdings).

UNIT-II**Alteration of Share Capital & Internal Reconstruction**

Alteration of Share Capital – Modes of Alteration - Internal Reconstruction – Conversion of Stock – Increase and Decrease of Capital – Reserve Liability.

UNIT-III**Accounting of Banking Companies**

Final Statements of Banking Companies (As Per New Provisions) - Non-Performing Assets - Rebate on Bills Discounted - Profit and Loss a/c - Balance Sheet as Per Banking Regulation Act 1949.

UNIT-IV**Consolidated Financial Statements**

Introduction - Holding & Subsidiary Company - Legal Requirements Relating to Presentation of Accounts - Preparation of Consolidated Balance Sheet (Excluding Inter-Company Holdings).

UNIT-V**Liquidation of Companies**

Meaning - Modes of Winding Up - Preparation of Statement of Affairs and Deficiency Accounts - Order of Payment - Liquidators Remuneration - Liquidator's Final Statement of Accounts

Course Outcomes	
CO1	Understand the accounting treatment of amalgamation, absorption and external reconstruction
CO2	Apply and alter the share capital and internal reconstruction
CO3	Do the accounting procedure of non-performing assets
CO4	Give the consolidated accounts of holding companies
CO5	Prepare liquidator's final statements
Textbooks	
1	S.P. Jain and K.L. Narang, Advanced Accountancy, Kalyani Publishers, New Delhi.
2	Dr. K.S. Raman and Dr. M.A. Arulanandam, Advanced Accountancy, Vol. II, Himalaya Publishing House, Mumbai.
3	R.L. Gupta and M. Radhaswamy, Advanced Accounts, Sultan Chand, New Delhi.
4	M.C. Shukla and T.S. Grewal, Advanced Accounts Vol. II, S Chand & Sons, New Delhi.
5	T.S. Reddy and A. Murthy, Corporate Accounting II, Margham Publishers, Chennai
Reference Books	
1	B. Raman, Corporate Accounting, Taxmann, New Delhi

2	M.C.Shukla,AdvancedAccounting,S.Chand,NewDelhi
3	Prof. MukeshBramhbutt, DeviAhilyapublication,MadhyaPradesh
4	Anilkumar,Rajeshkumar,AdvancedCorporateAccounting,HimalayaPublishinghouse,Mumbai.
5	PrasanthAthma,CorporateAccounting,HimalayaPublishinghouse,Mumbai.
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	https://www.accountingnotes.net/amalgamation/amalgamation-absorption-and-reconstruction-accounting/126
2	https://www.slideshare.net/debchat123/accounts-of-banking-companies
3	https://www.accountingnotes.net/liquidation/liquidation-of-companies-accounting/12862

**MAPPINGWITHPROGRAMMEOUTC
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UTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	3	2	3	2	2
CO2	3	2	3	2	3		3	2	3	2	2
CO3	3	2	3	2	3	2	3	2	3	2	2
CO4	3	2	3	2	2	2	3	2	3	2	2
CO5	3	2	3	2	2	2	3	2	3	2	2
TOTAL	15	10	15	10	12	10	15	10	15	10	10
AVERAGE	3	2	3	2	2.4	2	3	2	3	2	2

3–Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
CorporateAccountingII	I	15
	II	15
	III	15
	IV	15
	V	15

SEMESTER

PRISTUNIVERSITY, THANJAVUR B.COM

COURSECODE	COURSE TITLE	L	T	P	C
23161AEC44	Business Mathematics & Statistics	4	0	0	3

OBJECTIVES:

- To impart knowledge on the basics of ratio, proportion, indices and proportions
- To learn about simple and compound interest and arithmetic, geometric and harmonic progressions
- To familiarize with the measures of central tendency
- To conceptualize with correlation coefficient
- To gain knowledge on time series analysis

UNIT– I

Ratio

Ratio, Proportion and Variations, Indices and Logarithms..

UNIT–II

Interest and Annuity

Banker's Discount – Simple and Compound Interest – Arithmetic, Geometric and Harmonic Progressions.
Annuity – Meaning – Types of Annuity Applications

UNIT–III

Business Statistics Measures of Central Tendency

Arithmetic Mean, Geometric Mean - Harmonic Mean - Mode and Median – Quartiles – Deciles - Percentiles. Measures of Variation – Range – Quartile Deviation and Mean Deviation - Variance and Standard Deviation & Co-efficient

UNIT–IV

Correlation and Regression

Correlation - Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation – Regression Lines and Coefficients

UNIT– V

Time Series Analysis and Index Numbers

Time Series Analysis: Secular Trend – Seasonal Variation – Cyclical variations – Index Numbers – Aggregate and Relative Index – Chain and Fixed Index – Wholesale Index – Cost of Living Index

Course Outcomes	
CO1	Learn the basics of ratio, proportion, indices and logarithm
CO2	Familiarise with calculations of simple and compound interest and arithmetic, geometric and harmonic progressions.
CO3	Determine the various measures of central tendency
CO4	Calculate the correlation and regression coefficient.
CO5	Assess problems on time series analysis
Textbooks	

1	Dr.B.N.Gupta,BusinessMathematics&Statistics,Shashibhawanpublishinghouse,Chennai
2	AsimKumarManna,BusinessMathematics&Statistics,McGrawhilleducation,Noida
3	A.V.RayarikarandDr. P.G.Dixit,BusinessMathematics&Statistics,NiraliPrakashan Publishing,Pune
4	Dr.S.Sachdeva,BusinessMathematics&Statistics,LakshmiNarainAgarwal,Agra
5	P.R.Vittal,BusinessMathematics&Statistics,MarghamPublications,Chennai

ReferenceBooks

1	J.K.Sharma,Fundamentalsofbusinessstatistics,Vikaspublishing,Noida
2	PeterWaxman, BusinessMathematics &Statistics, PrenticeHall,NewYork
3	AndreFrancis, BusinessMathematics&Statistics,CengageLearningEMEA,Andover
4	AggarwalBM,BusinessMathematics &Statistics,AneBookPvt.Ltd.,NewDelhi
5	R.S.Bhardwaj,BusinessMathematics&Statistics,ExcelBooksPublisher,NewDelhi

NOTE: Latest EditionofTextbooksMay beUsed

WebResources

1	https://www.britannica.com/biography/Henry-Briggs
2	https://corporatefinanceinstitute.com/resources/data-science/central-tendency/
3	https://www.expressanalytics.com/blog/time-series-analysis/

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	3	2	3	2	2
CO2	3	2	3	2	3	2	3	2	3	2	2
CO3	3	2	3	2	3	2	3	2	3	2	2
CO4	3	2	3	2	2	2	3	2	3	2	2
CO5	3	2	3	2	2	2	3	2	3	2	2
TOTAL	15	10	15	10	12	10	15	10	15	10	10
AVERAGE	3	2	3	2	2.4	2	3	2	3	2	2

3– Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
Business MathematicsandStatistics	I	15
	II	15
	III	15
	IV	15
	V	15

SEMESTER-IV

PRISTUNIVERSITY, THANJAVUR B.COM

COURSECODE	COURSE TITLE	L	T	P	C
23161GEC45	Consumerism & Consumer Protection	4	0	0	3

OBJECTIVES:

- To understand the nature of consumers and consumerism
- To know how consumers are exploited
- To be familiar with consumer rights and duties
- To learn about Consumer Protection Act
- To gain insights into consumerism in India.

UNIT- I

Consumerism

Meaning of Consumer and Customer-Consumer Movements-Historical Perspectives-Concept of Consumerism-Need and Importance

UNIT-II

Consumer Exploitation

Meaning and Causes of Consumer Exploitation-Forms of Consumer- Exploitation Underweight Measures, High Prices, Substandard Quality, Poor or Inadequate After Sales Services- Challenges of Consumer Exploitation

UNIT-III

Consumer Rights and Duties

Consumer Rights-John F Kennedy's Consumer Bill of Rights.-Types of Consumer Rights-Right to Safety, Right to Information (RTI), Right to Redressal, Right to Consumer Education- Duties of Consumers.

UNIT-IV

Consumerism in India

Reasons for the Growth of Consumerism in India-Recent Trends in Consumerism-Problems Faced by Consumers in India

UNIT- V

Consumer Protection Act 2019

Consumer Protection Council-Central, State, Districts Consumer Protection Councils- Consumer Dispute Redressal Mechanism.

Course Outcomes	
CO1	Remember and recall aspects in consumerism
CO2	Identify the reasons for consumer exploitation
CO3	Discover the rights and duties of a consumer
CO4	Create an environment which protects the consumers in India

CO5	Critically appraise the consumer Protection Act
Textbooks	
1	Premavathy and Mohini Sethi, Consumerism – Strategies and Tactics, CBS Publication
2	Prof Kavita Sharma, Dr Swati Aggarwal, Principles of Marketing Book, Taxmann
3	Dr. J. Jayasankar, Marketing Management, Margham Publications, Chennai.
4	Assael, H., Consumer Behaviour and Marketing Action, PWS-Kent, USA
Reference Books	
1	Hoyer, W.D. and MacInnis, D.J., Consumer Behaviour, Houghton Mifflin Company, USA
2	Y. V. Rao, Consumer Protection Act, 1986, Asia Law House, Hyderabad
3	GB. Reddy and Baglekar Akash Kumar, Consumer Protection Act, Eastern Book Company, Bengaluru
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://lawcorner.in/forms-of-consumer-exploitation/
2	https://consumeraffairs.nic.in/en/organisation-and-units/division/consumer-protection-unit/consumer-rights
3	http://www.chdslsa.gov.in/right_menu/act/pdf/consumer.pdf

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	2	2	3	2	2
CO2	3	2	2	2	3	2	2	2	3	2	2
CO3	3	2	3	2	3	2	2	2	3	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2
CO5	3	2	3	2	2	2	2	2	3	2	2
TOTAL	15	10	13	10	12	10	10	10	15	10	10
AVERAGE	3	2	2.6	2	2.4	2	2	2	3	2	2

3– Strong, 2-Medium, 1-Low

Course title	Units	Hours allotment
Consumerism & Consumer Protection	I	09
	II	09
	III	09
	IV	09
	V	09

SEMESTER-IV

PRISTUNIVERSITY, THANJAVUR B.COM

COURSECODE	COURSE TITLE	L	T	P	C
23161GEC46	E-Commerce	4	0	0	3

OBJECTIVES:

- To know the goals of Electronic commerce
- To understand the various Business models in emerging E-commerce areas
- To have an insight on the internet marketing technologies
- To understand the benefits and implementation of EDI
- To examine the ethical issues of E-commerce

UNIT- I

Introduction to E-Commerce

Defining E - Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce - Process of E-Commerce - Types of E- Commerce; The World Wide Web, The Internet and the Web: Features, Role of Automation & Artificial Intelligence in E-Commerce

UNIT-II

E-Commerce Business Models & Consumer Oriented E-Commerce

E-commerce Business Models, Major Business to Consumer (B2C) Business Models, Major Business to Business (B2B) Business Models, Business Models in Emerging E-Commerce Areas - E-retailing: Traditional Retailing and E-retailing, Benefits of E-retailing, Models of E-retailing, Features of E-retailing.

UNIT-III

E-Commerce Marketing Concepts

The Internet Audience and Consumer Behaviour, Basic Marketing Concepts, Internet Marketing Technologies – Marketing Strategy - E services: Categories of E-services, Web-Enabled Services, Information-Selling on the Web.

UNIT-IV

Electronic Data Interchange & Security

Benefits of EDI, EDI Technology, EDI Standards, EDI Communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System - Digital Economy - Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web Server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server.

UNIT-V

Ethics in E-Commerce

Issues in E Commerce Understanding Ethical, Social and Political Issues in E-Commerce: A Model for Organizing the Issues, Basic Ethical Concepts, Analysing Ethical Dilemmas, Candidate Ethical Principles Privacy and Information Rights: Information Collected at E-Commerce Websites..

CO	Course Outcomes
CO1	Understand the role and features of world wide web
CO2	Understand the Benefits and model of e-tailing
CO3	Use the web enabled services
CO4	Tackle the threats in internet security system
CO5	Know about the Ethical principles Privacy and Information Rights
Textbooks	
1	Kenneth C. Laudon, E-Commerce: Business, Technology, Society, 4th Edition, Pearson Education Limited, New Delhi
2	S. J. Joseph, E-Commerce: an Indian perspective, PHI Learning Pvt. Ltd., New Delhi
3	David Whitley, E-Commerce- Strategy, Technologies & Applications, TMI, McGraw-Hill, London
4	Kamlesh K. Bajaj, E-Commerce- The cutting edge of business, TMH, McGraw-Hill, Noida
5	W. Clarke, E-Commerce through ASP-BPB, Wrox Publisher, Mumbai
Reference Books	
1	Agarwala, K.N. and D. Agarwala, Business on the Net : What's and How's of E-Commerce, McMillan Publisher India Pvt. Ltd., Chennai
2	Ravi Kalkota, Frontiers of E-Commerce, TM, Pearson Education Limited, New Delhi
3	Elias M Awad, Electronic Commerce: From Vision to Fulfillment. PHI Learning Pvt. Ltd., New Delhi
4	Mathew Reynolds, Beginning E-Commerce with Visual Basic, ASP, SQL Server 7.0 & MTS, Wrox Publishers, Mumbai
5	J. Christopher Westland and Theodore H. K. Clark Global Electronic Commerce- Theory and Case Studies, The MIT Press, Cambridge, London
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.investopedia.com/terms/e/ecommerce.asp
2	https://www.webfx.com/industries/retail-ecommerce/ecommerce/basic-ecommerce-marketing-concepts/
3	https://techbullion.com/the-importance-of-ethics-in-ecommerce/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	2	2	3	3	2
CO2	3	2	2	2	3	2	2	2	3	3	2
CO3	3	2	3	2	3	2	2	2	3	3	2
CO4	3	2	2	2	3	2	2	2	3	3	2
CO5	3	2	3	2	3	2	2	2	3	3	2
TOTAL	15	10	13	10	15	10	10	10	15	15	10
AVERAGE	3	2	2.6	2	3	2	2	2	3	3	2

3– Strong,2-Medium,1-Low

Course title	Units	Hours allotment
E-Commerce	I	09
	II	09
	III	09
	IV	09
	V	09

Course Code	Course Title	L	T	P	C
231AECCEVS	Environmental Studies	2	0	0	2

UNIT-I

The Multidisciplinary Nature of Environmental Studies – Definition, Scope and Importance –Need for Public awareness- natural Resources: Renewable and Non – Renewable Resources- Forest Resources – Water Resources- Mineral Resources- Food Resources – Energy Resources – Land Resources.

Ecosystems-Concept of an ecosystem–Structure and function of an ecosystem– Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession- Food chains, food webs and ecological pyramids–Types of ecosystem–Forest ecosystem–Greenland ecosystem–Desert ecosystem –Aquatic ecosystems.

UNIT-III

Biodiversity and its Conservation–Definition-Genetic, Species and ecosystem diversity– Biogeographical classification of India– Values of biodiversity– Biodiversity at global, National and local levels– India as a mega – diversity nation – Hot-spots of biodiversity- Threats to biodiversity –Endangered and endemic species of India– Conservation of biodiversity.

UNIT-IV

**Environmental Pollution–Definition–Air Pollution–Water pollution–Soil Pollution–
Marine Pollution- Noise Pollution –Thermal Pollution – Nuclear hazards –Solid waste
Management –Role of an individual in prevention of pollution–Disaster management.**

UNIT-V

Social Issues and the Environment – From Unsustainable to Sustainable development-related Urban problems – Energy – Water conservation, rainwater harvesting, watershed management – Environmental Ethics – Climate change greenhouse effect and global warming – Ozone depletion – Wasteland reclamation – Consumerism and waste products – Environmental Legislation – Issues involved in enforcement of environmental legislation – Public awareness – Human population and the environment.

OUTCOME:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Appreciate the ethical, cultural, and historical context of environmental issues and the links between human and natural systems.
- Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

TEXTBOOK:

‘ENVIRONMENTAL STUDIES’, K. Kumarasamy, A. Alagappa Moses, M. Vasanthi.

SEMESTER IV

Course Code	Course Title	L	T	P	C
231LC SCLS	Leadership and Management Skills	0	0	0	1

Aim:

The aim of the course is to cultivate and nurture the innate leadership skills of the youths so that they may transform these challenges into opportunities and become torchbearers of the future by developing creative solutions.

Course Objective:

The Module is designed to:

- Help students to develop essential skills to influence and motivate others
- Inculcate emotional and social intelligence, and integrative thinking for effective leadership
- Create and maintain an effective and motivated team to work for the society

- Nurtureacreativeandentrepreneurialmindset
- Makestudentsunderstandthepersonalvaluesandapplyethicalprinciplesin

professional and social contexts.

Course Outcomes:

Upon completion of the course, students will be able to:

1. Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision
2. Learn and demonstrate a set of practical skills such as time management, self management, handling conflicts, team leadership, etc.
3. Understand the basics of entrepreneurship and develop business plans
4. Apply the design thinking approach to leadership
5. Appreciate the importance of ethics and moral values for making of a balanced personality.

UNIT I - Leadership Skills

a. Understanding Leadership and its Importance

- What is leadership?
- Why Leadership required?
- Whom do you consider as an ideal leader?

b. Traits and Models of Leadership

- Are leaders born or made?
- Key characteristics of an effective leader
- Leadership styles
- Perspectives of different leaders

c. Basic Leadership Skills

- Motivation
- Teamwork
- Negotiation
- Net

working UNIT II -
Managerial Skills

a. Basic Managerial Skills

- Planning for effective management
- How to organise teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate

- Conflictmanagement

b. SelfManagementSkills

- Understandingselfconcept
- Developingself-awareness
- Self-examination
- Self-

regulationUNITIII-

EntrepreneurialSkills

a. BasicsofEntrepreneurship

- Meaningofentrepreneurship
- Classificationandtypesofentrepreneurship
- Traitsandcompetenciesofentrepreneur

b. CreatingBusinessPlan

- Problemidentificationandideageneration
- Ideavalidation
- Pitchmaking

UNITIV-InnovativeLeadershipandDesignThinking

a. InnovativeLeadership

- Conceptofemotionalandsocialintelligence
- Synthesisofhumanandartificialintelligence
- Whydoesculturematterfortoday'sgloballeaders

b. DesignThinking

- What isdesignthinking?
- Keyelementsofdesignthinking:
 - Discovery
 - Interpretation
 - Ideation
 - Experimentation
 - Evolution.
- Howtotransformchallengesintoopportunities?
- Howtodevelop human-centricsolutionsforcreatingocialgood?

UNITV-EthicsandIntegrity

a. LearningthroughBiographies

- Whatmakesanindividualgreat?
- Understandingthepersonaofaleaderforderivingholisticinspiration
- Drawinginsightsforleadership
- Howleaderssailthroughdifficultsituations?

b. EthicsandConduct

- Importanceofethics
- Ethicaldecisionmaking
- Personalandprofessionalmoralcodesofconduct
- Creatingaharmoniouslife

Bibliographyand SuggestedReadings:

Books

- Ashokan, M.S.(2015).*Karmayogi:ABbiographyofE. Sreedharan*.Penguin,UK.
- Brown,T.(2012).*ChangebyDesign*.HarperBusiness

- Elkington, J., & Hartigan, P. (2008). *The Power of Unreasonable People: How*

Social Entrepreneurs Create Markets that Change the World. Harvard Business Press.

- Goleman D. (1995). *Emotional Intelligence*. Bloomsbury Publishing India Private Limited
- Kalam A.A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin Books India
- Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us*. William Collins
- Kurien V., & Salve G. (2012). *I Too Had a Dream*. Roli Books Private Limited
- Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success*. New York: American Management Association
- McCormack M. H. (1986). *What They Don't Teach You at Harvard Business School: Notes From A Street-Smart Executive*. RHUS
- O'Toole J. (2019) *The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good*. HarperCollins
- Sinek S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. Penguin
- Sternberg R.J., Sternberg R.J., & Baltes P.B. (Eds.). (2004). *International Handbook of Intelligence*. Cambridge University Press.

E-Resources

- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15 from <https://www.forbes.com/sites/kimberlyfries/2018/02/08/8-essential-qualities-that-define-great-leadership/#452ecc963b63>.
- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence
- India's Hidden Hotbeds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - "A Leader Should Know How to Manage Failure" <https://www.youtube.com/watch?v=laGZaS4sdeU>
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, 85(6):60.
- NPTEL Course on Leadership - <https://nptel.ac.in/courses/122105021/9>

COURSECODE	COURSE TITLE	L	T	P	C
23161AEC51	Cost Accounting -I	5	1	0	4

OBJECTIVES

- To understand the various concepts of cost accounting
- To prepare and reconcile Cost accounts
- To gain knowledge regarding valuation methods of material
- To familiarize with the different methods of calculating labour cost.
- To know the apportionment of Overheads.

UNIT- I

Introduction of Cost Accounting

Definition-Nature and Scope – Principles of Cost Accounting – Cost Accounting and Financial Accounting - Cost Accounting Vs Management Accounting –Installation of Costing System –Classification of Costs– Cost Centre–Profit Centre.

UNIT-II

Cost Sheet and Methods of Costing

Preparation of Cost Sheet- Tenders & Quotations- Reconciliation of Cost and Financial Accounts– Unit Costing- Job Costing.

UNIT-III

Material Costing

Material Control – Meaning and Objectives – Purchase of Materials – EOQ – Stores Records – Reorder Levels – ABC Analysis - Issue of Materials – Methods of Issue – FIFO – LIFO – Base Stock Method – Specific Price Method – Simple and Weighted Average Method..

UNIT-IV

Labour Costing

Direct Labour and Indirect Labour – Time Keeping – Methods and Calculation of Wage Payments – Time Wages – Piece Wages – Incentives – Different Methods of Incentive Payments - Idle time– Overtime– Labour Turnover- Meaning, Causes and Measurement.

UNIT–V

Overheads Costing

Overheads – Definition – Classification – Allocation and Apportionment of Overheads – Basis of Apportionment – Primary and Secondary Distribution - Absorption of Overheads – Methods of absorption Preparation of Overheads Distribution Statement – Machine Hour Rate – Computation of Machine Hour Rate.

Course Outcomes	
CO1	Remember and recall the various concepts of cost accounting
CO2	Demonstrate the preparation and reconciliation of cost sheet.
CO3	Analyse the various valuation methods of issue of materials.
CO4	Examine the different methods of calculating labour cost.
CO5	Critically evaluate the apportionment of Overheads.
Textbooks	
1	Jain S.P. and Narang K.L, Cost Accounting. Kalyani Publishers, New Delhi
2	Khanna B.S., Pandey I.M., Ahuja G.K., and Arora M.N., Practical Costing, S.Chand & Co, New Delhi,
3	Dr.S.N.Maheswari, Principles of Cost Accounting, Sultan Chand Publications, New Delhi
4	T.S. Reddy and Y.Hari Prasad Reddy, Cost Accounting, Margham Publications, Chennai
5	S.P.Iyengar, Cost Accounting, Sultan Chand Publications, New Delhi
Reference Books	
1	Polimeni, Cost Accounting: Concepts and Applications for Managerial Decision Making, 1991, McGraw–Hill, New York.
2	Jain S.P. and Narang K.L. Cost Accounting, Latest Edition. 2013, Kalyani Publishers, New Delhi,
3	V.K.Saxena and C.D. Vashist, Cost Accounting, Sultan Chand Publications, New Delhi
4	Murthy A & Gurusamy S, Cost Accounting, Vijay Nicole Imprints Pvt.Ltd. Chennai
5	Prasad.N.K and Prasad.V.K, Cost Accounting, Book Syndicate, Kolkata
NOTE: Latest Edition of Textbooks May be Used	

WebResources	
1	https://study.com/learn/lesson/cost-accounting-principles-examples-what-is-cost-accounting.html
2	https://www.accountingtools.com/articles/what-is-material-costing.html
3	https://www.freshbooks.com/hub/accounting/overhead-cost

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	2	2	3	2	2
CO2	3	2	2	2	2	2	2	2	3	2	2
CO3	3	2	3	2	2	2	2	2	3	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2
CO5	3	2	3	2	2	2	2	2	3	2	2
TOTAL	15	10	13	10	10	10	10	10	15	10	10
AVERAGE	3	2	2.6	2	2	2	2	2	3	2	2

3– Strong, 2-Medium, 1-Low

Coursetitle	Units	Hours allotment
Cost Accounting	I	15
	II	15
	III	15
	IV	15
	V	15

SEMESTER-V

**PRIST UNIVERSITY, THANJAVUR
B.COM**

COURSE CODE	COURSE TITLE	L	T	P	C
23161AEC52	Banking Law and Practice	5	1	0	4

OBJECTIVES

- To help the students understand various provisions of Banking Regulation Act 1949 applicable to banking companies including cooperative banks
- To trace the evolution of central bank concept and prevalent central banking system around the world and their roles and function
- To throw light on Central Bank in India, its formation, nationalizing its organization structure, role of bank to government, role in promoting agriculture and industry, role in financial inclusion
- To understand how capital fund of commercial banks, objectives and process of Asset securitization etc.
- To explore practical banking systems relationship of bankers and customers, crossing of cheques, endorsement etc.

UNIT- I

Introduction to Banking

History of Banking- Provisions of Banking Regulations Act 1949 - Components of Indian Banking - Indian Banking System-Phases of Development- Banking Structure in India - Payment Banks and Small Banks -Commercial Banking: Definition - Classification of Banks. Banking System - Universal Banking - Commercial Banking functions - Role of Banks in Economic Development. Central Banking: Definition - Need - Principles-Central Banking Vs Commercial Banking-Functions of Central Bank.

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Establishment – objective - Legal framework – Functions – SBI - Origin and History – Establishment
Indian subsidiaries-Foreign subsidiaries-Non-Banking-Subsidiaries-Personal banking International banking-
Trade Financing-Correspondent banking - Co-operative banks-Meaning and definition-Features-Co-
operative banks vs Commercial banks-Structure.-NBFC-Role of NBFC RBI Regulations-
Financial sector reforms-Sukhoy committee 1985-Narasimham committee I and II-Prudential norms: capital
adequacy norms-classification of assets and provisioning – Meaning, Structure of Interest Rates - Short term
and Long Term – Impacts of Savings and Borrowings.

UNIT-III

Bank Account

Opening – Types of Accounts-FDR-Steps in opening Account-Saving vs Current Account-‘Donatio
Mortis Causa’-Passbook-Bank Customer Relationship-Special Types of currents –KYC norms. Bank
Lending –Lending Sources-Bank Lending Principles-Forms of lending-Loan evaluation process-
securities of lending-Factors influencing bank lending – Negotiable Instruments –Meaning –Characteristics-
Types. Crossing –Definition –Objectives-Crossing and negotiability-Consequences of Crossing.

UNIT-IV

Endorsement

Meaning-Components-Kinds of Endorsements-Cheques payable to fictitious person
Endorsement by legal representative –Negotiation bank-effect of endorsement-Rules regarding
Endorsement - Paying banker-Banker’s duty-Dishonouring of Cheques-
Discharge of paying banks Payments of a crossed cheque payment. Collecting bankers-
Statutory protection under section 85-Refusal of cheques Payment. Collecting Banker-Statutory
protection under section 131-Collecting bankers’ duty –RBI instruction –
Paying Banker Vs Collecting Banker-Customer Grievances-Grievance Redressal-
Banking Ombudsman.

UNIT- V

E-Banking

Meaning-Services-e-banking and financial services- Initiatives-Opportunities-Internet banking
Meaning-Internet banking Vs Traditional Banking-Services-Drawbacks-Frauds in Internet banking.
Mobile banking-Anywhere Banking-Any Time Banking- Electronic MobileWallets. ATM Evolution -
Concept-Features -Types-.Electronicmoney-Meaning-Categories-Meritsofe-money-
NationalElectronicFundsTransfer(NEFT)Real Time Gross Settlement (RTGS) Difference between
NEFT & RTGS- Meaning- Steps-Benefits-Monetarypolicies- final sector reforms- Chakravarthy
committee 1985- Narasimham Committee I &II Prudential norms capitaladequacynorms-
classificationofassets &provisions.

Course Outcomes	
CO1	AwareofvvariousprovisionofBankingRegulationAct1949applicableto bankingcompanies includingcooperativebanks
CO2	AnalysetheevolutionofCentralBankingconceptand prevalentCentralBanking systeminIndia andtheirrolesandfunction
CO3	GainknowledgeabouttheCentralBankinIndia,its formation,nationalizingitsorganization structure,roleofbanktogoovernment,role inpromotingagricultureand industry,roleinfinancialinclusion
CO4	Evaluatetheroleofcapitalfund ofcommercial banks,objectivesand processofAsset securitizationetc
CO5	Definethepracticalbankingsystemsrelationshipofbankersandcustomers,crossingofcheques,endorsementetc.
Textbooks	
1	GurusamyS, Banking Theory: Law and Practice, Vijay Nicole Publication, Chennai
2	Muraleedharan, Modern Banking: Theory and Practice, Prentice Hall India Learning Private Ltd, New Delhi
3	Gupta P.K. Gordon E. Banking and Insurance, Himalaya publication, Kolkata
4	Gajendra, A Text on Banking Theory Law & Practice, Vrinda Publication, Delhi
5	KPKandasami, SNatarajan & Parameswaran, Banking Law and Practice, S Chand publication, New Delhi
Reference Books	
1	B.Santhanam, Banking & Financial System, Margam Publication, Chennai
2	Katait Sanjay , Banking Theory and Practice, Lambert Academic Publishing,
3	Henry Dunning Macleod, The Theory And Practice Of Banking, Hard Press Publishing, Old New Zealand
4	William Amasa Scott, Money And Banking: An Introduction To The Study Of Modern Currencies, Kesinger publication, USA
5	Nektarios Michail, Money, Credit, and Crises: Understanding the Modern Banking System, Palgrave Macmillan, London
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.rbi.org.in/
2	https://businessjargons.com/e-banking.html
3	https://www.wallstreetmojo.com/endorsement/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	2	2	3	3	2
CO2	3	2	2	2	3	2	2	2	3	3	2
CO3	3	2	3	2	3	2	2	2	3	3	2
CO4	3	2	2	2	3	2	2	2	3	3	2
CO5	3	2	3	2	3	2	2	2	3	3	2
TOTAL	15	10	13	10	15	10	10	10	15	15	10
AVERAGE	3	2	2.6	2	3	2	2	2	3	3	2

3– Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
Banking Law and Practice	I	15
	II	15
	III	15
	IV	15
	V	15

SEMESTER-V

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COURSECODE	COURSETITLE	L	T	P	C
23161AEC53	Income Tax Law and Practice I	5	1	0	4

OBJECTIVES

- To understand the basic concepts & definitions under the Income Tax Act, 1961
- To compute the residential status of an assessee and the incidence of tax.
- To compute income under the head salaries
- To learn the concepts of Annual value, associated deductions and the calculation of income from House property
- To compute the income from Business & Profession considering its basic principles & specific disallowances.

UNIT- I

Introduction to Income Tax

Introduction to Income Tax – History – Objectives of Taxation – Features of Income Tax – Meaning of Income – Types – Important Definitions Under the Income Tax Act – Assessee – Types – Incomes Exempted under Section 10.

UNIT-II

Residential Status

Conditions–IncidenceofTaxand ResidentialStatus–ProblemsonResidentialStatusandIncidenceofTax.**UNIT–III****IncomefromSalary**

Computation of Salary Income – Features of Salary – Allowances – Types of Allowances - Perquisites – Kinds of Perquisites – Types of Provident Fund - Gratuity – Pension – Commutation of Pension – Deduction of Salary - Profits in Lieu of Salary

UNIT–IV**IncomefromHouseProperty**

Income from House Property – Basis of Charge – Annual Value – Gross Annual Value, Net Annual Value of Let-out Property, Self-Occupied Property – Amenities – Deductions

UNIT–V**ProfitsandGainsfromBusinessorProfession**

Income from Business or Profession – Allowable Expenses – Not Allowable Expenses - General Deductions – Provisions Relating to Depreciation – Deemed Business Profits – Undisclosed Incomes – Investments – Compulsory Maintenance of Books of Accounts – Audit of Accounts of Certain Persons – Special Provisions for Computing Incomes on Estimated Basis – Computation of Income from Business or Profession.

Course Outcomes	
CO1	Demonstrate the understanding of the basic concepts and definitions under the Income Tax Act.
CO2	Assess the residential status of an assessee & the incidence of tax.
CO3	Compute income of an individual under the head salaries.
CO4	Ability to compute income from house property.
CO5	Evaluate income from a business carried on or from the practice of a Profession.
Textbooks	
1	V.P.Gaur, Narang, Puja Gaur and Rajeev Puri- Income Tax Law and Practice, Kalyani Publishers, New Delhi.
2	T.S. Reddy and Hari Prasad Reddy, Income Tax Law and Practice, Margham Publications, Chennai.
3	Dinkar Pagare, Income Tax Law and Practice, Sultan & Chand Sons, New Delhi.
4	H.C. Mehrotra, Dr. Goyal S.P, Income Tax Law and Accounts, Sahitya Bhavan Publications, Agra.
5	T.Srinivasan – Income Tax & Practice – Vijay Nicole Imprints Private Limited, Chennai.
Reference Books	
1	Hariharan N, Income Tax Law & Practice, Vijay Nicole Imprints Pvt. Ltd. Chennai
2	Bhagwati Prasad, Income Tax Law and Practice, Vishwa Prakashan. New Delhi.
3	Vinod K. Singhanian, Students Guide to Income Tax., U.K. Bhargava Taxman.
4	Dr. Vinod K Singhanian, Dr. Monica Singhanian, Taxmann's Students' Guide to Income Tax, New Delhi.
5	Mittal Preethi Rani and Bansal Anshika, Income Tax Law and Practice, Sultan & Chand Sons, New Delhi.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://cleartax.in/s/residential-status/

2	https://www.legalraasta.com/itr/income-from-salary/
3	https://taxguru.in/income-tax/income-house-properties.html

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	2	2	3	3	2
CO2	3	2	2	2	2	2	2	2	3	2	2
CO3	3	3	3	2	3	2	2	2	3	3	2
CO4	3	2	2	2	2	2	2	2	3	3	2
CO5	3	3	3	2	3	2	2	2	3	2	2
TOTAL	15	12	13	10	13	10	10	10	15	13	10
AVERAGE	3	2.2	2.6	2	2.6	2	2	2	3	2.6	2

3- Strong, 2-Medium, 1-Low

Course title	Units	Hours allotment
Income Tax Law and Practice I	I	15
	II	15
	III	15
	IV	15
	V	15

SEMESTER -V

COURSECODE	COURSE TITLE	L	T	P	C
23161DSC55A	Elective Paper-I-A-Entrepreneurial Development	3	0	0	3

OBJECTIVES

- To know the meaning and characteristics of entrepreneurship
- To identify the various business opportunities
- To understand the Process of setting up an enterprise
- To gain knowledge in the aspects of legal Compliance of setting up of an enterprise
- To develop an understanding of the role of MSME in economic growth

UNIT-I

Introduction to Entrepreneur

Meaning of Entrepreneurship – Characteristics of Entrepreneurship – Types of Entrepreneurship – Self Employment – Difference between Entrepreneurship and Employment – Meaning of Entrepreneur – Traits – Classification – Functions – Entrepreneurial Scenario in India.

UNIT-II

Design Thinking

Idea Generation – Identification of Business Opportunities – Design Thinking Process – Creativity – Invention – Innovation – Differences – Value Addition – Concept and Types – Tools and Techniques of Generating an Idea – Turning Idea into Business Opportunity

UNIT-III

Setting Up an Enterprise

Process of Setting Up an Enterprise – Forms of an Enterprise – Sole Proprietorship – Partnership – Limited Liability Partnership Firm – Joint Stock Company – One Man partnership – Choice of Form of an Enterprise – Feasibility Study – Marketing, Technical, Financial, Commercial and Economical

UNIT-IV

Business Model Canvas and Formulation of Project Report

Introduction – Contents of Project Report – Project Description – Market Survey – Fund Requirement – Legal Compliance of Setting Up of an Enterprise – Registration – Source of Funds – Modern Sources of Funds.

UNIT-V

MSME's and Support Institutions

Government Schemes and Women Entrepreneurship – Importance of MSME for Economic Growth – MSME – Definition – Role of Government Organizations in Entrepreneurship Development – MSME DI – DIC – Khadi and Village Industries Commission – NSIC – NABARD, SICVI, SFC, SDC, EDII, EPCCB. Industrial Estates – Government Schemes – Prime Minister Employment Generation Programme – Women Entrepreneurship in India.

Course Outcomes	
CO1	Identify the various traits of an entrepreneur
CO2	Turn ideas into business opportunities
CO3	Do feasibility study before starting a project
CO4	Identify the sources of funds for funding a project
CO5	Develop an understanding about the Government schemes available for women entrepreneurs
Textbooks	
1	Jayashree Suresh, (Reprint 2017) Entrepreneurial Development, Margham Publications. Chennai.

2	Dr.C.B.Gupta&Dr.S.S.Khanka(Reprint2014).Entrepreneurship AndSmallBusiness Management,SultanChand&Sons,NewDelhi.
3	CharantimathPoornima,(Reprint 2014.),Entrepreneurshipdevelopment-Small,PearsonEducation,

	India.
4	RajShankar,(Reprint2016),EntrepreneurshipTheoryandPractice, VijayNicoleandImprintsPvt.Ltd, Chennai.
5	VasantDesai,(Reprint2017).DynamicsofEntrepreneurialDevelopment&ManagementTwenty FourthEdition. HimalayaPublishingHouse.Mumbai.
ReferenceBooks	
1	Anilkumar,Poornima, PrinciplesofEntrepreneurialdevelopment,Newagepublication,Chennai.
2	Dr.A.K.singh,Entrepreneurialdevelopmentandmanagement,Laxmipublications,Chennai.
3	Dr.R.K.Singal, Entrepreneurialdevelopment andmanagement,S.K.Katariapublishers,NewDelhi.
4	Dr.M.C.Garg,EntrepreneurialDevelopment,NewDelhi.
5	E.Gordon,K.Natrajan,Entrepreneurialdevelopment,Himalayapublishing,Mumbai.
NOTE: Latest EditionofTextbooksMaybeUsed	

WebResources	
1	https://www.interaction-design.org/literature/topics/design-thinking
2	https://www.bms.co.in/steps-involved-in-setting-up-of-an-enterprise/
3	http://www.msme.gov.in/

2.

3. MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	3	3	2	2
CO2	3	2	2	2	2	2	2	2	3	2	3
CO3	3	3	3	2	3	2	3	3	3	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2
CO5	3	3	3	2	3	2	3	3	3	2	3
TOTAL	15	12	13	10	13	10	13	13	15	10	12
AVERAGE	3	2.2	2.6	2	2.6	2	2.6	2.6	3	2	2.4

4. 3- Strong, 2-Medium, 1-Low

Coursetitle	Units	Hoursallotment
Entrepreneurial Development	I	12
	II	12
	III	12
	IV	12
	V	12

COURSECODE	COURSE TITLE	L	T	P	C
23161DSC55B	Elective Paper-II-B-Indirect Taxation	3	0	0	3

OBJECTIVES:

- To get introduced to indirect taxes
- To have an overview of Indirect taxes
- To be familiar with the CGST and IGST Act
- To learn procedures under GST
- To gain knowledge about Customs Duty.

Unit-I

Introduction to Indirect Tax

Concept and Features of Indirect Taxes- Difference between Direct and Indirect Taxes-
Special Feature of Indirect Tax Levies- Contribution to Government Revenues- Role of Indirect Taxation-
Merits and Demerits of Indirect Taxation - Reforms in Indirect Taxation

Unit -II

An Overview of Goods & Service Tax (GST)

Introduction of Goods and Service Tax in India- History of GST in India-
Constitutional Amendment under Pre-Goods and Service Tax Regime and Transitional Provisions-
Goods and Service Tax: Concepts, Meaning, Significance, Dual GST, Features and Benefits. GST Common Portal- Taxes and Duties not Subsumed in GST

Rates of GST in India.

Unit-III

CGST Act 2017 & IGST Act

Supply- Meaning- Classification- Time of Supply- Valuation- Registration- Voluntary- Compulsory
- Input Tax Credit - Eligibility - Reversal - Reverse charge Mechanism - E-Way Bill Returns - IGST
Act - Export and Import of Goods and Services- Inter State Vs Intra State Supply - Place of Supply.
Role of GSTN in Implementation of GST- Anti Profiteering Rules- Doctrine of Unjust Enrichment-
Challenges in Implementation of GST.

Unit -IV

Procedures under GST

Registration under GST Law, Tax Invoice Credit and Debit Notes, Different GST Returns, Electronic Liability Ledger, Electronic Credit Ledger, Electronic Cash Ledger, Different Assessment under GST, Interest Applicable under GST (Period), Penalty under GST, Various Provisions Regarding E-way Bill and GST, Mechanism of Tax Deducted at Source (TDS) and Tax Collected at Source (TCS), Audit under GST

Unit-V

Customs Duty 1962

Custom Duty: Concepts; Territorial Waters-High Seas-Levy of Customs Duty, Types of Custom Duties

- Valuation- Baggage Rules & Exemptions

Course Outcomes	
CO1	Acquaintance with Indirect tax laws
CO2	Exposed to the overview of GST.
CO3	Apply provisions of CGST and IGST
CO4	Summarise procedures of GST
CO5	Discuss aspects of Customs Duty in India
Textbooks	
1	Vinod K Singhania, Indirect Taxes, Taxman's Publications, New Delhi.
2	Dr. H.C. Mehrotra & Prof. V.P. Agarwal, Goods and Services Tax (GST), Sahitya Bhawan Publications, Agra.
3	Rajat Mohan, Goods & Services Tax, Bharat Law Publications House, New Delhi.
4	CA. Pushpendra Sisodia, Indirect Tax Laws, Bharat Publications, New Delhi.
Reference Books	
1	V.S. Datey, All About GST, Taxmann Publications, New Delhi.
2	T.S. Reddy & Y. Hariprasad Reddy, Business Taxation, Margham Publications, Chennai.
3	Study Material on GST- The Institute of Chartered Accountants of India / The Institute of Cost Accountants of India, Chennai.
4	Guidance material on GST issued by CBIC, Government of India.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://iimskills.com/goods-and-services-tax/#:~:text=GST-%20an%20acronym%20for%20Goods%20and%20Services%20Tax,%20etc.%2C%20to%20stand%20as%20a%20unified%20tax%20regime.
2	https://tax2win.in/guide/gst-procedure
3	https://www.cbic.gov.in/htdocs-cbec/customs/cs-act/cs-act-ch9

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	3	3	2	2
CO2	3	2	2	2	2	2	2	2	3	2	3
CO3	3	3	3	2	3	2	3	3	3	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2
CO5	3	3	3	2	3	2	3	3	3	2	3
TOTAL	15	12	13	10	13	10	13	13	15	10	12
AVERAGE	3	2.2	2.6	2	2.6	2	2.6	2.6	3	2	2.4

3- Strong, 2-Medium, 1-Low

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SEMESTER-V

COURSECODE	COURSE TITLE	L	T	P	C
23161DSC56A	Elective Paper-I-A- Human Resource Management	3	0	0	3

OBJECTIVE

S

- To understand aspects relating to Human Resource Management
- To know strategies relating to Human Resource Management
- To be acquainted with Industrial Relations Policy.
- To learn about organisation culture
- To assimilate knowledge on employee welfare.

UNIT-I

Introduction to HRM

Definition of HRM, Objectives – Importance – Nature- Scope, Role and Qualities of a HR Manager - Human Resource Planning- Meaning, Definition, Importance, Factors Affecting HRP, Process Involved in Human Resource Planning. Human Resource Information System (HRIS) - Job Analysis, Need for Job Analysis, Steps in Job Analysis, Job Description and Specification

UNIT-II

Strategic HRM

Definition of Strategy, Strategic Human Resource Management (SHRM), Importance of SHRM, Difference between Traditional and Strategic Human Resource Management, “Best Fit” Approach Vs. Best Practices of SHRM, Role of HR Strategy & Practices in National, Sectorial and Organizational Context, Investment Perspective of SHRM, Porter’s 5Ps Model

UNIT-III

Industrial Relations

Introduction to Industrial Relations - Employee Grievances Concept, Causes & Grievance Redressal Mechanism Discipline- Concept, Aspects of Discipline & Disciplinary Procedure- Trade Unions Act 1926- Industrial Disputes Act 1947

UNIT-IV

Organisational Development Collective Bargaining

Organisation Climate – Organization Change – Organisational Development: Definition, Meaning of Organizational Development. - Collective Bargaining- Essentials of Effective Collective Bargaining

Employee Welfare

Employee Welfare: Meaning, Objectives, Philosophy, Scope, Limitations, Types of Employee Welfare, Statutory and Non-Statutory Welfare Measures, and Labour Welfare Theories- Social Security, Health, Retirement & Other Benefits.

CO	Course Outcomes
CO1	Remember and recall concepts of Human Resource Management
CO2	Choose appropriate strategies for human resource management
CO3	Compare and contrast various industrial relations policy.
CO4	Determine appropriate organisation culture.

CO5

Formulate strategies for employee welfare.

Textbooks	
1	Ashwathappa, Human Resource Management, Tata McGraw-Hill Education, Noida.
2	Mamoria, C.B. and Gaonkar, S.V, Personnel Management, Himalaya Publishing House, Mumbai.
3	Sunil Lalla and Neha Shukla, Human Resource Management, Nirali Prakashan Publishers, Pune.
4	P. Subba Rao, Personnel and Human Resource Management, Himalaya Publishing House, Mumbai.
Reference Books	
1	L.M. Prasad, Human Resource Management, Sultan and Chandsons Publications, New Delhi.
2	DeCenzo, D.A. and Robbins, S.P. Human Resource Management, Wiley, India.
3	Dr. K. Sundar and Dr. J. Srinivasan, Human Resource Development, Margham Publications, Chennai.
4	Jane Weightman, Human Resource Management, VMPP Publishers, Mumbai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://hr.university/shrm/strategic-human-resource-management/
2	https://www.investopedia.com/terms/c/collective-bargaining.asp
3	https://www.yourarticlelibrary.com/human-resource-management-2/employee-welfare/employee-welfare/99778

COURSE CODE	COURSE TITLE	L	T	P	C
23161DSC56B	Disaster Management	3	0	0	3

Objective:

1. To provide basic conceptual understanding of disasters.
2. To understand approaches of Disaster Management
3. To build skills to respond to disaster

Unit: I Definition and types of disaster

Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters, earthquakes, floods drought, landside, lands subsidence, cyclones, volcanoes, tsunamis, avalanches, global climate extremes. Man-made disasters: Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires

Unit: II Study of Important disasters

Earthquakes and its types, magnitude and intensity, seismic zones of India, major fault systems of India plate, flood types and its management, drought types and its management, landside and its management case studies of disasters in Sikkim (e.g. Earthquakes, Landside). Social, Economic and Environmental impact of disasters

Unit:III Mitigation and Management techniques of Disaster

Basic principles of disaster management, Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warning Systems, Building design and construction in highly seismic zones, retrofitting of buildings.

Unit IV Training, awareness program and project on disaster management

Training and drills for disaster preparedness, Awareness generation program, Usages of GIS

and Remote sensing techniques in disaster management, Mini project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas.

OUTCOMES:

- Develop a deep understanding of disaster risk mitigation, and recovery policies as they arise from natural hazards around the globe; resilience,
- Develop the capacity to participate in debates on disaster governance and societal reconstruction.

Text Books:

1. Disaster Management Guidelines, GOI-UNDD Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S.S. and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
5. Modh S. (2010) Managing Natural Disasters, MacMillan publishers India LTD.

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SEMESTER-V

COURSE CODE	COURSE TITLE	L	T	P	C
23161DSC64A	Elective Paper-I-B-Financial Services	4	0	0	3

OBJECTIVES

- To impart knowledge on the role and function of the Indian financial system.
- To enrich their knowledge on key areas relating to management of financial products and services
- To familiarize students about Venture Capital, Leasing.
- To make them understand the Credit Ratings system.
- To provide insights into mutual funds and the operation of NSDL and CSDL.

UNIT-I

Introduction to Financial System

Structure of Financial System – Role of Financial System in Economic Development – Financial Markets

and Financial Instruments – Capital Markets – Money Markets – Primary Market Operations – Role of SEBI – Secondary Market Operations – Regulation – Functions of Stock Exchanges – Listing – Formalities – Financial Services Sector Problems and Reforms.

UNIT-II

Introduction to Financial Services

Concept, Nature and Scope of Financial Services – Regulatory Frame Work of Financial Services – Growth of Financial Services in India – Merchant Banking – Meaning – Types – Responsibilities of Merchant Bankers – Role of Merchant Bankers in Issue Management – Regulation of Merchant Banking in India

UNIT-III

Venture Capital and Leasing

Venture Capital – Growth of Venture Capital in India – Financing Pattern under Venture Capital – Legal Aspects and Guidelines for Venture Capital, Leasing – Types of Leases – Evaluation of Leasing Option Vs. Borrowing

UNIT-IV

Credit Rating

Credit Rating – Meaning, Functions – Debt Rating System of CRISIL, ICRA and CARE. Factoring, Forfeiting and Bill Discounting – Types of Factoring Arrangements – Factoring in the Indian Context.

UNIT-V

Mutual Funds

Mutual Funds – Concept and Objectives, Functions and Portfolio Classification, Organization and Management – Demat Services – Need and Operations – Role of NSDL and CSDL.

Course Outcomes	
CO1	Summarise the role and function of the financial system
CO2	Gain practical knowledge on key areas relating to management of financial products and services
CO3	Familiarize students about Venture Capital, Leasing.
CO4	Infer the importance of the Credit Rating system.
CO5	Understand various types of Mutual fund schemes and the roles of NSDL and CSDL.
Textbooks	
1	Gurusamy .S, Financial Services, Tata McGraw Hill, Noida.
2	C.Rama Gopal, Financial Services, Vikas Publishing House, Noida.
3	M. Y. Khan, Financial Services, Tata McGraw Hill, Noida.
4	E. Dharmaraj, Financial Services, S. Chand, New Delhi.
Reference Books	
1	Mike Heffner, Business process management in Financial Services, F.W. Olin Graduate school of Business, United States.
2	Perry Stinson, Bank management and Financial Services, Clanrye International, USA.
3	E. Gordon and K. Natarajan, Financial Market and Services, Himalaya Publishing House, Mumbai.
4	B. Santhanam, Financial Services, Margham Publications, Chennai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	

2	https://corporatefinanceinstitute.com/resources/fixed-income/credit-rating/
3	https://scripbox.com/mf/what-is-mutual-fund/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	3	3	3	2	2
CO2	3	2	2	3	2	2	2	2	3	2	3
CO3	3	3	3	2	3	2	3	3	3	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2
CO5	3	3	3	3	3	2	3	3	3	2	3
TOTAL	15	13	13	12	13	10	13	13	15	10	12
AVERAGE	3	2.6	2.6	2.4	2.6	2	2.6	2.6	3	2	2.4

3– Strong, 2-Medium, 1-Low

Course title	Units	Hours allotment
Financial Services	I	12
	II	12
	III	12
	IV	12
	V	12

SEMESTER V COMMUNICATIONS SKILLS

Course Code	Course Title	L	T	P	C
231ACLSPSL	Professional Skills	0	0	0	1

Course Objectives:

The Objectives of the course are to help students/candidates:

1. Acquire career skills and fully pursue to partake in a successful career path
2. Prepare a good resume, prepare for interviews and group discussions
3. Explore desired career opportunities in the employment market in consideration of an individual SWOT.

Course Outcomes:

At the end of this course the students will be able to:

1. Prepare their resume in an appropriate template without grammatical and other errors and using proper syntax
2. Participate in a simulated interview
3. Actively participate in group discussions towards gainful employment
4. Capture self-interview simulation video regarding the job role concerned
5. Enlist the common errors generally made by candidates in an interview
6. Perform appropriately and effectively in group discussions
7. Explore sources (online/offline) of career opportunities
8. Identify career opportunities in consideration of their own potential and aspirations
9. Use the necessary components required to prepare for a career in an identified occupation (as a case study).

Unit I: Resume Skills

Resume Skills: Preparation and Presentation

- Introduction of resume and its importance
 - Difference between a CV, Resume and Biodata
 - Essential components of a good resume
- ii. Resume skills: common errors
- Common errors people generally make in preparing their resume
 - Prepare a good resume of her/his considering all essential components

Unit II: Interview Skills

i. Interview Skills: Preparation and Presentation

- Meaning and types of interview (F2F, telephonic, video, etc.)
- Dress Code, Background Research, Do's and Don'ts
- Situation, Task, Approach and Response (STAR Approach) for facing an interview
- Interview procedure (opening, listening skills, closure, etc.)
- Important questions generally asked in a job interview (open and closed ended questions)

ii. Interview Skills: Simulation

- Observation of exemplary interviews
- Comment critically on simulated interviews

iii. Interview Skills: Common Errors

- Discuss the common errors generally candidates make in interview
- Demonstrate an ideal interview

Unit III: Group Discussion Skills

Meaning and methods of Group Discussion

- Procedure of Group Discussion
- Group Discussion-Simulation

- Group Discussion-

Common Errors Unit IV: Exploring Career

Opportunities

Knowing yourself – personal characteristics

- Knowledge about the world of work, requirements of jobs including self-employment.
- Sources of career information
- Preparing for a career based on their potentials and availability of opportunities

SEMESTER-VI

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COURSE CODE	COURSE TITLE	L	T	P	C
23161AEC61	Cost Accounting -II	6	1	0	3

OBJECTIVES

- To understand the standards in Cost Accounting
- To know the concepts of contract costing.
- To be familiar with the concept of process costing.
- To learn about operation costing.
- To gain insights into standard costing.

UNIT-I

Cost Accounting Standards

An Introduction to CAS – Purpose of CAS – Advantages of CAS – Difference between CAS and FAR Regulations – Different Degrees of CAS Coverage – Cost Accounting Standards – Responsibility Accounting and Divisional Performance Measurement.

UNIT-II

Contract Costing

Definition-Features of Contract Costing – Calculation of Profit on Contracts – Cost Plus Contract – Contract Costing and Job Costing – A Comparison – Preparation of Contract A/c.

UNIT-III

Process Costing

Process Costing – Meaning – Features of Process Costing – Application of Process Costing – Fundamental Principles of Process Costing – Treatment of Loss and Gain: Normal and Abnormal Loss
 - Abnormal Gain – Joint Products, By Products – Concept of Equivalent Production – Process Accounts
 - Process Losses and Gains..

UNIT-IV

Operation Costing

Operation Costing – Meaning – Preparation of Operating Cost Sheet – Transport Costing – Power Supply Costing – Hospital Costing – Simple Problems.

UNIT-V

Standard Costing

Definition – Objectives – Advantages – Standard Cost and Estimated Cost – Installation of Standard Costing – Variance Analysis – Material, Labour, Overhead, and Sales Variances – Calculation of Variances

Course Outcomes	
CO1	Remember and recall standards in cost accounting
CO2	Apply the knowledge in contract costing

CO3	Analyzeandassimilateconceptsinprocesscosting
CO4	Understandvarious basesofclassificationcostandprepareoperatingcoststatement.
CO5	Setupstandardsandanalysevariances.
Textbooks	
1	JainS.P.andNarang K.L.CostAccounting,KalyaniPublishers.NewDelhi.
2	KhannaB.S., PandeyI.M.,AhujaG.K.,andAroraM.N.,PracticalCosting,SChand&Co,New Delhi.
3	Dr.S.N.Maheswari,PrinciplesofCostAccounting,SultanChandpublications,NewDelhi.
4	T.S.ReddyandY.HariPrasadReddy, CostAccounting, Marghampublications, Chennai.
5	S.P.Iyengar,Cost Accounting,SultanChandPublications,NewDelhi.
ReferenceBooks	
1	Polimeni,Cost Accounting:Conceptsand ApplicationsforManagerialDecisionMaking,NewYork,McGraw–Hill,Noida.
2	JainS.P.andNarang K.L.CostAccounting,KalyaniPublishers,NewDelhi.
3	V.K.SaxenaandC.D.Vashist,CostAccounting,SultanChandpublications,NewDelhi.
4	MurthyA&GurusamyS, CostAccounting,VijayNicoleImprintsPvt.Ltd.Chennai.
5	Prasad.N.KandPrasad.V.K,CostAccounting,BookSyndicate,Bangladesh.
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	https://www.economicdiscussion.net/cost-accounting/contract-costing/32597
2	https://www.wallstreetmojo.com/process-costing/
3	https://www.accountingnotes.net/cost-accounting/operating-costing/17755

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	2	2
CO2	3	3	3	2	2	3	2	2	3	2	3
CO3	3	3	3	2	3	3	3	3	3	2	2
CO4	3	3	3	2	2	3	2	2	3	2	2
CO5	3	3	3	2	3	3	3	3	3	2	3
TOTAL	15	15	15	10	13	15	13	13	15	10	12
AVERAGE	3	3	3	2	2.6	3	2.6	2.6	3	2	2.4

3– Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
CostAccountingII	I	18
	II	18
	III	18
	IV	18
	V	18

SEMESTER-VI
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COURSE CODE	COURSE TITLE	L	T	P	C
23161AEC62	Management Accounting	6	2	0	3

OBJECTIVES:

- To understand basics management accounting
- To know the aspects of Financial Statement Analysis
- To familiarize with fund flow and cash flow analysis
- To learn about budgetary control
- To gain insights into marginal costing

UNIT-I

Introduction to Management Accounting

Management Accounting – Meaning – Scope – Importance – Limitations – Management Accounting Vs Cost Accounting – Management Accounting Vs Financial Accounting.

UNIT-II

Financial Statement Analysis

Analysis and Interpretation of Financial Statements – Nature and Significance – Types of Financial Analysis – Tools of Analysis – Comparative Statements – Common Size Statement – Trend Analysis. Ratio Analysis: Meaning – Advantages – Limitations – Types of Ratios – Liquidity Ratios – Profitability Ratios – Turnover Ratios – Capital Structure Ratios – Leverage Ratios – Preparation of Financial Statements from Ratios.

UNIT- III

Fund Flow Analysis & Cash Flow Analysis

Introduction, Meaning of Funds Flow Statement – Ascertainment of Flow of Funds – Technique of Preparing Funds Flow Statement – Schedule of Changes in Working Capital – Adjusted Profit and Loss Account – Preparation of Funds Flow Statement.

Cash Flow Statements: Meaning – Advantages – Limitations – Preparation of Cash Flow Statement as per AS 3 – Types of Cash Flows – Operating, Financing and Investing Cash Flows

UNIT-IV

Budgetary Control

Budgetary Control: Meaning – Preparation of Various Budgets – Cash Budget – Flexible Budget – Production Budget – Sales Budget..

UNIT-V

Marginal Costing: Meaning – Features – Fixed Cost, Variable Cost and Semi Variable Cost – Contribution – Marginal Cost Equation – P/V Ratio – Break Even Point – Margin of Safety – Cost-Volume-Profit Analysis – Break Even Point – Decision Making: Selection of a Product Mix – Make or Buy Decision – Discontinuance of a product line – Change or Status quo – Limiting Factors – Exploring New Markets

CO	CourseOutcomes
CO1	Rememberandrecallbasicsinmanagement accounting
CO2	ApplytheknowledgeofpreparationofFinancialStatements
CO3	Analysetheconceptsrelatingtofundflowandcashflow
CO4	Evaluatetechniquesof budgetarycontrol
CO5	Formulatecriteriafordecisionmakingusingprinciplesofmarginalcosting.
Textbooks	
1	JainS.P. &NarangK.L.(2018)CostandManagementAccounting,KalyaniPublications,
2	Rds.Maheswari,CostandManagementAccounting,SultanChandSonsPublications,NewDelhi.
3	SharmaandShashiK.Gupta,Management Accounting,KalyaniPublishers,Chennai.
4	JenitraLMervin,DasltonLCecil,ManagementAccounting,LerantecPress,Chennai.
5	T.S.Reddy&Y.HariPrasadReddy,ManagementAccounting,MarghamPublications,Chennai.

Reference Books	
1	Chadwick–TheEssenceofManagementAccounting,FinancialTimesPublications,England.
2	CharlesT.HorngrenandGaryN.Sundem–IntroductiontoManagementAccounting, Pearson, Chennai.
3	MurthyAandGurusamyS,ManagementAccounting-Theory&Practice,VijayNicoleImprintsPvt. Ltd.Chennai.
4	Hansen-Mowen, CostManagementAccountingandControl, SouthWesternCollege, India.
5	N.P.Srinivasan, Management Accounting, NewAgepublishers, Chennai.
NOTE: Latest EditionofTextbooksMaybeUsed	
WebResources	
1	https://www.accountingnotes.net/companies/fund-flow-analysis/fund-flow-analysis-accounting/13300
2	https://accountingshare.com/budgetary-control/
3	https://www.investopedia.com/terms/m/marginalcostofproduction.asp

I.

II. MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	3	3	2	2
CO2	3	2	2	2	3	2	2	2	3	2	3
CO3	3	2	3	2	3	2	3	3	3	2	2
CO4	3	2	2	2	3	2	2	2	3	2	2
CO5	3	3	3	2	3	2	3	3	3	2	3
TOTAL	15	11	13	10	15	10	13	13	15	10	12
AVERAGE	3	2.1	2.6	2	2	2	2.6	2.6	3	2	2.4

III. 3– Strong, 2–Medium, 1–Low

Coursetitle	Units	Hoursallotment
Management Accounting	I	18
	II	18
	III	18
	IV	18
	V	18

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COURSECODE	COURSE TITLE	L	T	P	C
23161AEC63	Income Tax Law & Practice -II	6	2	0	3

OBJECTIVES

- To understand provisions relating to capital gains
- To know the provisions for computation of income from other sources.
- To familiarize law relating to set off and carry forward of losses and deductions from Gross Total Income
- To learn about assessment of individuals
- To gain knowledge about assessment procedures.

UNIT- I

Capital Gains

Capital Gains – Kinds of Capital Assets – Computation of Capital Gains – Exemption under Section 54, 54B, 54D, 54EC, 54F, 54GA.

UNIT-II

Income From Other Sources

Income from Other Sources – Income Chargeable to Tax under the Head Income from Other Sources – Procedures for Computing Income from Other Sources – Deductions Allowed – Deduction not Allowed – Problems on Computation of Income from Other Sources

UNIT-III

Set Off and Carry Forward of Losses and Deductions From Gross Total Income

Provisions for Set-off and Carry Forward of Losses (Simple Problems). Deductions U/S 80C, 80CC, 80CCB, 80CCC, 80CCD, 80CCE, 80D, 80DD, 80DDB, 80E, 80EE, 80EEA, 80EEB, 80G, 80GG, 80GGA, 80TTA, 80TTB, and 80U only

UNIT-IV

Assessment of Individuals

Assessment:

Meaning and Types, Computation of Total Income and Tax Liability of an Individual (simple problems in case of Income from salaries, HP and Profits and Gains – computed income may be given).

UNIT- V

Income Tax Authorities

Administration of Income Tax Act – Income Tax Authorities – Powers of CBDT – Powers of Income Tax Officers - Procedures for Assessment – Filing of Return – Due Dates of Filing – Voluntary Filing – Return of Loss – Related Return – Defective Return – Signing of Return – Permanent Account Number (PAN)

Course Outcomes	
CO1	Remember and recall provisions on capital gains
CO2	Apply the knowledge about income from other sources
CO3	Analyse the set off and carry forward of losses provisions
CO4	Learn about assessment of individuals

CO5	Apply procedures learnt about assessment procedures.
Textbooks	

1	V.P.Gaur, Narang, PujaGaurandRajeevPuri- IncomeTaxLawandPractice, KalyaniPublishers, NewDelhi.
2	T.S.ReddyandHariprasadReddy,IncomeTaxLawandPractice, MarghamPublications, Chennai.
3	DinkarPagare, IncomeTaxLawandPractice, Sultan&ChandSons,NewDelhi.
4	MehrotraH.C,Dr.GoyalS.P, IncomeTaxLawandAccounts, SahityaBhavanPublications, Agra.
5	T.Srinivasan–IncomeTax&Practice –VijayNicoleImprintsPrivateLimited,Chennai.
ReferenceBooks	
1	HariharanN,IncomeTaxLaw&Practice, VijayNicoleImprintsPvt. Ltd. Chennai.
2	BhagwatiPrasad,IncomeTaxLawandPractice,VishwaPrakasan,NewDelhi.
3	VinodK.Singhanian,StudentsGuidetoIncomeTax.,U.K.BharghavaTaxman,NewDelhi.
4	Dr.VinodKSinghanian, Dr. MonicaSinghanian,Taxmann'sStudents'GuidetoIncomeTax, NewDelhi.
5	MittalPreethiRaniand BansalAnshika,IncomeTaxLawand Practice,Sultan &Chand Sons,NewDelhi.
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	https://www.investopedia.com/terms/c/capitalgain.asp
2	https://www.incometaxmanagement.com/Direct-Taxes/AY-2021-22/assessment/1-assessment-of-an-individual.html
3	https://www.incometax.gov.in/iec/foportal/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	3	3	2	2
CO2	3	2	2	2	2	2	2	2	3	2	3
CO3	3	3	3	2	3	2	3	3	3	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2
CO5	3	3	3	2	3	2	3	3	3	2	3
TOTAL	15	12	13	10	13	10	13	13	15	10	12
AVERAGE	3	2.2	2.6	2	2.6	2	2.6	2.6	3	2	2.2

3- Strong, 2-Medium, 1-Low

Course title	Units	Hours allotment
Income Tax Law & Practice II	I	18
	II	18
	III	18
	IV	18
	V	18

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COURSECODE	COURSETITLE	L	T	P	C
23161DSC64A	Electivepaper –I-A-FinancialManagement	4	0	0	3

OBJECTIVES:

- To introduce the concept of financial management.
- To learn the capital structure theories
- To gain knowledge about techniques in capital budgeting
- To learn about dividend payment models
- To understand the needs and calculation of working capital in an organization.

UNIT– I

Introduction

Meaning and Objectives of Financial Management – Functions of Financial Management. Finance - Sources of Financing - Role of Financial Manager in Financial Management - Financial Goals - Profit Maximization Vs. Wealth Maximization – Components of Financial Management

UNIT–II

Financial Decision

Capital Structure – Definition - Meaning- Theories- Factors determining Capital Structure – Various approaches of Capital structure - Cost of Capital – Meaning - Methods - Cost of Equity Capital – Cost of Preference Capital – Cost of Debt – Cost of Retained Earnings – Weighted Average (or) Composite Cost of Capital (WACC) Leverage – Concept – Operating and Financial Leverage on EPS.

UNIT–III

Investment Decision

Capital Budgeting - Meaning - Process – Cash Flow Estimation - Capital Budgeting Appraisal Methods: Traditional Methods - Payback Period – Accounting Rate of Return (ARR). Discounted Cash-flow Methods: Net Present Value (NPV) – Net Terminal Value - Internal Rate of Return – Profitability Index -

UNIT–IV

Dividend Decision

Meaning – Dividend Policies – Factors Affecting Dividend Payment – Provision on Dividend Payment in Company Law – Dividend Models - Walter's Model - Gordon's Model – M&M Model

UNIT– V

Working Capital Decision

Working Capital - Meaning and Importance – Factors Influencing Working Capital – Determining Working Capital Operating Cycle - Management of Current Assets: Inventories, Accounts Receivables and Cash

Course Outcomes	
CO1	Recall the concepts in financial management.
CO2	Apply the various capital structure theories.
CO3	Apply capital budgeting techniques to evaluate investment proposals.
CO4	Determine dividend pay-outs.

CO5	Estimate the working capital of an organization.
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Textbooks

1	R.K.Sharma,ShashiKGupta,FinancialManagement,KalyaniPublications,NewDelhi.
2	Y.KhanandP.K.Jain,FinancialManagement,McGrawHillEducation,Noida.
3	I.M.Pandey,FinancialManagement,VikasPublications,Noida.
4	Dr.S.N.Maheshwari, ElementsofFinancialManagement,SultanChand&Sons, NewDelhi.
5	Dr.KulkarniandDr.SathyaPrasad,FinancialManagement,HimalayaPublishingHouse,Mumbai.
ReferenceBooks	
1	PrasanaChandra,FinancialManagement,TataMcGrawHill,NewDelhi.
2	I.M.Pandey,FinancialManagement,VikasPublishing,Noida.
3	Khan&Jain, FinancialManagement,SultanChand&Sons,NewDelhi.
4.	A.Murthy,FinancialManagement,,MarghamPublications,Chennai.
5.	J.SrinivasanandP.Periyasamy,FinancialManagement,VijayNicolePublishers,Chennai.
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	https://efinancemanagement.com/financial-management/types-of-financial-decisions
2	https://efinancemanagement.com/dividend-decisions
3	https://www.investopedia.com/terms/w/workingcapital.asp

**MAPPINGWITHPROGRAMMEOUTC
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UTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	3	3	2	2
CO2	3	2	2	2	3	2	2	2	3	2	3
CO3	3	3	3	2	3	2	3	3	3	2	2
CO4	3	2	2	2	3	2	2	2	3	2	2
CO5	3	3	3	2	3	2	3	3	3	2	2
TOTAL	15	12	13	10	15	10	13	13	15	10	11
AVERAGE	3	2.2	2.6	2	3	2	2.6	2.6	3	2	2.1

3– Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
FinancialManagement	I	15
	II	15
	III	15
	IV	15
	V	15

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COURSECODE	COURSETITLE	L	T	P	C
23161DSC64B	Electivepaper-II-A- ComputerApplicationinBusiness	4	0	0	3

OBJECTIVIES:

- Toapplyvariousterminologiesusedintheoperationofcomputersystemsina businessenvironment
- ToUnderstand thebasicconceptsofawordprocessing package
- Toapplythebasicconceptsofelectronicspreadsheetsoftwareinbusiness
- ToUnderstandandapplythebasicconceptsofPowerPointpresentation
- Togeneratedeletelectronicmailforcommunicatinginanautomatedofficeforbusinessenvironment.

UNIT- I

WordProcessing

IntroductiontoWord-Processing, Word-ProcessingConcepts,UseofTemplates,andWorkingwithWord Document: Editing Text, Find and Replace Text, Formatting, Spell Check, Autocorrect, Auto Text - BulletsandNumbering, Tabs,ParagraphFormatting,Indent,and PageFormatting,HeaderandFooter

UNIT-II

MailMerge

Tables-Inserting,FillingandFormattinggaTable-InsertingPictures andVideo-MailMergeIncluding LinkingwithDatabase-PrintingDocuments,Creating BusinessDocuments.

UNIT-III

PreparingPresentations

BasicsofPresentations: Slides,Fonts,Drawing,Editing,Inserting,Tables,Images,texts,Symbols.Media -

Design–Transition–Animation- Slideshow.CreatingBusinessPresentations.

UNIT–IV

SpreadsheetanditsBusinessApplications

Spreadsheet:Concepts,ManagingWorksheets-Formatting,EnteringData,Editing,andPrintingaWorksheet - Handling Operators in Formula, Project Involving Multiple Spreadsheets, Organizing Charts and Graphs.Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and Reference, Database, and TextFunctions.

UNIT– V

CreatingBusinessSpreadsheet

Creating Spreadsheet in the Area of: Loan and Lease Statement, Ratio Analysis, Payroll Statements, CapitalBudgeting,DepreciationAccounting,GraphicalRepresentationofData,FrequencyDistributionandi tsStatisticalParameters,CorrelationandRegression.

CourseOutcomes	
CO1	RecallvarioustechniquesofworkinginMS-WORD.
CO2	Prepareappropriatebusinessdocument.
CO3	Create-Presentationfor SeminarsandLecture.
CO4	UnderstandingvarioustoolsusedinMS-EXCEL.
CO5	ApplyExceltools invariousbusinessareasofFinance, HR, Statistics.
Textbooks	
1	RParameswaran , ComputerApplicationinBusiness -S.ChandPublishing, UP.
2	Dr.SandeepSrivastava,Er.MeeraGoyal,ComputerApplicationsInBusiness- SBPD Publications,UP.
3	MansiBansal , SushilKumarSharma ,ComputerApplicationInBusiness,Mumbai, Maharashtra.
4	PeterNorton, “IntroductiontoComputers”–TataMcGraw-Hill,Noida.
5	RenuGupta:Computer Applications inBusiness, ShreeMahavir BookDepot (Publishers)NewDelhi.

ReferenceBooks	
1	Gupta,Swati,OfficeAutomationSystem, LapLambertAcademicPublication. USA.
2	JenniferAckermanKettel,GuyHat-Davis,CurtSimmons,“Microsoft2003”,TataMcGrawHill, Noida.
3	Dr.R.Deepalakshmi,ComputerFundamentalsandOfficeAutomation,CharulathaPublications,Tamilnadu.
4	JohnWalkenbach,MSExcel2007Bible,WileyPublication, NewJersey, USA.
5	GlynDavis&Branko Pecar:BusinessStatisticsusingExcel,Oxfordpublications,Chennai.

NOTE: Latest EditionofTextbooksMay beUsed

WebResources	
1	https://www.youtube.com/watch?v=Nv_Nnw01FaU

2	https://www.udemy.com/course/office-automation-certificate-course/
3	https://guides.lib.umich.edu/ld.php?content_id=11412285

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	2	3	2	2
CO2	3	2	3	2	2	2	2	2	3	2	3
CO3	3	3	3	2	3	2	3	2	3	2	2
CO4	3	2	3	2	2	2	2	2	3	2	2
CO5	3	3	3	2	3	2	3	2	3	2	3
TOTAL	15	12	15	10	13	10	13	10	15	10	12
AVERAGE	3	2.4	3	2	2.6	2	2.6	2	3	2	2.4

3– Strong,2-Medium,1-Low

Coursetitle	Units	Hoursallotment
Computer Application in Business	I	15
	II	15
	III	15
	IV	15
	V	15

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COURSECODE	COURSE TITLE	L	T	P	C
23161SEC66	General awareness for Competitive Examinations	2	0	0	2

OBJECTIVES:

- To create the opportunity for learning across different disciplines and builds experience for students as they grow into lifelong learners.
- To build experiences for students as they grow into lifelong learners.
- To know the basic concepts of various disciplines

UNIT- I

Indian Polity

Basics concepts- Three organs of Indian government (Executives, Legislature, Judiciary), Introduction to Indian Constitution – Salient features of constitution, Preamble, Fundamental rights, Fundamental duties, Directive Principles of State Policy, Types of Majority, Amendments to the Constitution, Basic structure

Doctrine, Division of subjects between the union and the states local Governance, Elections in India and Election Commission, CAG..

UNIT-II

Geography

Major oceans of the world – Important Canals – Gulfs – Straits and passes – Indian Rivers and its Tributaries – Climatology – Atmosphere, Wind systems, Cloud systems, World climatic classification – Indian climate – Indian Monsoon – Indian’s physical features, Indian Soil types and Distribution – Importance Trade routes and projects, Indian natural vegetation – Indian agriculture – Major crops and its distribution, Indian Industries and its Distribution..

UNIT-III

Economy

National Income – Inflation – Money and Banking – Agriculture in India – Union Budget – Planning in India – Poverty – Unemployment – Inclusive Development and Development issues – Industrial policies – Financial Markets

UNIT-IV

History

Modern India – formation of

Indian National Congress – Morley Minto Reforms, Revolutionary activities – World War I and India’s Response – Home Rule league – Montague Chelmsford reforms – Rowlett Act – Non – Cooperation Movement – Simon commission and Nehru Report – Civil Disobedience Movement and Round Table conferences – Quit India Movement and Demand for Pakistan – Cabinet Mission – Formation of Constituents Assembly and partition of India

UNIT-V

Environment and Ecology

Basic concepts – Ecology, Biodiversity – Food chain and food web – BioGeoChemical Cycles – International BioDiversity organisations – International Conventions – Conferences and Protocol – Indian Environmental laws and Environment Related organisation

Course Outcomes

Course Outcomes	
CO1	Develop board knowledge of the different components in polity
CO2	Understand the Geographical features across countries and in India
CO3	Acquire knowledge on the aspects of Indian Economy
CO4	Understand the significance of India’s Freedom Struggle
CO5	Gain knowledge on Ecology and Environment

Textbooks	
1	ClassXIandXII NCERTGeography
2	History–OldNCERT’S ClassXI andXII
ReferenceBooks	
1	M. LaxmiKant(2019),Indianpolity,McGraw-Hill
2	RameshSingh(2022),IndianEconomy,McGraw-Hill
3	G.CLeong,PhysicalandHumanGeography, OxfordUniversityPress
4	MajidHussain- IndiaMapEntries inGeography, GKPublicationsPvt,Ltd.
NOTE: Latest EditionofTextbooksMay beUsed	
WebResources	
1	https://www.freebookkeepingaccounting.com/using-excel-in-accounts
2	https://courses.corporatefinanceinstitute.com/courses/free-excel-crash-course-for-finance
3	https://www.youtube.com/watch?v=Nv_Nnw01FaU

Course title	Units	Hours allotment
General awareness for Competitive Examinations	I	06
	II	06
	III	06
	IV	06
	V	06

1

SEMESTER-VI

COURSECODE	COURSE TITLE	L	T	P	C
231ACSIKWS	Indian knowledge System	0	0	0	2

OBJECTIVES:

Establish, guide and monitor subject-wise interdisciplinary research groups comprising of researchers from institutes, centers and individuals. Create and promote popularization schemes. Facilitate funding of various projects and develop mechanisms to undertake research

Unit I: Introduction to Indian Knowledge System (IKS), Definition, Concept and Scope of IKS (4) 1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in ancient India and in modern India

Unit II: IKS and Indian Scholars, Indian Literature (8) 2.1 Philosophy and Literature (Maharishi Vyas, Manu, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhashkaracharya, Varahamihira and Brahmgupta) 2.3 Medicine and Yoga (Charak, Susruta, Maharishi Patanjali and Dhanwantri) 2.4 Sahitya (Vedas, Upvedas, Upavedas (Ayurveda, Dhanurveda, Gandharvaveda) Puran and Upnishad) and shaddarshan (Vedanta, Nyaya, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma and Meditation) 2.5 Shastra (Nyaya, vyakarana, Krishi, Shilp, Vastu, Natya and Sangeet)

Unit III: Indian Traditional/tribal/ethnic communities, their livelihood and local wisdom (6) 3.1 Geophysical aspects, Resources and Vulnerability 3.2 Resource availability, utilization pattern and limitations 3.3 Socio-Cultural linkages with Traditional Knowledge System 3.4 Tangible and intangible cultural heritage.

Unit-IV

unique Traditional Practices and Applied Traditional Knowledge (8) 4.1 Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives 4.2 Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices

UNIT-V

Protection, preservation, conservation and Management of Indian Knowledge System (4) 5.1 Documentation and Preservation of IKS 5.2 Approaches for conservation and Management of nature and bio-resources 5.3 Approaches and strategies to protection and conservation of IKS

COURSE OUTCOMES:

- Under Ministry of Education, Government of India has established IKS division with a vision to promote interdisciplinary and transdisciplinary research on all aspects of IKS, and disseminate IKS knowledge for further innovations and societal applications



B.Com - COMPUTER APPLICATION - 2023- REGULATION

COURSE STRUCTURE

SEMESTER - I					
Course Code	Course Title	L	T	P	C
23110AEC11 / 23111AEC11 / 23132AEC11 / 23135AEC11	Tamil – I/ Advanced English –I/ Hindi – I/ French – I	3	1	0	3
23111AEC12	English-I	3	1	0	3
23198AEC13	Financial Accounting -I	3	0	0	3
23198AEC14	Principles of Management	3	0	0	3
23198GEC15	Programming in c and lab	4	0	1	3
23198GEC16	Python Programming and lab	4	0	1	3
SKILL ENHANCEMENT COURSE (SEC)					
23198SEC17	Managerial Skill Development	2	0	0	2
23198SEC18	Foundation course	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					
231AECCINC	Indian Constitution	2	0	0	2
AUDIT COURSE					
231LSCUV	Universal Human Values	0	0	0	1
	Total	26	2	2	25
SEMESTER - II					
23110AEC21 / 23111AEC21 / 23132AEC21 / 23135AEC21	Tamil – I/ Advanced English –I/ Hindi – I/ French – I	3	0	0	3
23111AEC22	English-I	3	0	0	3
23198AEC23	Financial Accounting II	4	0	0	3
23198AEC24	Business Law	4	0	0	3
23198GEC25	Office Automation and lab	4	0	1	3
23198GEC26	Programming in C++ and lab	4	0	1	3
SKILL ENHANCEMENT COURSE (SEC)					
23198SEC27	E-Business	2	0	0	2
23198SEC28	Elements of Insurance	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					

231AECCMS	Communication Skills	2	0	0	2
AUDIT COURSE					
231SSCBE	Basic Behavioural Etiquette	0	0	0	1
	Total	28	0	2	25
SEMESTER - III					
23110AEC31 / 23111AEC31 / 23132AEC31 / 23135AEC31	Tamil – I/ Advanced English –I/ Hindi – I/ French – I	3	0	0	3
23111AEC32	English-I	3	0	0	3
23198AEC33	Corporate accounting- I	4	0	0	3
23198AEC34	Business Mathematics and statistics	4	0	0	3
23198GEC 35	Programing in JAVA and Lab	4	0	1	3
23198GEC36	Web Technology (PHP)andLab	4	0	1	3
SKILL ENHANCEMENT COURSE (SEC)					
23198SEC37	Intellectual Property Rights	2	0	0	1
23198SEC38	Tally. ERP 9	1	0	1	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC1)					
23198RMC39	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	0	0	0	1
	Total	27	0	3	24
SEMESTER - IV					
23110AEC41/ 23111AEC41/ 23132AEC41/ 23135AEC45	Tamil-IV/Advanced English-IV/Hindi-IV/French-IV	3	0	0	3
23111AEC31	English-IV	3	0	0	3
23198SEC43	Corporate Accounting II	4	1	0	3
23198SEC44	Company Law	4	1	0	3
23198GEC46	Relational Database Management	3	0	0	3
23161GEC46	Introductionto Data Science	3	0	0	3
SKILL ENHANCEMENT COURSE (SEC)					
23198SEC47	Information Technology Concepts	2	0	0	2
23198SEC48	Salesmanship	2	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC4)					
23161BRC49	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	0	0	2

AUDIT COURSE					
231LCSCLS	Leadership and Management Skills	0	0	0	1
	Total	28	2	0	27
SEMESTER - V					
23198AEC51	Cost Accounting -I	5	1	0	4
23198AEC52	Banking law and Practice	5	1	0	4
23198AEC53	Income Tax Law and Practice-I	5	1	0	4
23198DSC 54	Auditing and Corporate Governance	4	0	0	3
23198DSC55-	Financialmanagement	3	0	0	3
	DisasterManagement				
23198DSC56-	SoftwareEngineering+(UMLLab)	3	0	1	3
	Object oriented Analysis and Design+(UMLLab)				
SKILL ENHANCEMENT COURSE (SEC)					
23198SEC57	Summer Internship /Industrial Training	0	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC5)					
231AECCVED	Value Education	2	0	0	2
AUDIT COURSE					
231ACLSPSL	Professional Skills	0	0	0	1
	Total	27	2	1	26
SEMESTER - VI					
23198AEC61	CostAccounting-II	6	1	0	3
23198AEC62	ManagementAccounting	6	2	0	3
23198AEC63	IncomeTaxLawandPractice -II	6	2	0	3
23198DSE64	Introduction to Oracle and SQL (Theory)	4	0	1	3
	SQLApplicationsusing Oracle (Practical)				
23198PRW65	ProjectWork	0	0	0	4
SKILL ENHANCEMENT COURSE (SEC)					
23161SEC66	General awareness for Competitive Examinations	2	0	0	1
23161EXACT	Extension activity	0	0	0	1
AUDIT COURSE					
231ACSIKWS	Indian knowledge System	0	0	0	2
	Total	24	5	1	20
Total Credits - Programme					140
Total Credits - Audit Course					07

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER	COURSE CODE	COURSE TITLE
V	23198DSC55 -	Financial Management
		Disaster Management
V	23198DSC56-	SoftwareEngineering+(UMLLab)
		Object oriented Analysis and Design+(UMLLab)
VI	23198DSC64 -	Introduction to Oracle and SQL (Theory)
		SQLApplicationsusing Oracle (Practical)

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SEM	AEC	GEC	DSC	SECC	AECC	Audit	Research	Total
I	12	06	-	04	02	01	-	25
II	12	06	-	04	02	01	-	25
III	12	06	-	03	02	01	-	24
IV	12	06	-	04	04	01	-	27
V	15	-	06	02	02	01	-	26
VI	09	-	03	02	-	02	04	20
Total	72	24	09	19	12	07	04	147

	EMPLOYABILITY
	ENTERPRENURSHIP
	SKILL DEVELOPMENT

SEMESTER-I

CourseCode	CourseTitle	L	T	P	C
23110AEC11	Tamil-I	4	0	0	2

1. இலக்கணம்
2. இலக்கணம்
3. இலக்கணம்
4. இலக்கணம்
5. இலக்கணம்

இலக்கணம்

- இலக்கணம்
- இலக்கணம்
- இலக்கணம்
- இலக்கணம்
- இலக்கணம்

இலக்கணம்-1

1. இலக்கணம்--இலக்கணம், இலக்கணம், இலக்கணம்
2. இலக்கணம்--இலக்கணம், இலக்கணம், இலக்கணம்
3. இலக்கணம்--இலக்கணம், இலக்கணம், இலக்கணம்
4. இலக்கணம்--இலக்கணம், இலக்கணம், இலக்கணம்
5. இலக்கணம்--இலக்கணம், இலக்கணம், இலக்கணம்

இலக்கணம்-1

இலக்கணம்

2. இலக்கணம்--இலக்கணம், இலக்கணம், இலக்கணம்
3. இலக்கணம்--இலக்கணம், இலக்கணம், இலக்கணம்
4. இலக்கணம்--இலக்கணம், இலக்கணம், இலக்கணம்

இலக்கணம்

இலக்கணம்-1

இலக்கணம்

SEMESTER-I

CourseCode	CourseTitle	L	T	P	C
23111AEC12	PAPERII-GENERALENGLISH	4	0	0	2

Objectives:

- Toenablelearnerstoacquirethelinguisticcompetencenecessarilyrequiredinvariouslifesituations.
- Tohelpthemunderstandthewrittentextandabletouseskimming,scanningskills
- Toassistthemincreativethinkingabilities
- Toenablethembecomebetterreadersandwriters
- Toassistthemindevelopingcorrectreadinghabits,silently,extensivelyandintensively

UNIT-1

Poetry

A Patch of Land- Subramania Bharati

A Nation's Strength-

Ralph Waldo Emerson Love Cycle-

Chinua Achebe

UNIT-II

Prose

JRD- Harish Bhat

Us and Them- David Sedaris From Dress Your Family in Corduroy and Denim

UNIT-III

Short Stories

The Faltering Pendulum-

Bhabani Bhattacharya

How I Taught My Grandmother to Read-

Sudha Murthy The Gold Frame-R.K.Laxman

UNIT-IV

Language Competency

Vocabulary: Synonyms, Antonyms, Word Formation

Appropriate use of

Articles and Parts of Speech

Error correction

UNIT-V

English for Workplace

Self-

introduction, Greetings Introduction

using others

Listening for General and Specific Information

formation

Listening to and Giving Instructions/ Directions

rections

Textbooks	
1.	S. P. Jain and K. L. Narang Financial Accounting- I, Kalyani Publishers, New Delhi.
2.	S.N. Maheshwari, Financial Accounting, Vikas Publications, Noida.
3.	Shukla Grewal and Gupta, "Advanced Accounts", volume 1, S. Chand and Sons, New Delhi.
4.	Radhaswamy and R.L. Gupta: Advanced Accounting, Sultan Chand, New Delhi.
5.	R.L. Gupta and V.K. Gupta, "Financial Accounting", Sultan Chand, New Delhi.
Reference Books	
1.	Dr. Arulanandan and Raman: Advanced Accountancy, Himalaya Publications, Mumbai.
2.	Tulsian, Advanced Accounting, Tata McGraw Hills, Noida.
3.	Charumathi and Vinayagam, Financial Accounting, S. Chand and Sons, New Delhi.
4.	Goyal and Tiwari, Financial Accounting, Taxmann Publications, New Delhi.
5.	Robert N. Anthony, David Hawkins, Kenneth A. Merchant, Accounting: Text and Cases. McGraw-Hill Education, Noida.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2.	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3.	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

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SEMESTER-I

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COURSECODE	COURSE TITLE	L	T	P	C
23198AEC13	Financial Accounting -I	3	0	0	3

UNIT-I : Fundamentals of Financial Accounting

Financial Accounting – Meaning, Definition, Objectives, Basic Accounting Concepts and Conventions - Journal, Ledger Accounts– Subsidiary Books — Trial Balance - Classification of Errors – Rectification of Errors – Preparation of Suspense Account – Bank Reconciliation Statement - Need and Preparation.

UNIT-II :Final Accounts

Final Accounts of Sole Trading Concern- Capital and Revenue Expenditure and Receipts – Preparation of Trading, Profit and Loss Account and Balance Sheet with Adjustments.

UNIT-III : Depreciation and Bills of Exchange

Depreciation - Meaning – Objectives – Accounting Treatments - Types - Straight Line Method – Diminishing Balance method – Conversion method.Units of Production Method – Cost Model vs Revaluation. **Bills of Exchange** – Definition – Specimens – Discounting of Bills – Endorsement of Bill – Collection – Noting – Renewal – Retirement of Bill under rebate

UNIT-IV: Accounting from Incomplete Records – Single Entry System

Incomplete Records -Meaning and Features - Limitations - Difference between Incomplete Records and Double Entry System - Methods of Calculation of Profit - Statement of Affairs Method – Preparation of final statements by Conversion method.

UNIT-V: Royalty and Insurance Claims

Meaning – Minimum Rent – Short Working – Recoupment of Short Working – Lessor and Lessee – Sublease–AccountingTreatment.

Insurance Claims –Calculation of Claim Amount-Average clause (Loss of Stock only)

CO	Course Outcomes
CO1	Remember the concept of rectification of errors and Bank reconciliation statements
CO2	Apply the knowledge in preparing detailed accounts of sole trading concerns
CO3	Analyse the various methods of providing depreciation
CO4	Evaluate the methods of calculation of profit
CO5	Determine the royalty accounting treatment and claims from insurance companies in case of loss of stock.
Textbooks	
1.	S. P. Jain and K. L. Narang Financial Accounting- I, Kalyani Publishers, New Delhi.
2.	S.N. Maheshwari, Financial Accounting, Vikas Publications, Noida.
3.	Shukla Grewal and Gupta, "Advanced Accounts", volume 1, S.Chand and Sons, New Delhi.
4.	Radhaswamy and R.L. Gupta: Advanced Accounting, Sultan Chand, New Delhi.
5.	R.L. Gupta and V.K. Gupta, "Financial Accounting", Sultan Chand, New Delhi.
Reference Books	
1.	Dr. Arulanandan and Raman: Advanced Accountancy, Himalaya Publications, Mumbai.
2.	Tulsian , Advanced Accounting, Tata McGraw Hills, Noida.
3.	Charumathi and Vinayagam, Financial Accounting, S.Chand and Sons, New Delhi.
4.	Goyal and Tiwari, Financial Accounting, Taxmann Publications, New Delhi.
5.	Robert N Anthony, David Hawkins, Kenneth A. Merchant, Accounting: Text and Cases. McGraw-Hill Education, Noida.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2.	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3.	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

**PRISTUNIVERSITY, THANJAVUR SEMESTER-
IB.COMCA**

COURSE CODE	COURSE TITLE	L	T	P	C
23198AEC14	Principles of Management	3	0	0	3

UNIT- I

Introduction to Management

Meaning-Definitions-Nature and Scope-Level of Management-Importance-Management Vs. Administration
-Management: Science or Art-Evolution of Management Thoughts-F.W. Taylor, Henry Fayol,
Peter F. Drucker, Elton Mayo - Functions of Management - Trends and Challenges of Management. Managers
-Qualification-Duties & Responsibilities

UNIT -II

Planning

Planning – Meaning – Definitions – Nature – Scope and Functions – Importance and Elements of Planning –
Types – Planning Process - Tools and Techniques of Planning – Management by Objective (MBO).
Decision Making: Meaning-Characteristics-Types -Steps in Decision Making-Forecasting.

UNIT-III

Organizing

Meaning - Definitions - Nature and Scope – Characteristics – Importance – Types - Formal and
Informal Organization – Organization Chart – Organization Structure: Meaning and Types -
Departmentalization-Authority and Responsibility-Centralization and Decentralization-
Span of Management

UNIT-IV

Staffing

Introduction - Concept of Staffing- Staffing Process – Recruitment – Sources of Recruitment –
Modern Recruitment Methods-Selection Procedure-Test-Interview-Training: Need-Types-Promotion-
Management Games – Performance Appraisal - Meaning and Methods – 360 Performance Appraisal – Work from
Home -Managing Work from Home [WFH].

UNIT- V

Directing

Motivation-Meaning-Theories-Communication-Types-Barrier to Communications-
Measures to Overcome the Barriers. Leadership-Nature-Types and Theories of Leadership-Styles of Leadership
Qualities of a Good Leader-Successful Women Leaders. Supervision.

Co-ordination and Control

Co-ordination–Meaning- TechniquesofCo-ordination.

Control-Characteristics-Importance

–StagesintheControlProcess-

RequisitesofEffectiveControlandControllingTechniques–ManagementbyException[MBE].

OUTCOME

- Tounderstandthebasic managementconceptsandfunctions.
- Toknowthevarioustechniquesofplanninganddecisionmaking
- Tofamiliarizewiththeconceptsoforganisationstructure
- Togainknowledgeaboutthevariouscomponentsofstaffing
- Toenablethestudentsinunderstandingthecontroltechniquesofmanagement

Course Outcomes	
CO1	Demonstrate the importance of principles of management.
CO2	Paraphrase the importance of planning and decision making in an organization.
CO3	Comprehend the concept of various authorizes and responsibilities of an organization.
CO4	Enumerate the various methods of Performance appraisal
CO5	Demonstrate the notion of directing, co-ordination and control in the management.
Textbooks	
1	Gupta.C.B,-Principles of Management-L.M. Prasad,S.Chand&SonsCo. Ltd,NewDelhi.
2	DinkarPagare,Principles of Management,SultanChand&SonsPublications,NewDelhi.
3	P.C.Tripathi&P.N.Reddy,Principles of Management.TataMcGraw,Hill,Noida.
4	L.M.Prasad,Principles of Management,S.Chand &SonsCo.Ltd,NewDelhi.
5	R.K.Sharma,ShashiK.Gupta,RahulSharma,BusinessManagement,KalyaniPublications,NewDelhi.
Reference Books	
1	KSundhar,Principles Of Management, VijayNichole Imprints Limited, Chennai
2	HaroldKoontz,HeinzWeirich, Essentials of Management,McGrawHill,SultanChandandSons, NewDelhi.
3	Griffin,Management principles and applications,Cengage learning,India.
4	H.Mintzberg -The Nature of Managerial Work,Harper&Row,NewYork.
5	Eccles, R. G.&Nohria, N.Beyond the Hype:Rediscovering the Essence of Management. Boston TheHarvardBusinessSchoolPress, India.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	http://www.universityofcalicut.info/syl/management
2	https://www.managementstudyguide.com/manpower-planning.htm
3	https://www.businessmanagementideas.com/notes/management-notes/coordination/coordination/21392

COURSECODE	COURSETITLE	L	T	P	C
23198GEC15	Programming in c and lab	4	0	1	3

Objectives

- Describe the core syntax and semantics of C programming language.
- Discover the need for working with the strings and functions.
- Illustrate the process of structuring the data using matrix, struct.

UNIT-I

Introduction to C Language: C Language Introduction-Features of C Language- Benefits of C over other languages-Compilation of C Program-First Program in C Pre-processor in C Pre-processor directives

UNIT-II

Variables, Data Types & Operators: Variables and Keywords in C- Scope rules in C- Data Types in C- Operators & Its Types- Typecasting in C.

UNIT-III

Control Flow Statements: Decision Making Statements-Switch Statement in C- C Loops & Control Structure Practice problems-Continue Statement, Break Statement
Array & String Handling in C: Arrays in C- Strings in C.

UNIT-IV

Multidimensional Arrays in C- String functions in C- Practice problems
Functions in C: Function Prototype-Parameter Passing Techniques in C- Storage Classes in C- Recursion Concept- Functions in C Practice problems

UNIT-V

Pointers, Structures, and Unions: Pointers in C- Structures- Union - Enumeration (or enum) in C- Pointer vs Array in C- Application programs (Sorting, Matrix manipulations, student's mark list preparation)

Course Outcomes

- Apply the concept of Control Structures to solve any given problem.
 - Apply the concept of single and multi-dimensional arrays to solve problems related to searching, sorting and matrix operations.
 - Apply the concept of Strings for writing programs related to character array.
 - Write programs using concept of user defined and recursive functions.
- Apply concept of structures to write programs.

Textbooks	
1	E.Balaguruswamy, “Programming in ANSIC”, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
2	Pradip Dey, Manas Ghosh, “Programming in C”, 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
3	Kernighan B. W and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
Reference Books	
1	Yashavant P. Kanetkar, “Let Us C”, 16th Edition, 2019, BPB Publications, ISBN: 978-93-8728-449-4.
2	Jacqueline A Jones and Keith Harrow, “Problem Solving with C”, Pearson Education. ISBN: 978-93-325-3800-9.
3	Dr. Guruprasad Nagraj, “C Programming for Problem Solving”, Himalaya Publishing House. ISBN-978-93-5299-361-1.
NOTE: Latest Edition of Textbooks May be Used	

C Programming Lab

Learning Objectives: (for teachers: what they have to do in the class/lab/field)

- Understand problem statements and identify appropriate solutions.
- Demonstrate the use of IDE and C Compiler.
- Develop programs using C Programming Language.

Course Outcomes: (for students: To know what they are going to learn)

CO1: Apply the concept of Control Structures to solve any given problem.

CO2: Apply the concept of single and multi-dimensional arrays to solve problems related to searching, sorting and matrix operations.

CO3: Apply the concept of Strings for writing programs related to character array.

CO4: Write programs using concept of user defined and recursive functions.

CO5: Apply concept of structures to write programs.

List of Programs

1. Write a C program to find roots of a Quadratic equation.
2. Write a C program to find the total no. of digits and the sum of individual digits of a positive integer.
3. Write a C program to generate the Fibonacci sequence of first N numbers.
4. Write a C program to sum the series $S = 1 - x + (x^2/2!) - (x^3/3!) + \dots + (-1)^n (x^n/n!)$
5. Write a C program to arrange the elements of an integer array using Bubble Sort algorithm.
6. Write a C program to input two matrices and perform matrix multiplication on them.
7. Write a C program to check whether the given string is a palindrome or not without using Library functions.
8. Write a C program to count the number of lines, words and characters in a given text.
9. Write a C program to generate Prime numbers in a given range using user defined function.
10. Write a C program to find factorial of a given number using recursive function.
11. Write a C program to maintain a record of n student details using an array of structures with four fields - Roll number, Name, Marks and Grade. Calculate the Grade according to the following conditions.

Marks Grade

≥ 80 A

≥ 60 B

≥ 50 C

≥ 40 D

< 40 E

Print the details of the student, given the student Roll number as input.

Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC –CSIR / GATE / TNPSC / other to be solved (To be discussed during the Tutorial hour)
Skills acquired from the Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferable Skill

Text Books:

E. Balaguruswamy, “Programming in ANSIC”, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

Reference Books:

1. Pradipta Dey, Manas Ghosh, “Programming in C”, 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

2. Kernighan B. W. and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.

3. Yashavant P. Kanetkar, “Let Us C”, 16th Edition, 2019, BPB Publications, ISBN: 978-93-8728-449-4.

4. Jacqueline

A Jones and Keith Harrow, “Problem Solving with C”, Pearson Education. ISBN: 978-93-325-3800-9.

5. Dr. Guruprasad Nagraj, “C Programming for Problem Solving”, Himalaya Publishing House. ISBN-978-93-5299-361-1.

Weblinks and Video Lectures (e-Resources):

1. <http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html>

2. <https://nptel.ac.in/courses/106/105/106105171/>

CourseCode	CourseTitle	L	T	P	C
23198GEC16	Python Programming and lab	4	0	1	3

Objectives

- Describe the core syntax and semantics of Python programming language.
- Discover the need for working with the strings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- Understand the usage of packages and Dictionaries

Introduction: Computer algorithms-Computer Hardware-Computer Software-Python programming language- Literals - Variables and Identifiers-Operators-Expressions and Datatypes, Input/output.

Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs, Understanding and using ranges.

Functions: Program Routines-Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python- Variable Scope. Recursion: Recursive Functions

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design-Python Modules–

Dictionaries and Sets: Dictionary type in Python- Set Datatype. Text Files: Opening, reading and writing text files – Exception Handling.

Course Outcomes

- Develop and execute simple Python programs
- Write simple Python programs using conditionals and looping for solving problems
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries etc.

Textbooks	
1	Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem-solving Focus”, Wiley India Edition, 2015.
2	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education, 2016
3	Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’Reilly Media 2018, 5th Edition.
Reference Books	
1	Timothy A. Budd, “Exploring Python”, Tata McGraw Hill Education Private Limited 2011, 1st Edition.
2	John Zelle, “Python Programming: An Introduction to Computer Science”, Second Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1590282410
3	Michel Dawson, “Python Programming for Absolute Beginners” , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Course Code	Course Title	L	T	P	C
23198SEC17	Managerial Skill Development	2	0	0	2

OBJECTIVES:

- And to be a good manager it is important to have skills like Planning and creating an effective strategy, good communication skills, decision making, leadership skills, problem-solving skills, time management, conceptual skills, controlling, motivating, and leading the team, etc.

UNIT-I

Introduction to skills & personal skills Importance of competent managers, skills of effective managers, developing self-awareness on the issues of emotional intelligence, self-learning styles, values, attitude towards change, learning of skills and applications of skills.

UNIT-II

Problem solving and building relationship: Problem solving, creativity, innovation, steps of analytical problem solving, limitations of analytical problem solving, impediments of creativity, multiple approaches to creativity, conceptual blocks, conceptual block bursting. Skills development and application for above areas.

UNIT-III

Building relationship Skills for developing positive interpersonal communication, importance of supportive communication, coaching and counseling, defensiveness and disconfirmation, principles of supportive communications. Personal interview management. Skill analysis and application on above areas.

UNIT-IV

Teambuilding:Developingteamsandteamwork,advantagesofteam, leadingteam,teammembership.
Skilldevelopmentandskillapplication.

UNIT-V

Empoweringanddelegating:Meaningof empowerment,dimensionsof empowerment,howtodevelopempowerment,inhibitors ofempowerment,delegatingworks.Skillsdevelopmentandskillapplicationonaboveareas.

COURSEOUTCOMES:

- Making sound decisions in the workplace is essential in a managerial role. Effective managerial skills that help professionals make important choices include the ability to analyze and identify problems, challenges and opportunities and develop approaches that can solve problems or generate positive outcomes.

Course Code	Course Title	L	T	P	C
231AECCINC	Indian Constitution	2	-	-	2

Course Objectives:

- To make the students understand about the democratic rule and parliamentary administration
- To appreciate the salient features of the Indian constitution
- To know the fundamental rights and constitutional remedies
- To make familiar with powers and positions of the union executive, union parliament and the supreme court
- To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Unit I:

The making of Indian constitution

The constitution assembly organization – character – works – salient features of the constitution – written and detailed constitution – socialism – secularism – democracy and republic.

Unit II:

Fundamental rights and fundamental duties of the citizens

Right of equality – right of freedom – right against exploitation – right to freedom of religion – cultural and educational rights – right to constitutional remedies – fundamental duties .

Unit III:

Directive principles of state policy

Socialistic principles – Gandhi an principles – liberal and general principles – differences between fundamental rights and directive principles

Unit IV:

The union executive, union parliament and Supreme Court

Powers and positions of the president – qualification – method of election of president and vice president – prime minister – Rajya Sabha – Lok Sabha. the supreme court – high court – functions and position of supreme court and high court

Course outcome:

1. Democratic values and citizenship training are regained
2. Awareness on fundamental rights are established

3. The function of union government and state government are learnt
4. The power and functions of the judiciary are learnt thoroughly
5. Appreciation of democratic parliamentary rule is learnt

CourseCode	CourseTitle	L	T	P	C
23ILSCUV	Universal Human Values	-	-	-	2

Course Objectives:

The present course deals with meaning, purpose and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials.

Course Outcomes:

By the end of the course the learners will be able to:

- Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.
- Learn from case studies of lives of great and successful people who followed and practiced human values and achieved self-actualisation.
- Become conscious practitioners of human values.
- Realize their potential as human beings and conduct themselves properly in the way of the world.

Unit I

- Introduction: What is love? Forms of love for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living
- Love and compassion and inter-relatedness
 - Love, compassion, empathy, sympathy and non-violence
 - Individuals who are remembered in history for practicing compassion and love.
 - Narratives and anecdotes from history, literature including local folklore
 - Practicing love and compassion: What will learners learn gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?
 - Sharing learner's individual and/or group experience(s)
 - Simulated Situations
 - Case studies

UNIT-II

Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others)

Individuals who are remembered in history for practicing this value
Narratives and anecdotes from history, literature including local folklore

Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?

Learners' individual and/or group experience(s) Simulated situations

Case studies.

UNIT-III

Introduction: What is non-violence? Its need. Love, compassion, empathy, sympathy for others as pre-requisites for non-violence Ahimsa as non-violence and non-killing

Individuals and organisations that are known for their commitment to non-violence

Narratives and anecdotes about non-violence from history, and literature including local folklore

Practicing non-violence: What will learners learn/gain if they practice non-violence? What will learners lose if they don't practice it?

Sharing learner's individual and/or group experience(s) about non-violence Simulated situations

Case

UNIT-IV

Introduction: What is righteousness?

Righteousness and *dharma*, Righteousness and Propriety

Individuals who are remembered in history for practicing righteousness
Narratives and anecdotes from history, literature including local folklore

Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?

Sharing

learners' individual and/or group experience(s) Simulated situations

Case studies

UNIT-V

Introduction: What is peace? Its need, relation with harmony and

balance
Individuals and organisations that are known for their commitment to peace

Narratives and Anecdotes about peace from history, and literature including local folklore

Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?

Sharing

learner's individual and/or group experience(s) about peace Simulated situations

Case studies

UNIT-VI

Introduction: What is service? Forms of service for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.

Individuals who are remembered in history for practicing this value.

Narratives and anecdotes dealing with instances of service from history, literature including local folklore

Practicing service: What will learners learn/gain if they practice service?

What will learners lose if they don't practice it?

Sharing learners' individual and/or group experience(s) regarding service Simulated situations

Casestudies

UNIT-VI

Introduction: What is renunciation? Renunciation and sacrifice. Self-restraint and

Ways of overcoming greed. Renunciation with action a true renunciation

Individuals who are remembered in history for practicing this

value. Narratives and anecdotes from history

and literature, including local folklore about Individuals who are

remembered for their sacrifice and renunciation.

Practicing renunciation and sacrifice: What will

learners learn/gain if they practice Renunciation and sacrifice? What will

learners lose if they don't practice it?

Sharing learners' individual and/or group experience(s) Simulated situations

Casestudies

SEMESTER- II

CourseCode	CourseTitle	L	T	P	C
23110AEC21	Tamil-II	4	0	0	2

ଉତ୍ତରୀୟ ପଢ଼ାବହି

- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨
- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୪
- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୬
- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୭ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୮
- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୯ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧୦

ଉତ୍ତରୀୟ ପଢ଼ାବହି

- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧
- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨
- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩
- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୪
- ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫

ଉତ୍ତରୀୟ-୧ ଉତ୍ତରୀୟ ପଢ଼ାବହି

1. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୧ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୨
2. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୩ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୪
3. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୫ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୬
4. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୭ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୮ (ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧-୯)

ଉତ୍ତରୀୟ-୨ ଉତ୍ତରୀୟ ପଢ଼ାବହି

1. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨-୧ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨-୨
2. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨-୩ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨-୪ (ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨-୫ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨-୬)
3. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨-୭ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨-୮

ଉତ୍ତରୀୟ-୩ ଉତ୍ତରୀୟ ପଢ଼ାବହି

1. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩-୧ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩-୨, ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩-୩ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩-୪
2. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩-୫
3. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩-୬ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩-୭
4. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୩-୮

ଉତ୍ତରୀୟ-୪ ଉତ୍ତରୀୟ ପଢ଼ାବହି

1. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୪-୧ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୪-୨

ଉତ୍ତରୀୟ-୫ ଉତ୍ତରୀୟ ପଢ଼ାବହି

1. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫-୧ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫-୨
2. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫-୩
3. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫-୪ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫-୫
4. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫-୬
5. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୫-୭

ଉତ୍ତରୀୟ ପଢ଼ାବହି:

1. ଉତ୍ତରୀୟ ପଢ଼ାବହି-୧ ଓ ଉତ୍ତରୀୟ ପଢ଼ାବହି-୨

Objectives:

- To introduce learners to the essential skills of communication in English
- To enable them use these skills effectively in academic and non-academic contexts
- To help them identify and eliminate common mistakes in writing and speaking
- To enable them use various business communication strategies and to use advanced vocabulary
- To familiarize them in writing descriptive essays and respond to arguments orally and in writing

UNIT-I

Poetry

Very Indian Poem in Indian English- Nissim Ezekiel Still
Rise- Maya Angelou
On Killing a Tree- Gieve Patel

UNIT-II

Prose

If You Are Wrong Admit it-
Dale Carnegie Kindly Adjust Please-
Shashi Tharoor
The Spoon-fed Age- W.R. Inge

UNIT-III

Fiction

Alchemist - Paulo Coelho

UNIT-IV

Language Competency

Homonyms, Homophones, Homographs Portmanteau words
Subject Verb Agreement

UNIT-V

English in the Workplace

Reading for General and Specific information [charts, tables, schedules, graphs etc]
Reading news and weather reports
Writing paragraphs
Taking and making notes

Course Outcomes

- CO1-** Learn to introduce themselves and talk about everyday activities confidently
CO2- Be able to write short paragraphs on people, places and events
CO3- Identify the purpose of using various tenses and effectively employ them in speaking and writing
CO4- Gain knowledge to write subjective and objective descriptions
CO5- Identify and use their skills effectively in formal contexts.

SEMESTER-II

COURSECODE	COURSE TITLE	L	T	P	C
23198AEC23	FINANCIAL ACCOUNTING-II	5	1	0	4

Objectives:

- The students are able to prepare different kinds of accounts such
- Higher purchase and Instalments System.
- To understand the allocation of expenses under departmental accounts
- To gain an understanding about partnership accounts relating to Admission and retirement.
- Provide knowledge to the learners regarding Partnership Accounts relating to dissolution of firm.
- To know the requirements of international accounting standards

UNIT-I

Hire Purchase and Instalment System

Hire Purchase System – Accounting Treatment – Calculation of Interest – Default and Repossession - Hire Purchase Trading Account - Instalment System - Calculation of Profit

UNIT-II

Branch and Departmental Accounts

Branch – Dependent Branches: Accounting Aspects - Debtors system - Stock and Debtor system – Distinction between Wholesale Profit and Retail Profit – Independent Branches (Foreign Branches excluded) - Departmental Accounts: Basis of Allocation of Expenses – Inter-Departmental Transfer at Cost or Selling Price.

UNIT-III

Partnership Accounts- I

Partnership Accounts: – Admission of a Partner – Treatment of Goodwill - Calculation of Hidden Goodwill – Retirement of a Partner – Death of a Partner.

UNIT-IV

PartnershipAccounts-II

Dissolution of Partnership - Methods – Settlement of Accounts Regarding Losses and Assets – Realization account – Treatment of Goodwill – Preparation of Balance Sheet -One or more Partners insolvent – All Partners insolvent – Application of Garner Vs Murray Theory – Accounting Treatment - Piecemeal Distribution – Surplus Capital Method–Maximum Loss Method.

UNIT-V

Accounting Standards for financial reporting (Theory only)

Objectives and Uses of Financial Statements for Users-Role of Accounting Standards - Development of Accounting Standards in India
Role of IFRS- IFRS Adoption vs Convergence Implementation Plan in India- Ind AS- An Introduction-Difference between Ind AS and IFRS.

COURSE OUTCOMES:

CO1-To evaluate the Hire purchase accounts and Instalment systems

CO2-To prepare Branch accounts and Departmental Accounts

CO3-To understand the accounting treatment for admission and retirement in partnership

CO4-To know Settlement of accounts at the time of dissolution of a firm.

CO5-To elaborate the role of IFRS

Textbooks
RadhaswamyandR.L.Gupta:AdvancedAccounting,SultanChand,NewDelhi.
M.C. ShuklaT.S.Grewal&S.C.Gupta,AdvanceAccounts, SChandPublishing, NewDelhi.
R.L.GuptaandV.K.Gupta,“FinancialAccounting”,SultanChand,NewDelhi.
SPJainandK. L. Narang:FinancialAccounting- I, KalyaniPublishers,NewDelhi.
T.S.Reddy&A.Murthy,FinancialAccounting,MargamPublishers,Chennai.
ReferenceBooks
Dr.S.N.Maheswari:FinancialAccounting,VikasPublications,Noida.
Dr.Venkataraman&others(7lecturers):FinancialAccounting,VBH,Chennai.
Dr.ArulanandanandRaman:AdvancedAccountancy,Himalayapublications,Mumbai.
Tulsian,Advanced Accounting,TataMC.Grawhills,India.
CharumathiandVinayagam,FinancialAccounting,S.Chandandsons,NewDelhi.
NOTE: Latest EditionofTextbooksMay beUsed
WebResources
https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
https://www.slideshare.net/ramusakha/basics-of-financial-accounting
https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

COURSECODE	COURSETITLE	L	T	P	C
23198AEC24	BUSINESSLAW	4	1	0	4

Objectives:

- To know the nature and objectives of Mercantile law and the essentials of valid contract
- To gain knowledge on performance contracts
- To be acquainted with the rules of Indemnity and Guarantee
- To make aware of the essentials of Bailment and pledge
- To understand the provisions relating to sale of goods

UNIT-I

Element of Contract

Indian Contract Act 1872: Definition of Contract, Essentials of Valid Contract, Classification of Contract, Offer and Acceptance – Consideration – Capacity to Contract – Free Consent - Legality of Object – Contingent Contracts – Void Contract.

UNIT-II

Performance of Contract

Meaning of Performance, Offer to Perform, Devolution of Joint liabilities & Rights, Time and Place of Performance, Reciprocal Promises, Assignment of Contracts - Remedies for Breach of contract - Termination and Discharge of Contract - Quasi Contract.

UNIT-III

Contract of Indemnity and Guarantee

Contract of Indemnity and Contract of Guarantee - Extent of Surety's Liability, Kinds of Guarantee, Rights of Surety, Discharge of Surety -

UNIT-IV

Bailment and Pledge

Bailment and Pledge - Bailment - Concept - Essentials - Classification of Bailments, Duties and Rights of Bailor and Bailee - Law of Pledge - Meaning - Essentials of Valid Pledge, Pledge and Lien, Rights of Pawner and Pawnee.

UNIT-V

Sale of Goods Act 1930:

Definition of Contract of Sale - Formation - Essentials of Contract of Sale - Conditions and Warranties - Transfer of Property - Contracts involving Sea Routes - Sale by Non-owners - Rights and duties of buyer - Rights of an Unpaid Seller

Course Outcome:

- Explain the Objectives and significance of Mercantile law
- Understand the clauses and exceptions of Indian Contract Act.
- Outline the contract of indemnity and guarantee
- Familiar with the provision relating to Bailment and Pledge
- Explain the various provisions of Sale of Goods Act 1930

Textbooks
N.D.Kapoor, Business Laws-Sultan Chand and Sons, New Delhi.
R.S.N.Pillai– Business Law, S.Chand, New Delhi.
MCKuchhal & Vivek Kuchhal, Business law, SChand Publishing, New Delhi
M.V.Dhandapani, Business Laws, Sultan Chand and Sons, New Delhi.
Shusma Aurora, Business Law, Taxmann, New Delhi.
Reference Books
Preethi Agarwal, Business Law, CA foundation study material, Chennai.
Business Law by Saravanel, Sumathi, Anu, Himalaya Publications, Mumbai.
Kavya and Vidhyasagar, Business Law, Nithya Publication, New Delhi.
D.Geet, Business Law Nirali Prakashan Publication, Pune.
M.R.Sreenivasan, Business Laws, Margham Publications, Chennai.
NOTE: Latest Edition of Textbooks May be Used
Web Resources
www.cramerz.com www.digitalbusinesslawgroup.com
http://swcu.libguides.com/buslaw
http://libguides.slu.edu/businesslaw

COURSECODE	COURSE TITLE	L	T	P	C
23198GEC25	OFFICE AUTOMATION AND LAB	4	1	0	3

Objectives

- The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Powerpoint.
- The course is highly practice oriented rather than regular classroom teaching.
- To acquire knowledge on editor, spreadsheet and presentation software.

UNIT-I

Introductory concepts: Hardware and Software - Memory unit – CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems- Introduction to Programming Languages.

UNIT-II

Word Processing: File menu operations - Editing text – tools, formatting, bullets and numbering - Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, printing – Preview, options, merge.

UNIT-III

Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying.

UNIT-IV

Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.

UNIT-V

Power point: Introduction to Power point - Features – Understanding slide type casting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.

COURSE OUTCOMES:

- Understand the basics of computer systems and its components.
- Understand and apply the basic concepts of a word processing package.
- Understand and apply the basic concepts of electronic spreadsheet software.
- Understand and apply the basic concepts of database management system.
- Understand and create a presentation using PowerPoint tool.

Textbooks		
1	PeterNorton,“IntroductiontoComputers”–TataMcGraw-Hill.	
ReferenceBooks		
1	JenniferAckermanKettel,GuyHat-Davis,CurtSimmons,“Microsoft2003”,TataMcGraw-Hill.	
NOTE: Latest EditionofTextbooksMay beUsed		
WebResources		
1	WebcontentfromNDL/SWAYAMoropensource webresources	

OfficeAutomationLab
<p>LearningObjectives:(forteachers:whattheyhavetodointheclass/lab/field) Officetoolscoursewouldenablethestudentsincraftingprofessionalworddocuments, excelspreadsheets,powerpointpresentationsusingtheMicrosoftsuiteofficetools. To familiarizestudentsinpreparationofdocumentsand presentationswithofficeautomationtools.</p>
<p>CourseOutcomes:(forstudents:Toknowwhattheyaregoingtolearn) CO1:toperformdocumentation CO2: toperformaccountingoperations CO3:toperformpresentationskills</p>

ListofPrograms
<p>Word</p> <p>WordOrientation:TheinstructorneedstogiveanoverviewofMicrosoftword&Importance ofMSWordaswordProcessor,Detailsofthefourtasksandfeaturesthatwouldbecovered Using word – Accessing, overview of toolbars, saving files, Using help andresources,rulers,formatpainter.</p> <p>Task1:Usingwordto createprojectcertificate.Features tobecovered:-FormattingFontsin word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders andColors,InsertingHeaderandFooter,UsingDateandTimeoptioninWord.</p> <p>Task2:CreatingprojectabstractFeatures tobecovered:-FormattingStyles,Insertingtable, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote,Hyperlink, Symbols,SpellCheck, TrackChanges.</p> <p>Task 3 : Creating a Newsletter : Features to be covered:- Table of Content, Newspapercolumns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images,Textboxes and Paragraphs</p> <p>Excel</p> <p>Excel Orientation :The instructor needs to tell the importance of MS Excel as aSpreadsheet tool,givethedetailsofthefourtasksandfeatures thatwouldbecoveredExcel –Accessing,overviewoftoolbars,saving excelfiles, Using helpandresources{ ComdexInformationTechnologycoursetoolkitVikas }</p> <p>Task1:CreatingaScheduler-Features tobecovered:Gridlines,FormatCells,Summation,autofill, Formatting Text</p> <p>Task 2 : Calculations - Features to be covered:- Cell Referencing, Formulae in excel – average, standard deviation, Charts, Renaming and Inserting worksheets, Hyper linking,Countfunction, LOOKUP/VLOOKUP</p> <p>Task3:PerformanceAnalysis-Features tobecovered:- Splitcells,freeze panes,groupandoutline,Sorting,Booleanandlogicaloperators,Conditional formatting</p> <p>MS PowerPoint</p> <p>Task1 :Students will be working on basic power point utilities and tools which help themcreate basic power point presentation. Topic covered includes :- PPT Orientation, SlideLayouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes,Lines and Arrows</p> <p>Task2:This sessionhelpsstudentsinmakingtheirpresentationsinteractive.Topicscoveredincludes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and ChartsTask3:ConcentratingontheinandoutofMicrosoftpowerpoint.Helpsthemlearnbest practicesin designingandpreparingpowerpointpresentation.Topicscoveredincludes:- MasterLayouts(slide,template,andnotes),Typesofviews(basic,presentation,slideslotter,</p>

notes etc), Inserting –
 Background, textures, Design Templates, Hidden slides. Auto content wizard, Slide Transition,
 Custom Animation, Auto Rehearsing

<p>Extended Professional Component</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>
<p>Skills acquired from the Course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferable Skill</p>
<p>1. Comdex Information Technology course toolkit Vikas Gupta, WILEY Dreamtech, 2005. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech . Introduction to Information Technology, IT Education Solutions limited, Pearson Education. 4. PC Hardware and A+ Handbook – Kate J. Chas PHI (Microsoft)</p>	

COURSECODE	COURSE TITLE	L	T	P	C
23198GEC26	Programming in C++ and lab	4	0	1	3

Objectives:

- To engender an appreciation for the need and characteristics of Object-orientation.
- To impart knowledge of the C++ language grammar in order to design and implement programming solutions to simple problems by applying Object-oriented thinking.

UNIT-I

Object Oriented Programming Concepts: Complexity in software - The need for object-orientation - Abstraction - Encapsulation - Modularity - Hierarchy.

Basic Elements of C++: Classes - Objects - Data members and member functions - private and public access specifiers - Static members - Constructors - Singleton class - Destructors

UNIT-II

Friend Functions and Friend Classes - Array of objects - Pointer to objects - this pointer - References - Dynamic memory allocation - Namespaces.

Function Overloading: Overloading a function - Default arguments - Overloading Constructors.

Operator Overloading: Overloading an operator as a member function - Overloading an operator as a friend function.

UNIT-III

Overloading the operators [], (), -> and comma operators - Conversion Functions. Inheritance: Types of inheritance - protected access specifier - Virtual Base Class - Base class and derived class constructors. Run-time Polymorphism: Virtual Functions.

UNIT-IV

Function overriding - Pure virtual function - Abstract base class.

Templates: Function templates - Overloading a function template - Class templates.

UNIT-V

Exception Handling: Exceptions - try, catch, throw - Rethrowing an exception - Restricting exceptions - Handling exceptions in derived classes - terminate(), abort(), unexpected(), set_terminate().

I/O Streams: Formatted I/O with ios class functions - Manipulators - Creating own manipulator - Overloading << and >> operators.

COURSE OUTCOMES:

- Explain the various basic concepts of Object-orientation.
- Write programs to implement static binding
- Write programs to implement inheritance and dynamic binding
- Write programs to implement templates and exception handling and learn how to use STL class library.
- Write programs implementing File and Stream I/O.

Textbooks
Herbert Schildt, <i>C++ - The Complete Reference</i> , Third Edition, TMH, 1999.
Grady Booch, <i>Object Oriented Analysis and Design</i> , Pearson Education, 2008. (For Unit I)
Reference Books
Bjarne Stroustrup, <i>The C++ Programming Language</i> , Addison Wesley, 2000.
J. P. Cohoon and J. W. Davidson, <i>C++ Program Design – An Introduction to Programming and Object-Oriented Design</i> , Second Edition, McGraw Hill, 1999.
C. J. Lippman, <i>C++ Primer</i> , Third Edition, Addison Wesley, 2000.
NOTE: Latest Edition of Textbooks May be Used

CourseCode	CourseTitle	L	T	P	C
23198SEC27	E-Business	2	0	0	2

OBJECTIVES:

- To understand the use of Computers in decision making.
- To provide an insight into various processing and information systems.
- The objective is to expose the student to electronic modes of commercial operations..

UNIT1:

E-Business–AnIntroduction:

Introduction, E-Commerce–definition, History of E-commerce, types of E-Commerce BtoB etc. Comparison of traditional commerce and e-commerce. E-Commerce business models –major B to B, B to C model, Consumer-to-Consumer (C2C), Consumer-to-Business (C2B) model, Peer-to-Peer (P2P) model–emerging trends. Advantages/Disadvantages of e-commerce, web auctions, virtual communities, portals, e-business revenue models.

UNIT2:

Security For E-Business

Security threats–An overview–implementing E-commerce security–encryption–Decryption, Protecting client computers E-Commerce Communication channels and web servers Encryption, SSL protocol, Firewalls, Cryptography methods, VPNs, protecting networks, policies and procedures.

UNIT3

E-Payments:

E-payment systems – An overview. B to C payments, B to B payments. Types of E-payment system – Credit card payment, debit cards, accumulating balance, online stored value payments systems, digital cash, digital (electronic) wallets, agile wallet, smart cards and digital cheques. Secure Electronic Transaction (SET) protocol. RFID Concepts.

UNIT4:

E-Business Marketing Technologies

E-Commerce and marketing B to B and B to C marketing and branding strategies. Web transaction logs, cookies, shopping cart database, DBMS, SQL, data mining, CRM (customer relationship Management) system – permission marketing, affiliate marketing, viral marketing.

UNIT5

Cyber Laws

Legal Aspects of E-Business, Internet frauds – Cyber Laws. IT Act 2000 salient features. Guidelines on cyber securities to be included

COURSE OUTCOMES:

- Maintaining database and processing software.
- Analyzing records according to management policy.
- Systems to give practical exposure in various reporting methods and Internet Accessibility

REFERENCES:

1. Marriappa M – E-Commerce,
2. R.G.Saha, E-Business, HPH
3. M.Suman – E – Commerce & Accounting
4. Kalakota Ravi and A.B. Whinston: “Frontiers of Electronic Commerce”, Addison
5. Watson RT: “Electronic Commerce – the strategic perspective.” The Dryden press
6. Agarwala K.N and Deeksha Ararwala: “Business on the Net – Whats and Hows of E-Commerce”
7. Agarwala and Ararwala: “Business on the Net – Bridge to the online storefront,”
8. Murthy CSV: “E.Commerce” Himalaya Publishing House Pvt.Ltd.

CourseCode	CourseTitle	L	T	P	C
23198SEC28	Elements of Insurance	2	0	0	2

OBJECTIVES:

- To highlight the importance of insurance and its basic concepts.
- To make the students aware of various insurance and to impact of economic development
- To enable the students to prepare procedure regarding settlement of policy claims
- To understand the students various Principles of life Insurance, marine, fire, Medical insurance etc.
- To aware the students know Principles of life insurance and various kinds

UNIT-I

INTRODUCTION TO INSURANCE

Introduction to insurance: purpose and need of insurance – insurance as a social security tool – insurance and economic development – types of insurance.

UNIT-II

LICENSE FOR AGENT

Procedure for becoming an agent: Pre-requisite for obtaining a license – duration of license – cancellation of license – revocation or suspension/termination of agent appointment – code of conduct – unfair practices.

UNIT-III

REGULATIONS FOR AGENT

Fundamentals of agency – definition of an agent – agents regulations – insurance intermediaries – agents' compensation – IRDA.

UNIT-IV

FUNCTIONS OF AGENT

Functions of the agent: proposal form and other forms for grant of cover – financial and medical underwriting – material information – nomination and assignment – procedure regarding settlement of policy claims

UNIT-V

TYPES OF INSURANCE

Fundamentals/Principles of life insurance/marine/fire/medical/general insurance: Contracts of various kinds – insurable interest – Actuarial science.

COURSE OUTCOME:

- Concept and conversion of elements of insurance
- Fundamentals of agency, Procedure for becoming an agent
- Knowledge about various methods of insurance policies.
- Calculation of Agent proposal form and other forms
- Know about procedure regarding settlement of policy claims.

TEXT AND REFERENCE BOOKS: (Latest revised edition only)

1. Insurance by Dr.P.Periyasamy–TataMcGrawHill
2. Fundamentals of Insurance by P.Periasamy by Vijay Nicole Imprints (P) Ltd
3. Insurance in India by P.S.Palande, R.S.Shah.
4. Insurance principles and practices by Mishra M.N–S.Chand & Co.
5. Insurance Regulatory Development Act, 1999.

CourseCode	CourseTitle	L	T	P	C
231AECCMS	Communication Skills	2	0	0	2

CourseObjectives:

1. Identify common communication problems that may be holding learners back
2. Identify what their non-verbal messages are communicating to others
3. Understand role of communication in teaching-learning process
4. Learning to communicate through the digital media
5. Understand the importance of empathetic listening
6. Explore communication beyond language.

CourseOutcome:

By the end of this program, participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.

UnitI

- Techniques of effective listening
- Listening and comprehension
- Probing questions
- Barriers to listening

- Pronunciation
- Enunciation
- Vocabulary
- Fluency
- Common Errors

- Techniques of effective reading
 - Gathering ideas and information from a given text
 - i. Identify the main claim of the text
 - i. Identify the purpose of the text
 - ii. Identify the content of the text
 - iv. Identify the concepts mentioned
- Unit II**
- Evaluating these ideas and information
 - i. Identify the arguments employed in the text
 - ii. Identify the theories employed or assumed in the text
 - Interpret the text
 - i. To understand what a text says
 - i. To understand what a text means
 - ii. To understand what a text means
- Unit III**
- Clearly state the claims
 - Avoid ambiguity, vagueness, unwanted generalizations and oversimplification of issues
 - Provide background information
 - Effectively argue the claim
 - Provide evidence for the claims
 - Use examples to explain concepts
 - Follow convention
 - Be properly sequenced
 - Use proper signposting techniques
 - Be well structured
 - i. Well-knit logical sequence
 - i. Narrative sequence
 - ii. Category groupings
 - Different modes of Writing-
 - i. E-mails
 - ii. Proposal writing for Higher Studies
 - iii. Recording the proceedings of meetings
 - iv. Any other mode of writing relevant for learners
- Unit IV**
- Role of Digital literacy in professional life
 - Trends and opportunities in using digital technology in the workplace
 - Internet Basics
 - Introduction to MS Office tools
 - i. Paint
- Unit V*

- ii. Office
- iii. Excel
- iv. Powerpoint

UnitVI

- Introductiontosocialmediawebsites
- Advantagesofsocialmedia
- Ethicsandetiquettesofsocialmedia
- HowtouseGooglesearchbetter
- EffectivewaysofusingSocialMedia

UnitVII

- IntroductiontoMarketing

- Meaningofnon-verbalcommunication
- Introductiontomodesofnon-verbalcommunication
- Breakingthemisbeliefs
- OpenandClosedBodylanguage
- EyeContactandFacialExpression
- HandGestures
- Do'sandDon'ts

Reference:

- Learningfromexperts
 - Activities-BasedLearning
1. SenMadhucchanda(2010),*AnIntroductiontoCriticalThinking*,Pearson,Delhi
 2. SilviaP.J.(2007),*HowtoReadaLot*,AmericanPsychologicalAssociation,WashingtongtonDC

CourseCode	CourseTitle	L	T	P	C
23110AEC31	Tamil-III	4	0	0	2

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3. இலக்கணம்

இலக்கணம்-2

1. இலக்கணம்
2. இலக்கணம்

இலக்கணம்-3

1. இலக்கணம்
2. இலக்கணம்
3. இலக்கணம்

இலக்கணம்-4

இலக்கணம்-5

1. இலக்கணம்
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	3	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	2	3	2	2	2	3	3

CourseCode	CourseTitle	L	T	P	C
23111AEC32	GENERALENGLISH-III	4	0	0	2

Objectives:

- To enhance the level of literary and aesthetic experience of students and to help them respond creatively.
- To sensitize them to the major issues in the society and the world.
- To provide them with an ability to build and enrich their communication skills
- To equip them to utilize the digital knowledge resources effectively for their chosen fields of study
- To help them think and write imaginatively and critically.

UNIT-I

Poetry:

The Voice of the Mountains-
Mamang Dai A Song of Hope-
Oodgeroo Noonuccal
In an Artist's Studio-Christina

Rossetti UNIT-II

Scenes From Shakespeare:

Romeo & Juliet -The Balcony
Scene Macbeth-Banquet Scene
Julius Caesar - Murder

Scene UNIT-III

Speeches of Famous personalities

Yes, We Can-Barack Obama
You've Got to Find What You Love-

Steve Jobs UNIT-IV

Language Competency

Writing letters and emails
Writing and messaging in social media platforms [blogs, twitter, instagram, facebook]
Learning netiquette, email etiquette

UNIT-V

English for Workplace

Data Interpretation and Reporting
Data Presentation and analysis
Meeting Etiquettes-
language, dress code, voice modulation. Online Meetings-
Terms and expressions used
Conducting and participating in a meeting

COURSE OUTCOMES:

- Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.
- Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society
- Produce grammatically and idiomatically correct language
- Gain knowledge in writing techniques to meet academic and professional needs.
- Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.

TextBooks(LatestEditions)	
1	ArdenShakespeareComplete works by <u>Shakespeare</u> (Author), <u>William</u> (Author), Bloomsbury,2011)
ReferencesBooks (LatestEditions,andthestyleasgivenbelowmustbestrictlyadheredto)	
1	<u>TheShakespeareBook:BigIdeasSimplyExplained,StanleyWellsetal.DKPubli</u> <u>shing,2015</u>
3	FamousSpeechesbyMahatma Gandhi,CreatespaceIndependentPublishingPlatform,2016
4	HowtoBuildaProfessionalDigitalProfileKindleEdition byJeanneKellyBernish,BernishCommunicationsAssociates,LLC; 1stedition(May29,2012)
5	Keys to Teaching Grammar to English Language Learners, Second Ed.: APracticalHandbookbyKeithS Folse,MichiganTeacher Training,2016.
6	RolePlay-TheoryandPractice.KrysiMYardley-Matwiejczuk, SAGEpublicationsltd,1997

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WebResources	
1	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3	Inanartist'sstudiobyChristinaRossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4	SitabyToruDutt: https://www.poetrynook.com/poem/s%E2%94%9C%C2%ABta
5	TrystwithDestiny: https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html#:~:text=Jawaharlal%20Nehru%2C%20delivering%20his%20Tryst%20with%20Destiny%20speech.&text=%22Long%20years%20ago%20we%20made,awake%20to%20life%20and%20freedom.
6	Yes,WeCan: https://www.englishspeechchannel.com/english-speeches/barack-obama-speech/
7	You've got to find what you love: https://www.businessbusinessbusiness.com.au/steve-jobs-youve-got-to-find-what-you-love/#:~:text=Steve%20Jobs%2C%20in%20his%20commencement,emphasizes%20on%20believing%20in%20oneself.

COURSE CODE	COURSE TITLE	L	T	P	C
23198AEC33	Corporate accounting- I	4	0	0	3

OBJECTIVES:

- To understand about the pro-rata allotment and Underwriting of Shares
- To know the provisions of companies Act regarding Issue and Redemption of Preference shares and debentures
- To learn the form and contents of financial statements as per Schedule III of Companies Act 2013
- To examine the various methods of valuation of Goodwill and shares
- To identify the Significance of International financial reporting standard (IFRS)

UNIT-I

Issue of Shares

Issue of Shares – Premium- Discount- Forfeiture- Reissue – Pro-rata Allotment Issue of Rights and Bonus Shares- Underwriting of Shares and Debentures – Underwriting Commission- Types of Underwriting.

UNIT-II

Issue & Redemption of Preference Shares & Debentures

Redemption of Preference Shares – Provisions of Companies Act – Capital Redemption Reserve – Minimum Fresh Issue – Redemption at Par, Premium and Discount.

Debentures: Issue and Redemption – Meaning – Methods – In-One lot – in Instalment – Purchase in the Open Market includes Ex Interest and Cum Interest- Sinking Fund Investment Method.

UNIT-III

Final Accounts

Introduction – Final Accounts – Form and Contents of Financial Statements as Per Schedule III of Companies Act 2013 – Part I Form of Balance Sheet – Part II Form of Statement of Profit and Loss – Ascertaining Profit for Managerial Remuneration

UNIT-IV

Valuation of Goodwill & Shares

Valuation of Goodwill – Meaning – Need for Valuation of Goodwill – Methods of Valuing Goodwill – Average Profit – Super Profit – Annuity and Capitalisation Method.

Valuation of Shares – Need for Valuation of Shares – Methods of Valuation of Shares – Net Assets Method – Yield and Fair Value Methods.

UNIT-V

Indian Accounting Standards

International Financial Reporting Standard (IFRS) – Meaning and its Applicability in India-

Indian Accounting Standards – Meaning – Objectives – Significance – Procedures for Formulation of Standards – Ind AS – 1 Presentation of Financial Statement, Ind AS – 2 Valuation of Inventories, Ind AS – 7 Cash Flow Statement, Ind AS – 8 Accounting Policies, Changes in Accounting Estimate and Errors, Ind AS – 16 – Property, Plant & Equipment, Ind AS 38 – Intangible Assets Ind AS – 103, Business Combinations Ind AS 110, Consolidated Financial Statement. (Theory Only)

Course Outcomes:

CO1- Prepare and account for various entries to be passed in case of issue, forfeiture and reissue of shares and compute the liability of underwrites

CO2- Assess the accounting treatment of issue and redemption of preference shares and debentures

CO3- Construct Financial Statements applying relevant accounting treatments

CO4- Compute the value of goodwill and shares under different methods and assess its applicability

CO5 - Integrate theoretical knowledge on all accounting in par with IFRS and IND AS

Textbooks	
1	S.P.Jain and N.L.Narang, Advanced Accounting Vol I, Kalyani Publication, New Delhi.
2	R.L. Gupta and M. Radhaswamy, Advanced Accounts Vol I, Sultan Chand, New Delhi.
3	Broman, Corporate Accounting, Taxmann, New Delhi.
4	Shukla, Grewal and Gupta- Advanced Accounts Vol I, S.Chand, New Delhi.
5	M.C.Shukla, Advanced accounting Vol I, S.Chand, New Delhi.
Reference Books	
1	T.S.Reddy, A.Murthy – Corporate Accounting- Margham Publication, Chennai.
2	D.S.Rawat & Nozer Shroff, Students Guide To Accounting Standards, Taxmann, New Delhi
3	Prof.Mukesh bramhbut, Devi, Corporate Accounting I, Ahilya Publication, Madhya Pradesh
4	Anil Kumar, Rajesh Kumar, Corporate accounting I, Himalaya Publishing house, Mumbai.
5	Prasanth Athma, Corporate Accounting I, Himalaya Publishing house, Mumbai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.tickertape.in/blog/issue-of-shares/
2	https://www.taxmann.com/bookstore/bookshop/bookfiles/chapter12valuationofgoodwillandshares.pdf
3	https://www.mca.gov.in/content/mca/global/en/acts-rules/ebooks/accounting-standards.html

COURSECODE	COURSETITLE	L	T	P	C
23198AEC34	Business Mathematics and statistics	4	0	0	3

OBJECTIVES:

- To impart knowledge on the basics of ratio, proportion, indices and proportions
- To learn about simple and compound interest and arithmetic, geometric and harmonic progressions.
- To familiarise with the measures of central tendency
- To conceptualise with correlation co-efficient
- To gain knowledge on time series analysis

UNIT-I

Ratio

Ratio, Proportion and Variations, Indices and Logarithms.

UNIT-II

Interest and Annuity

Banker's Discount – Simple and Compound Interest – Arithmetic, Geometric and Harmonic Progressions.
Annuity – Meaning – Types of Annuity Applications.

UNIT-III

Business Statistics Measures of Central Tendency

Arithmetic Mean, Geometric Mean – Harmonic Mean – Mode and Median – Quartiles – Deciles – Percentiles. Measures of Variation – Range – Quartile Deviation and Mean Deviation – Variance and Standard Deviation & Co-efficient.

UNIT-IV

Correlation and Regression

Correlation - Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation – Regression Lines and Coefficients.

UNIT-V

Time Series Analysis and Index Numbers

Time Series Analysis : Secular Trend – Seasonal Variation – Cyclical variations – Index Numbers – Aggregative and Relative Index – Chain and Fixed Index – Wholesale Index – Cost of Living Index.

Course Outcomes

CO1-Learn the basics of ratio, proportion, indices and logarithm

CO2-Familiarise with calculations of simple and harmonic progressions.

compound interest and arithmetic, geometric and

CO3 -Determine the various measures of central

tendency **CO4** -Calculate the correlation and regression co-

efficient. **CO5**-Assess problems on time series analysis

Textbooks

Dr.B.N.Gupta,BusinessMathematics&Statistics,Shashibhawanpublishinghouse,Chennai

AsimKumarManna,BusinessMathematics&Statistics,McGrawhilleducation,Noida

A.V.RayarikarandDr.P.G.Dixit, BusinessMathematics&Statistics,NiraliPrakashanPublishing,Pune

Dr.S.Sachdeva,BusinessMathematics&Statistics,LakshmiNarainAgarwal,Agra

P.R. Vittal,BusinessMathematics&Statistics,MarghamPublications,Chennai

ReferenceBooks

J.K.Sharma,Fundamentalsofbusinessstatistics,Vikaspublishing,Noida

PeterWaxman, BusinessMathematics &Statistics, PrenticeHall,NewYork

AndreFrancis,BusinessMathematics&Statistics,CengageLearningEMEA,Andover

AggarwalBM,BusinessMathematics&Statistics,AneBookPvt.Ltd.,NewDelhi

R.S.Bhardwaj,BusinessMathematics&Statistics,ExcelBooksPublisher,New Delhi

NOTE: Latest EditionofTextbooksMay beUsed

WebResources

<https://www.britannica.com/biography/Henry-Briggs>

<https://corporatefinanceinstitute.com/resources/data-science/central-tendency/>

<https://www.expressanalytics.com/blog/time-series-analysis/>

COURSECODE	COURSE TITLE	L	T	P	C
23198GEC35	PROGRAMMING IN JAVA AND LAB	2	1	0	3

OBJECTIVES:

- To provide fundamental knowledge of object-oriented programming.
- To equip the student with programming knowledge in Core Java from the basics up.
- To enable the student to use AWT controls, Event Handling and Swing for GUI.

UNIT-I

Introduction: Review of Object-Oriented concepts - Java buzzwords (Platform independence, Portability, Threads)- JVM architecture –Java Program structure - –Java main method - Java Console output(System.out) - simple javaprogram - Data types - Variables - type conversion and casting- Java Console input: Buffered input - operators - control statements-Static Data-Static Method-String and StringBuffer Classes

UNIT-II

Java user defined Classes and Objects – Arrays – constructors - Inheritance:Basic concepts - Types of inheritance - Member access rules-Usage of this and Super keyword-Method Overloading-Method overriding-Abstract classes - Dynamic method dispatch-Usage of final keyword

UNIT-III

Packages:Definition-Access Protection-Importing Packages-Interfaces:Definition–Implementation– Extending Interfaces Exception Handling: try – catch - throw - throws – finally – Built-in exceptions - Creating own Exception classes - garbage collection, finalise-

UNIT-IV

Multithreaded Programming: Thread Class - Runnable interface – Synchronization – Using synchronized methods – Using synchronized statement- Interthread Communication–Deadlock.

UNIT-V

Adapter classes- Inner classes-Java Util Package/Collections Framework:Collection & Iterator Interface- Enumeration-List and ArrayList-Vector-Comparator

COURSE OUTCOMES:

CO1-Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java

CO2-Implement inheritance, packages, interfaces and exception handling of Core Java.

CO3-Implement multi-threading and I/O streams of Core Java

Textbooks	
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.
2	Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999.
Reference Books	
1	Head First Java, O’Rielly Publications, Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010.

Java Programming Lab	Core-S2EC1L
Learning Objectives: (for teachers: what they have to do in the class/lab/field) <ul style="list-style-type: none"> • To gain practical expertise in coding Core Java programs • To become proficient in the use of AWT, Event Handling and Swing. 	
Course Outcomes: (for students: To know what they are going to learn) <p>CO1: Code, debug and execute Java program to solve the given problems</p> <p>CO2: Implement multi-threading and exception-handling</p> <p>CO3: Implement functionality using String and StringBuffer classes</p>	

List of Programs
<ol style="list-style-type: none"> 1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer? 2. Write a Java program to multiply two given matrices. 3. Write a Java program that displays the number of characters, lines and words in a text? 4. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated. 5. Write a program to do String Manipulation using Character Array and perform the following string operations: <ol style="list-style-type: none"> a) String length b) Finding a character at a particular position c) Concatenating two strings 6. Write a program to perform the following string operations using String class: <ol style="list-style-type: none"> a) String Concatenation b) Search a substring c) To extract substring from given string 7. Write a program to perform string operations using StringBuffer class: <ol style="list-style-type: none"> a) Length of a string b) Reverse a string c) Delete a substring from the given string

8. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

9. Write a threading program which uses the same method as synchronously to print the numbers 1 to 10 using Thread 1 and to print 90 to 100 using Thread 2.
Write a program to demonstrate the use of following exceptions. Arith

- a) Arithmetic Exception
- b) NumberFormatException
- c) ArrayIndexOutOfBoundsException
- d) IllegalArgumentException

Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from the Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferable Skill

Learning Resources:
Recommended Texts
 Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010. Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999.
Reference Books
 Head First
 Java, O’Rielly Publications, Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010.
Web resources: Web resources from NDLLibrary, E-content from open-source libraries

COURSECODE	COURSE TITLE	L	T	P	C
23198GEC36	Web Technology (PHP)andLab	4	0	1	3

OBJECTIVES:

- To use PHP and MySQL to develop dynamic websites for users on the Internet
- To develop web sites ranging from simple online information forms to complex e-commerce sites with MySQL database, building, connectivity, and maintenance

UNIT-I

Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.

UNIT-II

Controlling Program Flow: Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

UNIT-III

Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms – Working with Array Functions – Working with Dates and Times.

UNIT-IV

Using Functions and Classes: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts.

UNIT-V

Working with Database and SQL : Introducing Database and SQL - Using MySQL - Adding and modifying Data - Handling Errors – Using SQLite Extension and PDO Extension. Introduction XML - Simple XML and DOM Extension

Course Outcomes

CO1- Understand the general concepts of PHP scripting language for the development of Internet websites. CO2-

Understand the basic functions of MySQL database program and XML concepts

CO3- Learn the relationship between the client side and the server side scripts.

Textbooks
Vikram Vaswani, “PHP A Beginner's Guide”, Tata McGraw Hill 2008.
Reference Books
Steven Holzner , “The PHP Complete Reference”, Tata McGraw Hill, 2007.
Steven Holzer, “Spring into PHP”, Tata McGraw Hill 2011, 5th Edition.
NOTE: Latest Edition of Textbooks May be Used
Web Resources
https://www.w3schools.com/php/
https://www.phptpoint.com/php-tutorial-pdf/
http://www.xmlsoftware.com/

WEB TECHNOLOGY LAB	
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> • The objectives of this course are to have a practical understanding about how to write PHP code to solve problems. • Display and insert data using PHP and MySQL. • Test, debug, and deploy web pages containing PHP and MySQL. • It also aims to introduce a practical session to develop simple applications using PHP and MySQL. 	
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <ol style="list-style-type: none"> 1. On the completion of this laboratory course the students ought to 2. Obtain knowledge and develop application programs using Python. 3. Create dynamic Web applications such as content management, user registration, and e-commerce using PHP and to understand the ability to post and publish a PHP website. 4. Develop a MySQL database and establish connectivity using MySQL. 	
LIST OF PRACTICALS	
<ol style="list-style-type: none"> 1. Write a PHP program which adds up columns and rows of a given table 2. Write a PHP program to compute the sum of first n given prime numbers 3. Write a PHP program to find a valid email address 4. Write a PHP program to convert a number written in words to a digit. 5. Write a PHP script to delay the program execution for the given number of seconds. 6. Write a PHP script, which changes the colour of the first character of a word 7. Write a PHP program to find the multiplication table of a number. 8. Write a PHP program to calculate the factorial of a number. 9. Write a PHP code to create a student marks sheet table. Insert, delete, and modify records. 10. From an XML document (email.xml), write a program to retrieve and print all the email addresses from the document using XML 	

11. From aXMLdocument(tree.xml),suggestthreedifferentwaystoretrievethevalue'John'usingtheDOM:
12. WriteaprogramthatconnectstoMySQLdatabaseandretrievesthecontentsofanyoneofitstables as

Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC /TRB/NET/UGC– CSIR/GATE/TNPSC/otherstobesolved(TobediscussedduringtheTutorialhour)
Skills acquired from the Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferable Skill

COURSECODE	COURSE TITLE	L	T	P	C
23198SEC37	Intellectual Property Rights	2	0	0	1

OBJECTIVES:

- To introduce fundamental aspects of Intellectual Property Rights to students who are going to play a major role in development and management of innovative projects in industries.
- To disseminate knowledge on patents, patent regime in India and abroad and registration aspects
- To disseminate knowledge on copyrights and its related rights and registration aspects
- To disseminate knowledge on trademarks and registration aspects
- To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects
- To aware about current trends in IPR and Govt. steps in fostering IPR.

UNIT-I

Overview of Intellectual Property

Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967, the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994

UNIT-II

Patents

Patents - Elements of Patentability: Novelty, Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board.

UNIT-III

Copyrights

Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights

UNIT-IV

Trademarks

Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board

UNIT-V

Current Contour

India's New National IP Policy, 2016 – Govt. of India step towards promoting IPR – Govt. Schemes in IPR – Career Opportunities in IP - IPR in current scenario with case studies

COURSE OUTCOMES:

- The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works. During their research career, information in patent documents •
- provide useful insight on novelty of their idea from state-of-the-art search.
- This provides further way for developing their idea or innovations. Pave the way for the students to catch up Intellectual Property (IP) as a career option. R&D IPCouns

References:

Textbook:

1. Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited. 2. Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI Learning Private Limited. Reference book: 1. Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: Lexis Nexis. E-resources: 1. Subramanian, N., & Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from <http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf> 2. World Intellectual Property Organisation. (2004). WIPO Intellectual property Handbook. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf Reference Journal: 1. Journal of Intellectual Property Rights (JIPR): NISCAIR Useful Websites: 1. Cell for IPR Promotion and Management (<http://cipam.gov.in/>) 2. World Intellectual Property Organisation (<https://www.wipo.int/about-ip/en/>) 3. Office of the Controller General of Patents, Designs & Trademarks (<http://www.ipindia.nic.in/>)

COURSECODE	COURSETITLE	L	T	P	C
23198SEC38	Tally. ERP 9	1	0	1	2

OBJECTIVES:

- Examination of general accounting applications as they apply to computerized financial records for each step of the accounting cycle to the completion of financial statements, as well as management accounting applications.

1. Preparation of Trial Balance- preparation of profit and loss accounts, Balance sheet
2. Interest simple, compound interest calculation. Setting ledger master, Interest report.
3. Receivable and payable management, meaning activating bill wise details, all types of entries
4. Cost Centres and Category summary, cost centre breakup ledgers and group breakup outstanding receivable and payable, interest receivable and payable, statistics, cash and fund flow daybook list of account reversing journals, optional vouchers.
5. Budget Budgetary control creation of budget, group budget Budgetary ledger creation alteration of budget deletion of budget.
6. Introduction to GST, Getting started with GST, Transferring Input tax to GST, Interest supply of goods, GST reports
7. Recording advance entries, Exports, Imports, Exempted Goods, Adjustment and Return filing, GST tax payments
8. Electronic Commerce Introduction, Tax Collected at Source (TCS), Procedures for E-commerce Operator, Input Tax Credit: - Introduction, Important Points, Input Service Distributors
9. Matching of Input Tax Credit, Returns, GSTR-2, Other Taxable Persons, Annual Return, Overview of the IGST Act, Overview, Other Provisions. GST Portal, Introduction, GST Eco-system, GST Suvidha Provider (GSP), Uploading Invoices.

Course Outcomes

- Input journal entries, adjust entries and prepare financial statements for cash and accrual-based businesses
- Record vendor, customer, and inventory transactions essential for maintaining accounts payable, accounts receivable, and inventory subsidiary ledgers

COURSECODE	COURSETITLE	L	T	P	C
23198RMC39	Research Methodology	2	0	0	2

OBJECTIVES

- I. To understand the steps in research process and the suitable methods.
- II. To identify various research communications and their salient features.
- III. To carry out basic literature survey using the common data-bases.

PREREQUISITES:

Basic computer skills for working in window-environment & Conceptual knowledge on basic matrices.

UNIT-I

Research in Management : An Introduction – Definition, meaning and nature – Scope and objects of Research. Types of Research.

UNIT-II

Research Design – Defining Research Problem and Formulation of Hypothesis – Experimental Designs – Sampling and types of sampling.

UNIT-III

Research Process – Steps in the process of Research, Data Collection and Measurement: Sources of Secondary data – Methods of Primary data collection – Questionnaire Construction.

UNIT-IV

Data presentation and Analysis – Data Processing – Methods of Statistical analysis and interpretation of Data – Testing of Hypothesis and theory of inference – Correlation and Regression analysis.

UNIT-V

Report writing and Presentation – Steps in Report writing – Types of reports – Formats of Reports – Presentation of a Report.

OUTCOME:

- Able to carry out independent literature survey corresponding to the specific publication type and assess basic literary research tools.
- Familiarize participants with basic of research and the research process.
- Enable the participants in conducting research work and formulating research synopsis and report.
- Develop understanding on various kinds of research
- objectives of doing research, research process, research designs and sampling.
- Have basic knowledge on qualitative research techniques
- Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis

REFERENCE BOOKS

1. Rajendrapal and Korlahalli-Business Communication
2. M.S.Ramesh and Pattenshetty-Effective Business English & Correspondence
3. Sharma and Krishnamohan-Report writing Business Correspondence

SEMESTER-IV

CourseCode	CourseTitle	L	T	P	C
23110AEC41	Tamil-IV	4	0	0	2

தமிழ்மொழியியல்-இலக்கணம்

இலக்கணம்

- ◆ இலக்கணத்தின் பொருள்
- ◆ இலக்கணத்தின் வகைகள்
- ◆ இலக்கணத்தின் பயன்பாடு
- ◆ இலக்கணத்தின் அடிப்படை
- ◆ இலக்கணத்தின் முக்கிய அம்சங்கள்

இலக்கணம்

- ◆ இலக்கணத்தின் பொருள்
- ◆ இலக்கணத்தின் வகைகள்
- ◆ இலக்கணத்தின் பயன்பாடு
- ◆ இலக்கணத்தின் அடிப்படை
- ◆ இலக்கணத்தின் முக்கிய அம்சங்கள்

இலக்கணம்-1

1. இலக்கணத்தின் பொருள்-இலக்கணம்:28,38
2. இலக்கணத்தின் வகைகள்-இலக்கணம்:1,27,28,167,168
3. இலக்கணத்தின் பயன்பாடு-இலக்கணம்:இலக்கணத்தின் பொருள்

இலக்கணம்-2

1. இலக்கணத்தின் பொருள்-இலக்கணம்:3,7
2. இலக்கணத்தின் வகைகள்-இலக்கணம்:5,42,100
3. இலக்கணத்தின் பயன்பாடு-இலக்கணம்:182,204,41,121

இலக்கணம்-3

1. இலக்கணத்தின் பொருள்-இலக்கணம்:இலக்கணத்தின் பொருள்

இலக்கணம்-4

1. இலக்கணத்தின் பொருள்-இலக்கணத்தின் பொருள், இலக்கணத்தின் வகைகள், இலக்கணத்தின் பயன்பாடு
2. இலக்கணத்தின் வகைகள்-இலக்கணம்:1,172,215,253

இலக்கணம்-5

- இலக்கணத்தின் பொருள்**
1. இலக்கணத்தின் பொருள்
 2. இலக்கணத்தின் வகைகள்
 3. இலக்கணத்தின் பயன்பாடு

இலக்கணத்தின் பொருள்

1. இலக்கணத்தின் பொருள்-இலக்கணத்தின் பொருள், இலக்கணத்தின் வகைகள்
2. இலக்கணத்தின் வகைகள்-இலக்கணத்தின் பொருள், இலக்கணத்தின் வகைகள்
3. இலக்கணத்தின் பயன்பாடு-இலக்கணத்தின் பொருள், இலக்கணத்தின் வகைகள்
4. இலக்கணத்தின் அடிப்படை-இலக்கணத்தின் பொருள், இலக்கணத்தின் வகைகள்
5. இலக்கணத்தின் முக்கிய அம்சங்கள்-இலக்கணத்தின் பொருள், இலக்கணத்தின் வகைகள்
6. இலக்கணத்தின் பயன்பாடு-இலக்கணத்தின் பொருள், இலக்கணத்தின் வகைகள்
7. இலக்கணத்தின் முக்கிய அம்சங்கள்-இலக்கணத்தின் பொருள், இலக்கணத்தின் வகைகள்
8. இலக்கணத்தின் பயன்பாடு-

CourseCode	CourseTitle	L	T	P	C
23111AEC42	English-IV	4	0	0	2

OBJECTIVES:

- To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.
- To enable them use receptive skills through reading and listening to acquire good exposure to language and literature.
- To help them develop style in speech and writing and manipulate the tools of language for effective communication.
- To provide exposure to plays, autobiographies and expose them to value based ideas.
- To enhance their language skills especially in the areas of grammar and pronunciation

UNIT-I

Life Writing

I am Malala- Malala Yousafzai-
Chapter 1 My Inventions- Nikola Tesla-
Chapter 2

UNIT-II

One Act Plays

The Zoo Story- Edward
Albee The Proposal-
Anton Chekhov

UNIT-III

Interviews

Nelson Mandela's Interview with Larry King.
Rakesh Sharma's Interview with Indira Gandhi from
Space Lionel Messi with Sid Lowe (Print)

UNIT-IV

Language Competency

Refuting, Arguing & Debating
Making Suggestions & Responding to Suggestions,
Asking for and Giving Advice or Help Interviews (face to face, telephone and video conferencing)

UNIT-V

English for Workplace

Job Applications: Covering letters, CV and Resume Creating a digital profile- LinkedIn
Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card
Body Language- Practical Skills for Interviews

COURSE OUTCOMES:

- CO1-** Learn to communicate effectively and appropriately in real life situation.
CO2- Use English effectively for study purpose across the curriculum
CO3 - Develop interest in and appreciation of Literature
CO4- Develop and integrate the use of the four language skills
CO5 - Enhance their language skills especially in the areas of grammar and pronunciation

TextBooks(LatestEditions)	
1	I Am Malala: The Girl Who Stood Up for Education and Was Shot by the Taliban by <u>Malala Yousafzai, Christina Lamb</u> , Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	<u>Writing Your Life: A Guide to Writing Autobiographies</u> , Mary Borg, Taylor & Francis, 2021
2	One-act Plays for Acting Students: An Anthology of Short Plays <u>Norman A. Bert</u> , 1987.
3	<u>The One-Act Play Companion: A Guide to Plays, Playwrights...</u> <u>Colin Dolley, Rex Walford</u> , 2015
4	How to Build a Professional Digital Profile Kindle Edition by <u>Jeanne Kelly Bernish</u> , Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Role Play - Theory and Practice. <u>Krysia Myrdal, Matwiejczuk</u> , SAGE Publications Ltd, 1997

WebResources	
1	For Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s (the link to the performance; referscripts by Aaron Sheperd)
2	http://BBClearnEnglish.com
3	http://onestopenglish.com
4	http://hearn-english-today.com
5	http://talkenglish.com
6	The Zoo Story: http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pdf
7	The Proposal: https://www.one-act-plays.com/comedies/proposal.html
	Nelson Mandela with Larry King

8	Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lkl.00.html
9	RakeshSharmawithIndiraGandhi Interview : https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-told-indira-gandhi-about-india-from-space-2204839
1 0	LionelMessiwithSidLowe Interview: https://www.worldsoccer.com/world-soccer-latest/lionel-messi-interview-part-one-338553

SEMESTER-IV

CourseCode	CourseTitle	L	T	P	C
23198SEC43	CORPORATEACCOUNTING-II	4	1	0	3

OBJECTIVES:

- To know the types of Amalgamation, Internal and external Reconstruction
- To know Final statements of banking companies
- To understand the accounting treatment of Insurance company accounts
- To understand the procedure for preparation of consolidated Balance sheet
- To have an insight on modes of winding up of a company

UNIT-I

Amalgamation, Internal & External Reconstruction

Amalgamation – Meaning – Purchase Consideration –

Lumpsum Method, Net Assets Method, Net Payment Method, Intrinsic Value Method - Types of **Methods of Accounting for Amalgamation - The Pooling of Interest Method - The Purchase Method (Excluding Inter-Company Holdings).**

Internal & External Reconstruction

Internal Reconstruction – Conversion of Stock – Increase and Decrease of Capital – Reserve Liability – Accounting Treatment of External Reconstruction

UNIT-II

Accounting of Banking Companies

Final Statements of Banking Companies (As Per New Provisions) - Non-Performing Assets - Rebate on Bills Discounted - Profit and Loss/c-Balance Sheet as Per Banking Regulation Act 1949.

UNIT-III

Insurance Company Accounts:

Meaning of Insurance – Principles – Types – Preparation of Final Accounts of Insurance Companies – Accounts of Life Insurance Business – Accounts of General Insurance Companies - New Format.

UNIT-IV

Consolidated Financial Statements

Introduction - Holding & Subsidiary Company - Legal Requirements Relating to Preparation of Accounts - Preparation of Consolidated Balance Sheet (Excluding Inter-Company Holdings).

UNIT-V

Liquidation of Companies

Meaning - Modes of Winding Up –

Preparation of Statement of Affairs and Statement of Deficiency or Surplus (List H) Order of Payment – Liquidators Remuneration - Liquidator's Final Statement of Accounts.

COURSE OUTCOMES:

CO1- Understand the accounting treatment of amalgamation, Internal and external reconstruction

CO2-

Construct Profit and Loss account and Balance Sheet of Banking Companies in accordance in the prescribed format.

CO3-

Synthesize and prepare final accounts of Insurance companies in the prescribed format

CO4- Give the consolidated accounts of holding companies

CO5- Preparation of liquidator's final statement of account

Textbooks		
1	S.P.Jain and K.L.Narang, Advanced Accountancy, Kalyani Publishers, New Delhi.	
2	Dr.K.S.Raman and Dr.M.A.Arulanandam, Advanced Accountancy, Vol.II, Himalaya Publishing House, Mumbai.	
3	R.L.Gupta and M.Radhaswamy, Advanced Accounts, Sultan Chand, New Delhi.	
4	M.C.Shukla and T.S.Grewal, Advanced Accounts Vol.II, S.Chand & Sons, New Delhi.	
5	T.S.Reddy and A.Murthy, Corporate Accounting II, Margham Publishers, Chennai	
Reference Books		
1	B.Raman, Corporate Accounting, Taxmann, New Delhi	
2	M.C.Shukla, Advanced Accounting, S.Chand, New Delhi	
3	Prof. Mukesh Bramhbut, Devi Ahilya publication, Madhya Pradesh	
4	Anilkumar, Rajeshkumar, Advanced Corporate Accounting, Himalaya Publishing house, Mumbai.	
5	Prasanth Athma, Corporate Accounting, Himalaya Publishing house, Mumbai.	
NOTE: Latest Edition of Textbooks May be Used		
Web Resources		
1	https://www.accountingnotes.net/amalgamation/amalgamation-absorption-and-reconstruction-accounting/126	
2	https://www.slideshare.net/debchat123/accounts-of-banking-companies	
3	https://www.accountingnotes.net/liquidation/liquidation-of-companies-accounting/12862	

SEMES

SEMESTER-IV

CourseCode	CourseTitle	L	T	P	C
23198SEC44	CompanyLaw	4	1	0	3

Objectives:

- ToknowCompanyLaw1956andCompaniesAct2013
- To have an understanding on the formation of a company
- To understand the requisites of meeting and resolution
- To gain knowledge on the procedure to appoint and remove Directors
- To familiarize with the various modes of winding up

UNIT-I

Introduction to Company Law

Companies Act 2013 – Definition of a Company, Characteristics of Company – Lifting or Piercing the Corporate Veil – Company Distinguished from Partnership and Limited Liabilities Partnerships – Classification of Companies

– Based on Incorporation, Liability, Number of Members, Control.

– UNIT-II

Formation of Company

Formation of a Company – Promoter – Incorporation Document – e-filing – Memorandum of Association – Contents – Alteration – Legal Effects – Articles of Association – Certificate of Incorporation – Prospectus – Contents – Kinds – Liabilities – Share Capital – Kinds – Issue – Alteration – Dividend – Debentures

.UNIT-III

Meeting

Meeting and Resolution – Types – Requisites – Voting & Poll – Quorum – Proxy – Resolution – Ordinary & Special – Audit & Auditors – Qualification, Disqualification, Appointment and Removal of an Auditor –

UNIT-IV

Management & Administration

Management & Administration – Directors – Legal Position – Board of Directors – Appointment/ Removal – Disqualification – Director Identification Number – Directorships – Powers – Duties – Board Committees – Related Party Transactions – Contract by One Person Company – Insider Trading – Managing Director – Manager – Secretarial Audit – Administrative Aspects and Winding Up – National Company Law Tribunal (NCLT) – National Company Law Appellate Tribunal (NCLAT) – Special Courts

UNIT-V

Winding up

Meaning – Modes – Compulsory Winding Up – Voluntary Winding Up – Consequences of Winding Up Order – Powers of Tribunal – Petition for Winding Up – Company Liquidator.

CourseCode	CourseTitle	L	T	P	C
23198GEC46	Relational Database Management	3	0	0	3

OBJECTIVE:

- Gain a good understanding of the architecture and functioning of Database Management Systems
- Understand the use of Structured Query Language (SQL) and its syntax.
- Apply Normalization techniques to normalize a database
- Understand the need of transaction processing and learn techniques for controlling the consequences of concurrent data access.

UNIT-I

Introduction to DBMS – Data and Information - Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram

UNIT-II

Relationship Degree – Classification – ER diagram to Tables – IS A relationship – Constraints – Aggregation and Composition – Advantages

Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools – Redundancy and Data Anomaly

UNIT-III

– Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security.

UNIT-IV

Introduction to Built-in ActiveX control – Toolbar – The Treeview control – The Listview control the ImageList control - Command Dialog Control – status bar Control – Rich text box control – Menu editor.

UNIT-V

Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables. Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT – MINUS

OUTCOMES:

- Describe basic concepts of database system Design a Data model and Schema in RDB
- MS Competent in use of SQL
- Analyze functional dependencies for designing robust Database

Textbooks

S.Sumathi,S.Esakkirajan,“Fundamentals ofRelationalDatabaseManagement System”,SpringerInternationalEdition2007.
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ReferenceBooks

AbrahamSilberchatz,HenryF. Korth,S.Sudarshan,“DatabaseSystem Concepts”,McGrawHill2019,7thEdition.

Alexis Leon&MathewsLeon, “FundamentalsofDBMS”, VijayNicolePublications2014,2 nd Edition.

NOTE: Latest EditionofTextbooksMay beUsed
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WebResources

https://nptel.ac.in/courses/106106093/

https://nptel.ac.in/courses/106106095/

NPTEL&MOOCcoursestitledRelationalDatabaseManagementSystems
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CourseCode	CourseTitle	L	T	P	C
23161GEC46	Introduction to Data Science	3	0	0	3

OBJECTIVE:

To introduce the concepts, techniques and tools in Data Science
 To understand the various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modelling, descriptive modeling and effective communication.

UNIT-I

Introduction:

Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science

UNIT-II

The Data science process:

Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building - Data Visualization

UNIT-III

Algorithms:

Machine learning algorithms – Modelling process – Types – Supervised – Unsupervised – Semi-supervised

UNIT-IV

Introduction to Hadoop:

Hadoop framework – Spark – replacing MapReduce – NoSQL – ACID – CAP – BASE – types

UNIT-V

Case Study:

Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation

OUTCOME:

- To describe what Data Science is, what Statistical Inference means, identify probability distributions, fit a model to data and use tools for basic analysis and communication
- To describe what Data Science is, what Statistical Inference means, identify probability distributions, fit a model to data and use tools for basic analysis and communication
- To describe what Data Science is, what Statistical Inference means, identify probability distributions, fit a model to data and use tools for basic analysis and communication
- To describe what Data Science is, what Statistical Inference means, identify probability distributions, fit a model to data and use tools for basic analysis and communication
- To describe what Data Science is, what Statistical Inference means, identify probability distributions, fit a model to data and use tools for basic analysis and communication

Textbooks
Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications 2016
Roger Peng, “The Art of Data Science”, lulu.com 2016.
Murtaza Haider, “Getting Started with Data Science – Making Sense of Data with Analytics”, IBM press, E-book.
Reference Books
Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools”, Dreamtech Press 2016.
Annalyn Ng, Kenneth Soo, “Numsense! Data Science for the Layman: No Math Added”, 2015, 1st Edition.
Cathy O’Neil, Rachel Schutt, “Doing Data Science: Straight Talk from the Frontline”, O’Reilly Media 2013.
Lillian Pierson, “Data Science for Dummies”, 2015 II Edition

CourseCode	CourseTitle	L	T	P	C
23198SEC47	Information Technology Concepts	2	0	0	2

- OBJECTIVES:** Companies rely on IT for fast communications, data processing and market intelligence. IT plays an integral role in every industry, helping companies improve business processes, achieve cost efficiencies, drive revenue growth and maintain a competitive advantage in the marketplace.

UNIT-I

Introduction to Computers-Definition, Characteristics of computer Evolution of Computer, Block Diagram of a computer, Generations of Computer, Classification of Computers, Applications of Computer, Capabilities and limitations of computer. Computer peripherals-Role of I/O devices in a computer system.

UNIT-II

Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers:

Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers, storage units.

UNIT-IV

Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language and their

advantages & disadvantages. Application S/W and its types: Word

Processing, Spread Sheets Presentation, Graphics, DBMS s/w. Data Communication and BDP: Communication Process,

Data Transmission speed, Communication Types (modes), Data Transmission Media, Modem. Business Data

Processing: Introduction, data storage hierarchy, Method of organizing data, File Types, File Organization.

UNIT-V

Computers at Home, Education, Entertainment, Business, Science, Medicine and Engineering-

Introduction to Computer Security- Computer Viruses, Bombs, Worms- WWW and Internet

COURSE OUTCOMES:

An ability to design, implement, and evaluate software or a software/hardware system, component, or process to meet desired needs within realistic constraints. An ability to identify, formulate, and provide schematic solutions to complex engineering/Technology problems.

CourseCode	CourseTitle	L	T	P	C
23198SEC48	Salesmanship	2	0	0	2

- OBJECTIVES:** To maintain present accounts and add new customers. To maintain market share and competitive edge. To achieve sales volume and satisfy company's product mix norms. To submit sales reports regularly as per company's policies

UNIT-I Introduction to selling-meaning-definitions-importance- methods-qualities-functions-duties-responsibilities -types of salesperson- sales careers.

UNIT-II Selling process-steps-customer expectations-understanding prospects-importance sources-buyer motives and behaviour- transaction oriented selling-relationships selling.

UNIT-III Selling techniques - planning- setting objectives- approach techniques - building rapport-product knowledge- product benefits- features -functions- sales presentation demonstration- handling objections-handling difficult customers-closing sales-after sales service

UNIT-IV Sales territory- sales targets/quotas- creating product strategies - understanding selling terms and prices-retail stores salesperson- online stores and sales opportunities-personal selling in the information age

UNIT-V Sales force management- selection- training- motivation- compensation - supervision and control-sales reports and knowledge management - evaluation- selling expenses- sales team professionalism - ethics-personal grooming.

COURSE OUTCOMES:

will be able to explain the concepts of sales management, person selling and sales task. will be able to summarize history of sale stages. will be able to explain the personal sale strategies and

environmental factors that affect the person's sales.

Course Code	Course Title	L	T	P	C
231AECEVS	Environmental Studies	2	0	0	2

OBJECTIVES:

- An Environmental Studies major will be able to recognize the physical, chemical, and biological components of the earth's systems and show how they function. An Environmental Studies major will be able to apply lessons from various courses through field experiences.

UNIT-I

The Multidisciplinary Nature of Environmental Studies – Definition, Scope and Importance – Need for Public awareness- natural Resources: Renewable and Non – Renewable Resources- Forest Resources – Water Resources- Mineral Resources- Food Resources–Energy Resources–Land Resources.

UNIT-II

Ecosystems-Concept of an ecosystem–Structure and function of an ecosystem–Producers, consumers and decomposers–Energy flow in the ecosystem–Ecological succession- Food chains, food webs and ecological pyramids–Types of ecosystem–Forest ecosystem–Greenland ecosystem–Desert ecosystem –Aquatic ecosystems.

UNIT-III

Biodiversity and its Conservation–Definition-Genetic, Species and ecosystem diversity–Biogeographical classification of India–Values of biodiversity–Biodiversity at global, National and local levels –India as a mega–diversity nation–Hot-spots of biodiversity–Threats to biodiversity– Endangered and endemic species of India–Conservation of biodiversity.

UNIT-IV

Environmental Pollution–Definition–Air Pollution–Water pollution–Soil Pollution-Marine Pollution- Noise Pollution –Thermal Pollution – Nuclear hazards –Solid waste Management–Role of an individual in prevention of pollution–Disaster management.

UNIT-V

Social Issues and the Environment–From Unsustainable to Sustainable development- Urban problems related to energy–Water conservation, rainwater harvesting, watershed management- Environmental Ethics –Climate change greenhouse effect and global warming–Ozone depletion–Wasteland reclamation–Consumerism and waste products–Environmental Legislation–Issues involved in enforcement of environmental legislation–Public awareness- Human population and the environment.

OUTCOME:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Master core concepts and methods from economic, political, and social analysis
- As they pertain to the design and evaluation of environmental policies and institutions.

- **Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.**
- **Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.**
- **Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.**
- **Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.**
- **Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.**

TEXTBOOK:

'ENVIRONMENTAL STUDIES', K. Kumarasamy, A. Alagappa Moses, M. vananthy.

SEMESTER IV

CourseCode	CourseTitle	L	T	P	C
231LCSCLS	Leadership and Management Skills	0	0	0	1

CourseObjective:

TheModuleisdesignedto:

- Helpstudentstodevelopessentialskillstoinfluenceandmotivateothers
- Inculcateemotionalandsocialintelligence,andintegrativethinkingforeffectiveleadership
- Createandmaintainaneffectiveandmotivatedteamtoworkforthesociety
- Nurtureacreativeandentrepreneurialmindset

- Makestudentsunderstandthepersonalvaluesandapplyethicalprinciplesinprofessionalandsocialcontexts.

CourseOutcomes:

Uponcompletionofthecourse,studentswillbeableto:

1. Examinevariousleadershipmodelsandunderstand/assesstheirskills,strengthsandabilitiesthataffecttheirownleadershipstyleandcancreatetheirleadershipvision
2. Learnanddemonstrateasetofpracticalskillssuchastimemanagement,selfmanagement,handlingconflicts,teamleadership,etc.
3. Understandthebasicsofentrepreneurshipanddevelopbusinessplans
4. Applythedesignthinkingapproachtoleadership
5. Appreciatetheimportanceofethicsandmoralvaluesformakingofabalancedpersonality.

UNITI-LeadershipSkills

a. UnderstandingLeadershipanditsImportance

- Whatisleadership?
- WhyLeadershiprequired?
- Whomdoyouconsiderasanidealleader?

b. TraitsandModelsofLeadership

- Areleadersbornormade?
- Keycharacteristicsofaneffectiveleader
- Leadershipstyles
- Perspectivesofdifferentleaders

c. BasicLeadershipSkills

- Motivation
- Teamwork
- Negotiation
- Networking

UNITII-ManagerialSkills

a. BasicManagerialSkills

- Planningforeffectivemanagement
- Howtoorganiseteams?
- Recruitingandretainingtalent
- Delegationoftasks
- Learntocoordinate
- Conflictmanagement

b. Self Management Skills

- Understanding self concept
- Developing self-awareness
- Self-examination
- Self-regulation

UNIT III-Entrepreneurial Skills

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurship
- Traits and competencies of entrepreneur

b. Creating Business Plan

- Problem identification and ideation and devalidation
- Pitchmaking

c. UNIT-IV-Innovative Leadership and Design Thinking

d. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

e. Design Thinking

- What is design thinking?
- Key elements of design thinking:
 - Discovery
 - Interpretation
 - Ideation
 - Experimentation
 - Evolution.
- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

UNIT V-Ethics and Integrity

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

b. Ethics and Conduct

- Importance of ethics
- Ethical decision making
- Personal and professional moral codes of conduct
- Creating a harmonious

• lifeBibliographyand

Suggested Readings: Books

- Ashokan, M.S. (2015). *Karmayogi: A Biography of E. Sreedharan*. Penguin, UK.
- Brown, T. (2012). *Change by Design*. Harper Business
- Elkington, J., & Hartigan, P. (2008). *The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World*. Harvard Business Press.
- Goleman D. (1995). *Emotional Intelligence*. Bloomsbury Publishing India Private Limited
- Kalam A. A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin Books India
- Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us*. William Collins
- Kurien V., & Salve G. (2012). *I Too Had a Dream*. Roli Books Private Limited
- Livermore D. A. (2010). *Leading with Cultural Intelligence: The New Secret to Success*. New York: American Management Association
- McCormack M. H. (1986). *What They Don't Teach You at Harvard Business School: Notes From a Street-Smart Executive*. RHUS
- O'Toole J. (2019) *The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good*. HarperCollins
- Sinek S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. Penguin
- Sternberg R. J., Sternberg R. J., & Baltes P. B. (Eds.). (2004). *International Handbook of Intelligence*. Cambridge University Press.

E-Resources

- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15 from <https://www.forbes.com/sites/kimberlyfries/2018/02/08/8-essential-qualities-that-define-great-leadership/#452ecc963b63>.
- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - "A Leader Should Know How to Manage Failure" <https://www.youtube.com/watch?v=laGZaS4sdeU>
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, 85(6):60.
- NPTEL Course on Leadership - <https://nptel.ac.in/courses/122105021/9>

SEMESTER-V

COURSECODE	COURSE TITLE	L	T	P	C
23198AEC51	Cost Accounting -I	5	1	0	4

OBJECTIVES

To understand the various concepts of cost accounting. To prepare and reconcile cost accounts.

To gain knowledge regarding valuation methods of material.

To familiarize with the different methods of calculating labour cost. To know

the apportionment of Overheads.

UNIT-I

Introduction of Cost Accounting

Definition-Nature and Scope – Principles of Cost Accounting – Cost Accounting and Financial Accounting - Cost Accounting Vs Management Accounting – Installation of Costing System – Classification of Costs– Cost Centre–Profit Centre.

UNIT-II

Cost Sheet and Methods of Costing

Preparation of Cost Sheet - Tenders & Quotations - Reconciliation of Cost and Financial Accounts – Unit Costing- Job Costing.

UNIT-III

Material Costing

Material Control – Meaning and Objectives – Purchase of Materials – EOQ – Stores Records – Reorder Levels – ABC Analysis - Issue of Materials – Methods of Issue – FIFO – LIFO – Base Stock Method – Specific Price Method – Simple and Weighted Average Method

UNIT-IV

Labour Costing

Direct Labour and Indirect Labour – Time Keeping – Methods and Calculation of Wage Payments – Time Wages – Piece Wages – Incentives – Different Methods of Incentive Payments - Idle time–Overtime – Labour Turnover - Meaning, Causes and Measurement

UNIT-V

Overheads Costing

Overheads – Definition – Classification – Allocation and Apportionment of Overheads – Basis of Apportionment – Primary and Secondary Distribution - Absorption of Overheads – Methods of absorption Preparation of Overheads Distribution Statement–Machine Hour Rate–Computation of Machine Hour Rate

OUTCOME:

- Remember and recall the various concepts of cost accounting Understand Mutual funds' investments.
- Demonstrate the preparation and reconciliation of cost sheet Enabling the students to understand the features of Shares and Debentures
- Analyse the various valuation methods of issue of materials.
- Examine the different methods of calculating labour cost.
- Critically evaluate the apportionment of Overheads.

Textbooks	
1	Jain S.P. and Narang K.L, Cost Accounting. Kalyani Publishers, New Delhi
2	Khanna B.S., Pandey I.M., Ahuja G.K., and Arora M.N., Practical Costing, S. Chand & Co, New Delhi,
3	Dr. S.N. Maheswari, Principles of Cost Accounting, Sultan Chand Publications, New Delhi
4	T.S. Reddy and Y. Hari Prasad Reddy, Cost Accounting, Margham publications, Chennai
5	S.P. Iyengar, Cost Accounting, Sultan Chand Publications, New Delhi
Reference Books	
1	Polimeni, Cost Accounting: Concepts and Applications for Managerial Decision Making, 1991, McGraw-Hill, New York.
2	Jain S.P. and Narang K.L. Cost Accounting, Latest Edition. 2013, Kalyani Publishers, New Delhi,
3	V.K. Saxena and C.D. Vashist, Cost Accounting, Sultan Chand publications, New Delhi
4	Murthy A & Gurusamy S, Cost Accounting, Vijay Nicole Imprints Pvt. Ltd. Chennai
5	Prasad. N. K and Prasad. V. K, Cost Accounting, Book Syndicate, Kolkata
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://study.com/learn/lesson/cost-accounting-principles-examples-what-is-cost-accounting.html
2	https://www.accountingtools.com/articles/what-is-material-costing.html
3	https://www.freshbooks.com/hub/accounting/overhead-cost

SEMESTER-V

COURSECODE	COURSE TITLE	L	T	P	C
23198AEC52	Banking law and Practice	5	1	0	4

OBJECTIVE:

- To help the students understand various provision of Banking Regulation Act 1949 applicable to banking companies including cooperative banks
- To trace the evolution of central bank concept and prevalent central banking system around the world and their roles and function
- To throw light on Central Bank in India, its formation, nationalizing its organization structure, role of bank to government, role in promoting agriculture and industry, role in financial inclusion
- To understand how capital fund of commercial banks, objectives and process of Asset securitization etc.
- To explore practical banking systems relationship of bankers and customers, crossing of cheques, endorsement etc.

Unit-I

Introduction to Banking

History of Banking- Provisions of Banking Regulations Act 1949 - Components of Indian Banking - Indian Banking System-Phases of Development - Banking Structure in India – Public Sector Banks, Private Banks, Foreign Banks, RRB, UCB, Payment Banks and Small Finance Banks - Banking System – Branch Banking-Unit Banking-Universal Banking-Financial Inclusion

Unit –II

Central Bank and Commercial Bank

Central Banking: Definition–Need-Principles-Central Banking Vs Commercial Banking- Functions of Central Bank–Credit Creation.

Commercial Banking: Definition - Functions – Personal Banking – Corporate Banking – Digital banking – Core Banking System(CBS)-Role of Banks in Economic Development.

Unit –III

Banking Practice

Types of Accounts CASA–Types of Deposits-Opening Bank Account-Jan Dhan Yojana-Account Statement vs Passbook vs

e-statement-Banker Customer Relationship-Special Types of Customers –KYC norms.

Loans & Advances –Lending Sources- Lending Principles-Types of Loans - classification of assets and income recognition / provisioning (NPA) – Repo Rate & Reverse Repo Rate - securities of lending-Factors influencing bank lending.

Unit —IV

Negotiable Instruments Act Negotiable Instruments – Meaning & Definition – Characteristics -Types of negotiable instruments. Crossing of Cheques– Concept - Objectives – Types of Crossing - - Consequences of Non-Crossing.

Endorsement - Meaning-Components-Kinds of Endorsements-Cheques payable to fictitious person Endorsement by legal representative –Negotiation bank-Effect of endorsement-Rules regarding Endorsement. Paying banker - Banker's duty - Dishonouring of Cheques- Discharge by paying banks -Payments of a crossed cheque - Refusal of cheques Payment. Duties of Collecting Banker-Statutory protection under section 131-Collecting bankers' duty –RBI instruction –Paying Banker Vs Collecting Banker-Customer Grievances-Grievance Redressal–Banking Ombudsman.

Unit —V

Digital Banking

Meaning-Services-e-banking and financial services-Initiatives-Opportunities-Internet banking Vs Traditional Banking

Mobile banking–Anywhere Banking-Any Time Banking- Electronic Mobile Wallets. ATM – Concept - Features- Types-.Electronic money-Meaning-Categories-Meritsof e-money- National Electronic Funds Transfer (NEFT), RTGS, IMPS, UPI and Digital currency – Differences - Safety and Security in Digital Banking.

OUTCOME:

- Aware of various provisions of Banking Regulation Act 1949 applicable to banking companies including cooperative banks
- Analyse the evolution of Central Banking concept and prevalent Central Banking system in India and their roles and function
- Gain knowledge about the Central Bank in India, its formation, nationalizing its organization structure, role of bank to government, role in promoting agriculture and industry, role in financial inclusion
- Evaluate the role of capital fund of commercial banks, objectives and process of Asset securitization etc
- Define the practical banking systems relationship of bankers and customers, crossing of cheques, endorsement etc.

Textbooks	
1	Gurusamy S, Banking Theory: Law and Practice, Vijay Nicole Publication, Chennai
2	Muraleedharan, Modern Banking: Theory and Practice, Prentice Hall India Learning Private Ltd, New Delhi
3	Gupta P.K. Gordon E. Banking and Insurance, Himalaya Publication, Kolkata
4	Gajendra, A Text on Banking Theory Law & Practice, Vrinda Publication, Delhi
5	KPKandasami, SNatarajan & Parameswaran, Banking Law and Practice, S Chand Publication, New Delhi
Reference Books	
1	B. Santhanam, Banking & Financial System, Margam Publication, Chennai
2	<u>Katait Sanjay</u> , Banking Theory and Practice, Lambert Academic Publishing,
3	Henry Dunning Macleod, The Theory And Practice Of Banking, Hard Press Publishing, Old New Zealand
4	William Amasa Scott, Money And Banking: An Introduction To The Study Of Modern Currencies, Kesinger Publication, USA
5	Nektarios Michail, Money, Credit, and Crises: Understanding the Modern Banking System, Palgrave Macmillan, London
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.rbi.org.in/
2	https://businessjargons.com/e-banking.html
3	https://www.wallstreetmojo.com/endorsement/

COURSECODE	COURSETITLE	L	T	P	C
23198AEC53	Income Tax Law and Practice-I	5	1	0	4

OBJECTIVE:

To understand the basic concepts & definitions under the Income Tax Act, 1961 To compute the residential status of an assessee and the incidence of tax.

To compute income under the head salaries

To learn the concepts of Annual value, associated deductions and the calculation of income from House property. To compute the income from Business & Profession considering its basic principles & specific disallowances.

Unit—I

Introduction to Income Tax

Introduction to Income Tax – History – Objectives of Taxation – Features of Income Tax – Meaning of Income – Types – Important Definitions Under the Income Tax Act – Types of Assessee – Income exempted under

Section 10.

Unit—II

Residential Status

Residential Status – Residential Status of an Individual – Company – HUF – Basic Conditions – Additional Conditions – Incidence of Tax and Residential Status – Problems on Residential Status and Incidence of Tax.

Unit—III

Income from Salary

Salary Income – Definition – Allowances – Taxability – Perquisites – Kinds of Perquisites – Types of Provident Fund – Gratuity – Pension – Commutation of Pension – Deduction of Salary – Profits in Lieu of Salary – Computation of Salary Income.

Unit—IV

Income from House Property

Income from House Property – Basis of Charge – Annual Value – Gross Annual Value, Net Annual Value – Let-out vs Deemed to be let out – Self-Occupied Property – Deductions – Computation of Income from House Property.

Unit—V

Profits and Gains from Business or Profession

Income from Business or Profession – Allowable Expenses – Expenses Disallowed – General Deductions – Depreciation – Undisclosed Income & Investments, Unexplained expenditure (Sec 69A, 69B, 69C, 69D) – Compulsory Maintenance of Books of Accounts – Audit of Accounts of Certain Persons – Special Provisions for Computing Income on Estimated Basis (Deemed Income) – Computation of Income from Business or Profession.

OUTCOME:

- Demonstrate the understanding of the basic concepts and definitions under the Income Tax Act.
- Assess the residential status of an assessee & the incidence of tax.
- Compute income of an individual under the head salaries.
- Ability to compute income from house property.
- Evaluate income from a business carried on or from the practice of a Profession

Textbooks
V.P.Gaur, Narang, Puja Gaur and Rajeev Puri- Income Tax Law and Practice, Kalyani Publishers, New Delhi.
T.S. Reddy and Hariprasad Reddy, Income Tax Law and Practice, Margham Publications, Chennai.
Dinkar Pagare, Income Tax Law and Practice, Sultan & Chand Sons, New Delhi.
H.C. Mehrotra, Dr. Goyal S.P, Income Tax Law and Accounts, Sahitya Bhavan Publications, Agra.
T. Srinivasan- Income Tax & Practice- Vijay Nicole Imprints Private Limited, Chennai.
Reference Books
Hariharan N, Income Tax Law & Practice, Vijay Nicole Imprints Pvt. Ltd. Chennai
Bhagwati Prasad, Income Tax Law and Practice, Vishwa Prakashan. New Delhi.
Vinod K. Singhania, Students Guide to Income Tax., U.K. Bhargava Taxman.
Dr. Vinod K Singhania, Dr. Monica Singhania, Taxmann's Students' Guide to Income Tax, New Delhi.
Mittal Preethi Rani and Bansal Anshika, Income Tax Law and Practice, Sultan & Chand Sons, New Delhi.
NOTE: Latest Edition of Textbooks May be Used
Web Resources
https://cleartax.in/s/residential-status/
https://www.legalraasta.com/itr/income-from-salary/
https://taxguru.in/income-tax/income-house-properties.html

COURSECODE	COURSE TITLE	L	T	P	C
23198DSC 54	Auditing and Corporate Governance	4	0	0	3

OBJECTIVE:

To enable student to understand process of auditing and its classification. To impart knowledge on internal check and internal control. To illustrate the role of auditors in company. To help students understand the framework, theories and models of Corporate Governance. To provide insights into the concept of Corporate Social Responsibility

UNIT-I

Introduction to Auditing

Meaning and Definition of Auditing – Distinction between Auditing and Accounting – Objectives – Advantages and Limitations of Audit – Scope of Audit – Classifications of Audits – Audit of For Profit enterprises and Non-profit Organizations.

UNIT-II

Audit Procedures and Documentation

Audit Planning – Audit Programme – Procedures - Internal Audit - Internal Control – Internal Check System – Vouching – Cash and Trade Transactions - Verification of Assets and Liabilities and its Valuation

UNIT-III

Company Auditor

Appointment and Removal of Auditors – Rights, Duties and Liabilities of Auditor – Audit Report - Recent Trends in Auditing - Information Systems Audit (ISA) – Auditing around the computer – Auditing through the computer - e-audit tools.

UNIT-IV

Introduction to Corporate Governance

Conceptual Framework of Corporate Governance: Theories & Models, Broad Committees - Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance Problems Noticed in various Corporate Failures. Introduction to Environment, Social and Governance (ESG - Code of Conduct – Directors and Auditors

UNIT-V

Corporate Social Responsibility

Concept of CSR, Corporate Philanthropy, Strategic Relationship of CSR with Corporate Sustainability - CSR and Business Ethics, CSR and Corporate Governance - CSR Provisions under the Companies Act, 2013 (Section 135 schedule - VII). – CSR Policy Rules

OUTCOMES:

- Define auditing and its process.
- Compare and contrast essence of internal check and internal control
- Identify the role of auditors in companies.
- Define the concept of Corporate Governance.
- Appraise the implications of Corporate Social Responsibility

Textbooks

Dinkar Pagare, Principles and Practice of Auditing, Sultan Chand & Sons, New Delhi

B.N. Tandon, S. Sudharsanam & S. Sundharabahu, Practical Auditing, S. Chand & Sons New Delhi.

Dr. T.R. Sharma, Dr. Gaurav Sankalp, Auditing & Corporate Governance, Sahitya Bhawan Publications, Agra

Aruna Jha, Auditing & Corporate Governance, Taxmann Publication Pvt. Ltd, New Delhi.

Reference Books

Kevin Keasey, Steve Thompson & Mike Wright, Governance & Auditing, Emerald Group Publishing Limited, Bingley

Dr. T.R. Sharma, Auditing, Sahitya Bhawan Publications, Agra

C.B. Gupta, Neha Singhal, Auditing & Corporate Governance, Scholar Tech Press, New Delhi.

Shri. Vengadamani, Practical Auditing, Margham Publication, Chennai.

NOTE: Latest Edition of Textbooks May be Used

Web Resources

<https://www.wallstreetmojo.com/audit-procedures/>

<https://theinvestorsbook.com/company-auditor.html>

<https://www.investopedia.com/terms/c/corp-social-responsibility.asp>

COURSECODE	COURSETITLE	L	T	P	C
23198DSC55A	Financial management	3	0	0	3

OBJECTIVES:

- To introduce the concept of financial management. To learn the capital structure theories.
- To gain knowledge about techniques in capital budgeting. To learn about dividend payment models.
- To understand the needs and calculation of working capital in an organization.

UNIT-I

Introduction

Meaning and Objectives of Financial Management – Functions of Financial Management. Finance - Sources of Finance - Role of Financial Manager - Financial Goals- Profit maximization Vs. Wealth Maximization – Concept of Time Value Money – Risk and Return – Components of Financial Management.

UNIT-II

Financial Decision

Capital Structure – Definition - Meaning - Theories - Factors determining Capital Structure – Various approaches of Capital structure

Cost of Capital – Meaning – Factors determining cost of capital - Methods - Cost of Equity Capital – Cost of Preference Capital – Cost of Debt – Cost of Retained Earnings – Weighted Average (or) Composite Cost of Capital (WACC) Leverage – Concept – Operating and Financial Leverage

UNIT-III

Investment Decision

Capital Budgeting - Meaning - Process – Cash Flow Estimation Capital Budgeting Appraisal Methods: Traditional Methods - Payback Period – Accounting Rate of Return (ARR).

Discounted Cash-flow Methods: Net Present Value (NPV) – Internal Rate of Return – Profitability Index. UNIT-

IV

Dividend Decision

Meaning – Dividend Policies – Factors Affecting Dividend Payment – Provisions on Dividend Payment in Company Law – Dividend Models - Walter's Model - Gordon's Model – M & M Model.

UNIT-V

Working Capital Decision

Working Capital - Meaning and Importance – Classification - Working Capital Cycle - Factors Influencing Working Capital – Determining Working Capital - Management of Current Assets: Inventories, Accounts Receivables and Cash.

OBJECTIVES:

Recall the concepts
in financial management. Apply the
various capital structure theories.
Apply capital budgeting techniques to evaluate investment proposals. Determine dividend pay-outs
Estimate the working capital of an organization

Textbooks
R.K.Sharma, Shashi K Gupta, Financial Management, Kalyani Publications, New Delhi.
M.Y.Khan and P.K.Jain, Financial Management, McGraw Hill Education, Noida.
I.M.Pandey, Financial Management, Vikas Publications, Noida.
Dr.S.N.Maheshwari, Elements of Financial Management, Sultan Chand & Sons, New Delhi.
Dr.Kulkarni and Dr.Sathya Prasad, Financial Management, Himalaya Publishing House, Mumbai.
Reference Books
Prasanna Chandra, Financial Management, Tata McGraw Hill, New Delhi.
I.M.Pandey, Financial Management, Vikas Publishing, Noida.
Khan & Jain, Financial Management, Sultan Chand & Sons, New Delhi.
A.Murthy, Financial Management, Margham Publications, Chennai.
J.Srinivasan and P.Periyasamy, Financial Management, Vijay Nicole Publishers, Chennai.

COURSECODE	COURSE TITLE	L	T	P	C
23198DSC55B	Disaster Management	3	0	0	3

Objective:

1. To provide basic conceptual understanding of disasters.
2. To understand approaches of Disaster Management
3. To build skill to respond to disaster

Unit: I Definition and types of disaster

Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters, earthquakes, floods, drought, landside, landsubside, cyclones, volcanoes, tsunamis, avalanches, global climate extremes. Man-made disasters: Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires.

Unit: II Study of Important disasters

Earthquakes and its types, magnitude and intensity, seismic zones of India, major fault systems of India plate, flood types and its management, drought types and its management, landside and its management case studies of disasters in Sikkim (e.g. Earthquakes, Landside). Social Economics and Environmental impact of disasters.

Unit: III Mitigation and Management techniques of Disaster

Basic principles of disasters management, Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warning Systems, Building design and construction in highly seismic zones, retrofitting of buildings.

Unit: IV Training, awareness program and project on disaster management

Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management, Mini project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas.

OUTCOMES:

- Develop a deep understanding of disaster resilience, risk mitigation, and recovery policies as they arise from natural hazards around the globe; Develop the capacity to participate in debates on disaster governance and societal reconstruction.

Text Books:

1. Disaster Management Guidelines, GOI-UNDD Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S. and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
5. Modh S. (2010) Managing Natural Disasters, MacMillan publishers India LTD.

COURSECODE	COURSETITLE	L	T	P	C
23198DSC56A	SOFTWARE ENGINEERING AND UML LAB	3	0	1	3

OBJECTIVES

- To introduce the software development lifecycle
- To introduce concepts related to structured and object oriented analysis & design
- To provide an insight into UML and software testing techniques

UNIT-I

Introduction–Evolution–Software Development projects– Emergence of Software Engineering. Software Life cycle models – Waterfall model – Rapid Application Development– Agile Model– Spiral Model.

UNIT-II

Requirement Analysis and Specification– Gathering and Analysis– SRS– Formal System Specification.

UNIT-III

Software Design – Overview – Characteristics – Cohesion & Coupling – Layered design – Approaches Function Oriented Design– Structured Analysis– DFD– Structured Design– Detailed design

UNIT-IV

Object Modeling using UML– OO concepts– UML– Diagrams– Use case, Class, Interaction, Activity, State Char Postscript.

UNIT-V

Coding & Testing– coding– Review– Documentation– Testing– Black-box, White-box, Integration, OO Testing, Smoke testing.

OUTCOMES:

- The student should be able to specify software requirements, design the software using tools
- To write test cases using different testing techniques.

Textbooks	
1	Rajib Mall, “Fundamentals of Software Engineering”, PHI 2018, 5th Edition.
2	Roger S. Pressman, “Software Engineering- A Practitioner’s Approach”, McGraw Hill 2010, 7th Edition.
Reference Books	
1	Pankaj Jalote, “An Integrated Approach to Software Engineering”, Narosa Publishing House 2011, 3rd Edition.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	

1	NPTEL online course – Software Engineering - https://nptel.ac.in/courses/106105182/
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UML Lab Common for both Electives in semester V	Core-Core-S5EC1/2L
Credits 4	Lecture Hours: 5 per week
Learning Objectives: (for teachers: what they have to do in the class/lab/field) <ul style="list-style-type: none"> • To get familiarized to the usage of UML toolkit. • To understand the requirements of the software and to map them appropriately to subsequent phases of the software development • To develop the ability to verify and validate their designs 	
Course Outcomes: (for students: To know what they are going to learn) <p>CO1: Students must be able to analyse and design the problem at hand.</p> <p>CO2: Students should be able to use UML tools for the designing the software and test the correctness and soundness of their software through testing tools.</p>	

LIST OF PRACTICALS
Using UML tools produce analysis and design models for <ol style="list-style-type: none"> Library Management System Automatic Teller Machine Student Information Management Matrimony Service Stock Management System

Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC /TRB/NET/UGC–CSIR/ GATE/TNPSC/other to be solved (To be discussed during the Tutorial hour)
Skills acquired from the Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC–CSIR/GATE/TNPSC/otherstobesolved(TobediscussedduringtheTutorialhour)
Skills acquired from the Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
<p>Learning Resources:</p> <p>Recommended Texts</p> <ol style="list-style-type: none"> 1. Roger D. Peng, "R Programming for Data Science", 2012 2. Norman Matloff, "The Art of R Programming - A Tour of Statistical Software Design", 2011 <p>Reference Books</p> <ol style="list-style-type: none"> 1. Garrett G. Grolemund, Hadley Wickham, "Hands-On Programming with R: Write Your Own Functions and Simulations", 1st Edition, 2014 2. Venables, W.N., and Ripley, "S programming", Springer, 2000. 	

SEMESTER-V
COMMUNICATION SKILLS

CourseCode	CourseTitle	L	T	P	C
23198DSC56B	OBJECTORIENTEDANALYSIS ANDDESIGNAND UMLLAB	3	0	1	3

Objectives:

- Tomakeawareofthesoftwarerequirements,designthesoftwareusingtools
- Tobeacquaintedwiththewritingoftestcasesusingdifferenttestingtechniques

Unit-I

ObjectOrientation–Systemdevelopment–Reviewofobjects- inheritance- Object relationship – Dynamic binding – OOSD life cycle – Process – Analysis – Design – prototyping – Implementation – Testing-OverviewofMethodologies

Unit-II

Rambaugh methodology, OMT – Booch methodology, Jacobson methodology – patterns – Unified approach – UML–Class diagram–Dynamicmodelling.

Unit-III

Introduction - UML – Meta model - Analysis and design - more information.
OutlineDevelopmentProcess:Overviewoftheprocess-Inception-Elaboration-
construction-refactoringpatternstransmission-iterative development-use cases.

Unit-IV

OODesignaxioms–Classvisibility–refiningattributes–Methods–Access layer–OODBMS–Table–
classmappingviewlayer

Unit-V

Interactiondiagram-packagediagram-statediagram-activitydiagram-
deploymentdiagram-UMLandprogramming

CourseOutcomes

Thestudentshouldbeabletospecifysoftwarerequirements,
designthesoftwareusingtoolsTowritetestcases usingdifferenttestingtechniques.

Textbooks	
1	Ali Bahrami, “Object Oriented System Development”, McGraw-Hill International Edition 2017.
2	Martin Fowler, Kendall Scott, "UML Distilled", Addison Wesley
3	Eriksson, "UML Tool Kit", Addison Wesley
Reference Books	
1	Booch G., “Object oriented analysis and design”, Addison- Wesley Publishing Company 3rd edition.
2	Rambaugh J, Blaha M. Premeriani, W., Eddy F and Loesen W., “Object Oriented Modeling and Design”, PHI
NOTE: Latest Edition of Textbooks May be Used	

UML Lab Common for both Electives in semester V	Core-Core-S5EC1/2L
Credits 4	Lecture Hours: 5 per week
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> • To get familiarized to the usage of UML toolkit. • To understand the requirements of the software and to map them appropriately to subsequent phases of the software development • To develop the ability to verify and validate their designs 	
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: Students must be able to analyse and design the problem at hand. CO2: Students should be able to use UML tools for the designing the software and test the correctness and soundness of their software through testing tools.</p>	

LIST OF PRACTICALS
Using UML tools produce analysis and design models for
a. Library Management System
b. Automatic Teller Machine
c. Student Information Management
d. Matrimony Service
e. Stock Management System

SEMESTER-VI

COURSECODE	COURSE TITLE	L	T	P	C
23198AEC61	Cost Accounting-II	6	1	0	3

.OBJECTIVES

To understand the standards in Cost Accounting To know the concepts of contract costing.

To be familiar

with the concept of process costing To learn about operation costing.

To gain insights into standard costing.

UNIT-I

Cost Accounting Standards

An Introduction to CAS – Purpose of CAS – Advantages of CAS – Difference between CAS and FAR Regulations – Different Degrees of CAS Coverage – Cost Accounting Standards - Responsibility Accounting and Divisional Performance Measurement.

UNIT-II

Job Costing, Batch Costing and Contract Costing

Definitions - Features - A Comparison - Calculation of Profit on Contracts – Cost Plus Contract - Preparation of Contract A/c.

UNIT-III

Process Costing

Process Costing – Meaning – Features of Process Costing – Application of Process Costing – Fundamental Principles of Process Costing – Preparation of Process Accounts - Treatment of Loss and Gain: Normal and Abnormal Loss - Abnormal Gain - Concept of Equivalent Production - Joint Products and By Products.

UNIT-IV

Operation Costing

Operation Costing – Meaning – Preparation of Operating Cost Sheet – Transport Costing – Power Supply Costing – Hospital Costing – Simple Problems.

UNIT-V

Standard Costing and Variance Analysis

Definition – Objectives – Advantages – Standard Cost and Estimated Cost – Installation of Standard Costing System – Variance Analysis – Material, Labour, Overhead, and Sales Variances – Calculation of Variances.

Course Outcomes

- Remember and recall standards in cost accounting
- Apply the knowledge in contract costing
- Analyze and assimilate concepts in process costing
- Understand various bases of classification cost and prepare operating cost statement.
- Set up standards and analyze variances.

Textbooks
Jain S.P. and Narang K.L. Cost Accounting. Kalyani Publishers. New Delhi.
Khanna B.S., Pandey I.M., Ahuja G.K., and Arora M.N., Practical Costing, S Chand & Co, New Delhi.
Dr. S.N. Maheswari, Principles of Cost Accounting, Sultan Chand publications, New Delhi.
T.S. Reddy and Y. Hari Prasad Reddy, Cost Accounting, Margham publications, Chennai.
S.P. Iyengar, Cost Accounting, Sultan Chand Publications, New Delhi.
Reference Books
Polimeni, Cost Accounting: Concepts and Applications for Managerial Decision Making, New York, McGraw-Hill, Noida.
Jain S.P. and Narang K.L. Cost Accounting, Kalyani Publishers, New Delhi.
V.K. Saxena and C.D. Vashist, Cost Accounting, Sultan Chand publications, New Delhi.
Murthy A & Gurusamy S, Cost Accounting, Vijay Nicole Imprints Pvt. Ltd. Chennai.
Prasad. N. K. and Prasad. V. K., Cost Accounting, Book Syndicate, Bangladesh.
NOTE: Latest Edition of Textbooks May be Used
Web Resources
https://www.economicdiscussion.net/cost-accounting/contract-costing/32597
https://www.wallstreetmojo.com/process-costing/
https://www.accountingnotes.net/cost-accounting/operating-costing/17755

COURSECODE	COURSE TITLE	L	T	P	C
23198AEC62	Management Accounting	6	2	0	3

OBJECTIVES:

To understand basics management accounting

To know the aspects of Financial Statement Analysis To

familiarize with fund

flow and cash flow analysis To learn about budgetary con

trol

To gain insights into marginal costing.

Unit—I

Introduction to Management Accounting

Management Accounting – Meaning – Scope – Importance – Limitations –

Management Accounting Vs Cost Accounting – Management Accounting Vs Financial Accounting.

Analysis and Interpretation of Financial Statements – Nature and Significance – Types of Financial Analysis – Tools of Analysis – Comparative Statements – Common Size Statement – Trend Analysis.

Unit - II

Ratio Analysis

Ratio Analysis: Meaning – Advantages – Limitations – Types of Ratios – Liquidity Ratios – Profitability Ratios – Turnover Ratios – Solvency Ratios – Leverage Ratios – Preparation of Financial Statements from Ratios.

Unit—III

Funds Flow & Cash Flow Analysis

Introduction, Meaning of Funds Flow Statement – Ascertainment of Flow of Funds – Schedule of Changes in Working Capital – Adjusted Profit and Loss Account – Preparation of Funds Flow Statement.

Cash Flow Statement: Meaning – Advantages – Limitations –

Preparation of Cash Flow Statement as per AS

3 – Cash Flow from Operating, Financing and

Investing activities.

Unit —IV

Budget and Budgetary Control

Meaning – Preparation of Various Budgets – Cash Budget – Flexible Budget – Production Budget – Sales Budget – Master Budget – Budgetary Control – Benefits **Unit—V**

Capital Gains: Basis of charge — Cost of acquisition, cost of improvement — exempted capital gain — computation of capital gain — Income from other sources — Chargeability — deductions — Computation of Income under other sources.

Unit —V

Marginal Costing: Meaning - Features – Marginal Costing vs Absorption Costing - Fixed Cost, Variable Cost and Semi Variable Cost- Contribution- Marginal Cost Equation- P/V Ratio - Break Even Point - Margin of Safety–Cost-Volume Profits Analysis.

Decision Making: Selection of a Product Mix– Make or Buy Decision–Discontinuance of a product line – Change of Status quo–Limiting Factor or Key Factor.

Course Outcomes

- Remember and recall basics in management accounting
- Apply the knowledge of preparation of Financial Statements
- Analyse the concepts relating to fund flow and cash flow
- Evaluate techniques of budgetary control
- Formulate criteria for decision making using principles of marginal costing

Textbooks

Jain S.P. & Narang K.L. (2018) Cost and Management Accounting, Kalyani Publications,

Rds. Maheswari, Cost and Management Accounting, Sultan Chand Sons Publications, New Delhi.

Sharma and Shashi K. Gupta, Management Accounting, Kalyani Publishers, Chennai.

Jenitra L Mervin, Dasilton L Cecil, Management Accounting, Lerantec Press, Chennai.

T.S. Reddy & Y. Hari Prasad Reddy, Management Accounting, Margham Publications, Chennai.

Reference Books

Chadwick – The Essence of Management Accounting, Financial Times Publications, England.

Charles T. Horngren and Gary N. Sundem – Introduction to Management Accounting, Pearson, Chennai.

Murthy A and Gurusamy S, Management Accounting- Theory & Practice, Vijay Nicole Imprints Pvt. Ltd. Chennai.

Hansen-Mowen, Cost Management Accounting and Control, South Western College, India.

N.P.Srinivasan, Management Accounting, New Age publishers, Chennai.

NOTE: Latest Edition of Textbooks May be Used

Web Resources

<https://www.accountingnotes.net/companies/fund-flow-analysis/fund-flow-analysis-accounting/13300>

<https://accountingshare.com/budgetary-control/>

<https://www.investopedia.com/terms/m/marginalcostofproduction.asp>

COURSE CODE	COURSE TITLE	L	T	P	C
23198AEC63	Income Tax Law and Practice -II	6	2	0	3

OBJECTIVES

To understand provisions relating to capital gains

To know the provisions for computation of income from other sources.

To familiarize law relating to set off and carry forward of losses and deductions from Gross Total Income. To learn about assessment of individuals

To gain knowledge about assessment procedures.

UNIT-I:

Capital Gains

Capital Assets – Transfer – Short term vs Long term capital assets – Computation of Capital Gains – Exemption under Section 54, 54B, 54D, 54EC, 54F, 54GA.

UNIT-II:

Income From Other Sources & Clubbing of Income

Chargeability - Computation of Income from Other Sources – Deductions Allowed – Clubbing of Income – Concept.

UNIT-III:

Set Off and Carry Forward of Losses and Deductions From Gross Total Income

Gross Total Income vs Total Income - Provisions for Set-off and Carry Forward of Losses (Simple Problems). Deductions U/S 80C, 80CC, 80CCB, 80CCC, 80CCD, 80CCE, 80D, 80DD, 80DDB, 80E, 80EE, 80EEA, 80EEB, 80G, 80GG, 80GGA, 80TTA, 80TTB, and 80U only. **UNIT-IV:**

Forms, reports, properties, wizards, macros, Access requirements, starting & quitting access, the access workspace & toll view ws.

UNIT-IV:**Computation of Total Income – Individual**

Computation of Total Income - Tax Liability of an Individual (Old regime vs New regime)

UNIT-V:**Income Tax Authorities**

Administration of Income Tax Act – Income Tax Authorities – Powers of CBDT – Powers of Income Tax Officer - Procedure for Assessment – Filing of Return – Due Dates of Filing – Voluntary Filing – Return of Loss – Belated Return – Defective Return – Signing of Return – Permanent Account Number (PAN), e-PAN – Tax credit statement (26AS) and Annual Information Statement (AIS).

OUTCOME:

Remember and recall provisions on capital gains
Apply the knowledge about income from other sources
Analyse the set off and carry forward of losses provisions
Learn about assessment of individuals
Apply procedures learnt about assessment procedures

Textbooks

V.P.Gaur, Narang, Puja Gaur and Rajeev Puri - Income Tax Law and Practice, Kalyani Publishers, New Delhi.
T.S. Reddy and Hari Prasad Reddy, Income Tax Law and Practice, Margham Publications, Chennai.
Dinkar Pagare, Income Tax Law and Practice, Sultan & Chand Sons, New Delhi.
Mehrotra H.C, Dr. Goyal S.P, Income Tax Law and Accounts, Sahitya Bhavan Publications, Agra.
T.Srinivasan – Income Tax & Practice – Vijay Nicole Imprints Private Limited, Chennai.

Reference Books

Hariharan N, Income Tax Law & Practice, Vijay Nicole Imprints Pvt. Ltd. Chennai.
Bhagwati Prasad, Income Tax Law and Practice, Vishwa Prakashan, New Delhi.
Vinod K. Singhania, Students Guide to Income Tax., U.K. Bhargava Taxman, New Delhi.

Dr. Vinod K Singhania, Dr. Monica Singhania, Taxmann's Students' Guide to Income Tax, New Delhi.

Mittal Preethi Rani and Bansal Anshika, Income Tax Law and Practice, Sultan & Chand Sons, New Delhi.

NOTE: Latest Edition of Textbooks May be Used

Web Resources

<https://www.investopedia.com/terms/c/capitalgain.asp>

<https://www.incometaxmanagement.com/Direct-Taxes/AY-2021-22/assessment/1-assessment-of-an-individual.html>

<https://www.incometax.gov.in/iec/foportal/>

Course Code	Course Title	L	T	P	C
23198DSE64	Introduction to Oracle and SQL (Theory)	4	0	1	3

Course Objectives:

- Objective: To enable the student to know about Oracle and SQL with practical knowledge

Course Outcomes:

UNIT-I: Introduction to File – Flat File – Advantage and disadvantage of Flat File – Introduction to Database – Types of database structure: Hierarchical Database – Relational Database – Object Relational Database

UNIT-II

Introduction to Relational Database – Relational Database terms: Records – Fields – Tables – Advantage and disadvantage of Relational Database.

UNIT-III

Keys: Primary Key – Foreign Key – Candidate Key – Composite Key – Super Key – Implementation of those keys on tables. UNIT-IV Introduction to Oracle: Creating database – Creating tables – Setting Primary Key and Foreign Keys on tables – Introduction to SQL queries: CREATE, ALTER, DROP, RENAME, TRUNCATE, SELECT statements – Retrieving data – Restricting and Sorting data

UNIT-V

Function – Single Row Function – Group Function – Reporting Aggregated data – Displaying data from multiple tables – Sub Queries.

Text and Reference Books (Latest revised edition):

1. Oracle – backup and recovery handbook publication – Ramavel pure – Tata McGraw Hill.
2. Oracle 8i on Windows NT – Meghraj Thakkar Tech media publications.
3. Oracle power objects handbook Bruce Kolste, David Petersen – Tata McGraw Hill.
4. Oracle 8 – Edwalen and Steve Adrien de Luca – Tech Media publications

COURSECODE	COURSE TITLE	L	T	P	C
23161SEC66	General awareness for Competitive Examinations	2	0	0	1

Objective:

To create the opportunity for learning across different disciplines and build experience for students as they grow into lifelong learners. To know the basic concepts of various disciplines.

UNIT-I

Indian Polity

Basics concepts- Three organs of Indian government (Executives, Legislature, Judiciary), Introduction to Indian Constitution – Salient features of constitution, Preamble, Fundamental rights, Fundamental duties, Directive Principles of State policy, Types of Majority, Amendments to the Constitution, Basic structure Doctrine, Division of subjects between the union and the states local Governance, Elections in India and Election Commission, CAG.

UNIT-II

Geography

Major oceans of the world – Important Canals – Gulfs – Straits and passes – Indian Rivers and its Tributaries – Climatology – Atmosphere, Wind systems, Clouds systems, World climatic classification – Indian climate – Indian Monsoon – Indian's physical features, Indian Soil types and Distribution – Importance of Trade routes and projects, Indian natural vegetation – Indian agriculture – Major crops and its distribution, Indian Industries and its Distribution.

UNIT-III

Economy

National Income – Inflation – Money and Banking - Agriculture in India – Union Budget – Planning in India – Poverty – Unemployment – Inclusive Development and Development issues – Industrial policies – Financial Markets.

UNIT-IV

History

Modern India – formation of Indian National Congress – Morley Minto Reforms, Revolutionary activities – World War I and India's Response – Home Rule League – Montague Chelmsford reforms – Rowlett Act – Non-Cooperation Movement – Simon Commission and Nehru Report – Civil Disobedience Movement and Round Table conferences – Quit India Movement and Demand for Pakistan – Cabinet Mission – Formation of Constituent Assembly and partition of India.

UNIT-V

Environment and Ecology

Basic concepts – Ecology, Biodiversity- Food chain and food web – Bio Geo Chemical Cycles – International Bio Diversity organisations- International Conventions – Conferences and Protocol – Indian Environmental laws and Environment Related Organisation Reference Book:-

Course Outcomes

Develop board knowledge of the different components in polity
Understand the Geographical features across countries and in India
Acquire knowledge on the aspects of Indian Economy
Understand the significance of India's Freedom Struggle
Gain knowledge on Ecology and Environment

Textbooks	
1	Class XI and XII NCERT Geography
2	History – Old NCERT'S Class XI and XII
Reference Books	
1	M. Laxmi Kant (2019), Indian Polity, McGraw-Hill
2	Ramesh Singh (2022), Indian Economy, McGraw-Hill
3	G. C. Leong, Physical and Human Geography, Oxford University Press
4	Majid Hussain - India Map Entries in Geography, GK Publications Pvt, Ltd.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.freebookkeepingaccounting.com/using-excel-in-accounts
2	https://courses.corporatefinanceinstitute.com/courses/free-excel-crash-course-for-finance
3	https://www.youtube.com/watch?v=Nv_Nnw01FaU

SEMESTER-VI

COURSECODE	COURSE TITLE	L	T	P	C
231ACSIKWS	Indian knowledge System	0	0	0	2

OBJECTIVES:

Establish, guide and monitor subject-wise interdisciplinary research groups comprising of researchers from institutes, centers and individuals. Create and promote popularization schemes. Facilitate funding of various projects and develop mechanism to undertake research

Unit I: Introduction to Indian Knowledge System (IKS), Definition, Concept and Scope of IKS (4) 1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in ancient India and in modern India

Unit II: IKS and Indian Scholars, Indian Literature (8) 2.1 Philosophy and Literature (Maharishi Vyas, Manu, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhashkaracharya, Varahamihira and Brahmgupta) 2.3 Medicine and Yoga (Charak, Susruta, Maharishi Patanjali and Dhanwantri) 2.4 Sahitya (Vedas, Upvedas, Upavedas (Ayurveda, Dhanurveda, Gandharvaveda) Puran and Upnishad) and shaddarshan (Vedanta, Nyaya, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma and Meditation) 2.5 Shastra (Nyaya, vyakarana, Krishi, Shilp, Vastu, Natya and Sangeet)

Unit III: Indian Traditional/tribal/ethnic communities, their livelihood and local wisdom (6) 3.1 Geophysical aspects, Resources and Vulnerability 3.2 Resource availability, utilization pattern and limitations 3.3 Socio-Cultural linkages with Traditional Knowledge System 3.4 Tangible and intangible cultural heritage.

Unit-IV
unique Traditional Practices and Applied Traditional Knowledge (8) 4.1 Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives 4.2 Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices

UNIT-V
Protection, preservation, conservation and Management of Indian Knowledge System (4) 5.1 Documentation and Preservation of IKS 5.2 Approaches for conservation and Management of nature and bio-resources 5.3 Approaches and strategies to protection and conservation of IKS

COURSE OUTCOMES:

- Under Ministry of Education, Government of India has established IKS division with a vision to promote interdisciplinary and transdisciplinary research on all aspects of IKS, and disseminate IKS knowledge for further innovations and societal applications



**PONNAIYAH RAMAJAYAM INSTITUTE OF
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U/s 3 of UGC Act, 1956

SCHOOL OF COMMERCE AND BUSINESS MANAGEMENT

DEPARTMENT OF COMMERCE

M.Com. - REGULATION 2023

PROGRAMME OUTCOMES:

PO1: Problem Solving Skill:

Apply knowledge of Management Theories and Human Resource Practices to solve business problems through researching global context.

PO2: Decision Making Skill:

Foster analytical and critical thinking abilities to enable decision-making based on data.

PO3: Ethical Value:

Incorporate quality, ethical and value-based legal perspectives in all organisational activities.

PO4: Employability Skill:

Develop business acumen to enhance employability skills in the competitive environment.

PO5: Entrepreneurial Skill:

Equip with skills and competencies to become an entrepreneur.

PO6: Contribution to Society:

Succeed in career endeavours and contribute significantly to society.

PO7: Communication Skill:

Develop communication, managerial and interpersonal skills.

PO8: Individual and Team Leadership Skill:

Lead oneself and the team to achieve organizational goals.

PO9: Multicultural competence:

Demonstrate knowledge of the values and beliefs of multiple cultures to address issues in the global scenario

PO10: Moral and ethical awareness/reasoning:

Embrace moral and ethical values in one's life,

PO11: Leadership readiness qualities:

Demonstrate to take up leadership mapping out the tasks and formulating an inspiring vision and mission

PO12: Lifelong learning:

Acquire knowledge and skills, including "learning how to learn",

PROGRAMME SPECIFIC OUTCOMES:

PSO1-Entrepreneurship:

Exhibit entrepreneurial ability by enhancing critical thinking, problem solving, decision making and leadership skills that will facilitate start-ups and high potential organizations.

PSO2-Research and Development:

Design and implement accounting, marketing, finance and HR systems and practices grounded in research that comply with mercantile laws, leading the organization towards growth and development.

PSO3 -Contribution to the Society:

Contribute to the development of the society by collaborating with stakeholders for mutual benefit.

PSO4-Placement:

Demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply in diverse frames of decisions and actions.

PSO5-Contribution to Business World:

Facilitate production of employable, ethical and innovative professionals to sustain in the dynamic business world.

PROGRAM EDUCATIONAL OBJECTIVES:

PEO1 -Becomewellversedand competentinthecoreconceptsoftheProgramme

PEO2-Berecognizedforquantitative,qualitative,cognitiveandanalytical skillsto identify,analyze,designand createbusinessopportunitiesinadynamicenvironment ontheGlobalmap.

PEO3-BecomesuccessfulentrepreneursandfinanceprofessionalsinthefieldofBanking,Insurance, Manufacturing, Transport, Telecom, Service, Hospitality, IT and to pursue career inteachingandforadvancedstudies.

PEO4-Contribute to the creation,transmission andapplication of knowledgein thefieldofCommerce and other related fields adapting to a rapidly changing environment through lifelonglearning.

PEO5 - Become with professional integrity and humanitarian values to fulfill the societal needs atregional,state,nationalandgloballevels

Mapping of Course outcomes (COs) with Programme Outcomes (POs) and Programme SpecificOutcomes (PSOs) can be carried out, assigning the appropriate level(1 – Low; 2 – Middle and 3 –High)inthe grids:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PS0 1	PSO 2	PSO 3
CO1									
CO2									
CO3									
CO4									
CO5									

Strong-3

Medium-2

Low -1



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COURSE STRUCTURE

SEMESTER - I					
Course Code	Course Title	L	T	P	C
23261AEC11	Business Finance	6	1	0	5
23261AEC12	Digital Marketing	5	1	0	4
23261AEC13	Banking and Insurance	5	1	0	4
23261DSC14 -	Security Analysis and Portfolio Management	4	1	0	3
	Operations Research				
23261GEC15-	Labour Laws	4	0	0	3
	Strategic Human				
23261RMC16	Research Methodology	2	0	0	2
	Total	26	4	0	21
SEMESTER - II					
23261AEC21	Strategic Cost Management	6	1	0	5
23261AEC22	Corporate Accounting	6	1	0	5
23261AEC23	Setting up of Business Entities	4	0	0	4
23261DSC24 -	Business Ethics and Corporate Sustainability	4	0	0	3
	Audit and Due Diligence				
23261GEC25 -	Rural and Agricultural Marketing	4	0	0	3
	Logistics and Supply Chain Management				
23261BRC26	Participation in Bounded Research	2	0	0	2
23261SEC 27	Principles and Practice of Banking	2	0	0	2
	Total	28	2	0	24
SEMESTER - III					
23261AEC31	Taxation	5	1	0	4
23261AEC32	Digital Advertising	5	1	0	4
23261AEC33	Computer Applications in Business	6	1	0	5

23261AEC34	International Business	4	1	0	4
23261DSC35 -	Strategic Management	3	1	0	3
	International Financial Management				
23261SEC36	Term Paper and Seminar Presentation	2	0	0	2
23261SEC37	Internship/Industrial Activity (Credits)	0	0	0	3
	Total	25	5	0	25
	SEMESTER - IV				
23261AEC41	Corporate and Economic Laws	6	1	0	5
23261AEC42	Human Resource Analytics	5	1	0	4
23261DSC44-	Organizational Behaviour	4	0	0	3
	Insolvency Law and Practice				
23261PRW44	Project with Viva	10	0		7
23261SEC46	Professional Competency Skill	2	0	0	2
	Total	28	2	0	21
	Total				91

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER	COURSE CODE	COURSE TITLE
I	23161DSC14 -	Security Analysis and Portfolio Management
		Operations Research
I	23161DSC15 -	Labour Laws
		Strategic Human Resource Management
II	23161DSC24 -	Business Ethics and Corporate Sustainability
		Audit and Due Diligence
II	23161DSC25 -	Rural and Agricultural Marketing
		Logistics and Supply Chain Management
III	23261DSC35 -	Strategic Management
		International Financial Management
IV	23261DSC44-	Organizational Behaviour
		Insolvency Law and Practice

M.COM CREDIT DISTRIBUTION

SEM	AEC	GEC	DSC	SEC	Research	Total
I	13	03	03	-	02	21
II	14	03	03	02	02	24
III	17	-	03	05	-	25
IV	09	-	03	02	07	21
Total	53	06	12	09	11	91

Course Code	Course Title	L	T	P	C
23261CCI	Core I - Business Finance	7	0	0	5

OBJECTIVES

- To outline the fundamental concepts in finance
- To estimate and evaluate risk in investment proposals
- To evaluate leasing as a source of finance and determine the sources of startup financing
- To examine cash and inventory management techniques
- To appraise capital budgeting techniques for MNCs

UNIT-I

Introduction to Business Finance and Time Value of Money

Business Finance: Meaning, Objectives, Scope - Time Value of Money: Meaning, Causes - Compounding - Discounting - Sinking Fund Deposit Factor - Capital Recovery Factor - Multiple Compounding - Effective rate of interest - Doubling period (Rule of 69 and Rule of 72) - Practical problems.

UNIT-II

Risk Management

Risk and Uncertainty: Meaning - Sources of Risk - Measures of Risk - Measurement of Return - General pattern of Risk and Return - Criteria for evaluating proposals to minimize Risk (Single Asset and Portfolio) - Methods of Risk Management - Hedging currency risk.

UNIT-III

Startup Financing and Leasing

Startup Financing: Meaning, Sources, Modes (Bootstrapping, Angel investors, Venture capital fund)
- Leasing: Meaning – Types of Lease Agreements – Advantages and Disadvantages of Leasing –
Financial evaluation from the perspective of Lessor and Lessee.

UNIT-IV

Cash, Receivable and Inventory Management

Cash Management: Meaning, Objectives and Importance – Cash Cycle – Minimum Operating Cash
– Safety level of cash – Optimum cash balance – Receivable Management: Meaning – Credit policy
– Controlling receivables: Debt collection period, Ageing schedule, Factoring – Evaluating investment in
accounts receivable - Inventory Management: Meaning and Objectives – EOQ with price breaks – ABC
Analysis.

UNIT-V

Multi National Capital Budgeting

Multi National Capital Budgeting: Meaning, Steps involved, Complexities, Factors to be considered
– International sources of finance – Techniques to evaluate multi-
national capital expenditure proposals: Discounted Pay Back Period, NPV, Profitability
Index, Net Profitability Index and Internal Rate of Return – Capital rationing -
Techniques of Risk analysis in Capital Budgeting.

Course Outcomes

- Explain the important finance concepts
- Estimate risk and determine its impact on return
- Examine leasing and other sources of finance for startups
- Summarise cash, receivable and inventory management techniques
- Evaluate techniques of long term investment decision incorporating risk factor

Books for study:

1. Maheshwari S.N., (2019), "Financial Management Principles and Practices", 15th Edition, Sultan Chand & Sons, New Delhi.
2. Khan M. Y & Jain P.K., (2011), "Financial Management: Text, Problems and Cases", 8th Edition, McGraw Hill Education, New Delhi.
3. Prasanna Chandra, (2019), "Financial Management, Theory and Practice", 10th Edition, McGraw Hill Education, New Delhi.
4. Apte P.G., (2020), "International Financial Management" 8th Edition, Tata McGraw

Hill, New Delhi.

Books for reference:

1. Pandey I. M., (2021), "Financial Management", 12th Edition, Pearson India Education Services Pvt. Ltd, Noida.
2. Kulkarni P. V. & Satyaprasad B. G., (2015), "Financial Management", 14th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
3. Rustagi R. P., (2022), "Financial Management, Theory, Concept, Problems", 6th Edition, Taxmann Publications Pvt. Ltd, New Delhi.
4. Arokiamary Geetha Rufus, Ramani N. & Others, (2017), "Financial Management", 1st Edition, Himalaya Publishing House Pvt Ltd, Mumbai.

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1. <https://resource.cdn.icai.org/66674bos53808-cp8.pdf>
2. <https://resource.cdn.icai.org/66677bos53808-cp10u2.pdf>
3. <https://resource.cdn.icai.org/66592bos53773-cp4u5.pdf>
4. <https://resource.cdn.icai.org/65599bos52876parta-cp16.pdf>

Note: Latest edition of the books may be used

Mapping of Course Outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	1	3	3	3	2	2	2
CO2	3	3	2	3	3	3	3	3	3
CO3	2	2	1	2	2	2	3	2	2
CO4	2	2	1	2	2	2	2	2	2
CO5	3	3	2	3	3	3	3	3	3

High -3

Medium-2

Low-1

SEMESTER-I

Course Code	CourseTitle	L	T	P	C
23261CCII	CoreII - DigitalMarketing	5	0	0	5

OBJECTIVES

- Toassesstheevolutionofdigitalmarketing
- Toappraisethedimensionsofonlinemarketingmix
- Toinferthetechniquesofdigitalmarketing
- Toanalyseonlineconsumerbehaviour
- Tointerpretdatafromsocialmediaandtoevaluategamebasedmarketing

UNIT I

IntroductiontoDigitalMarketing

Digital Marketing – Transition from traditional to digital marketing – Rise of internet – Growth of e-concepts – Growth of e-business toadvanced e-commerce – Emergence of digital marketing as atool – Digital marketing channels – Digital marketing applications, benefits and limitations – Factorsfor successofdigitalmarketing–Emergingopportunitiesfordigitalmarketingprofessionals.

UNITII

Onlinemarketingmix

Online marketing mix – E-product – E-promotion – E-price – E-place – Consumer segmentation – Targeting – Positioning – Consumers and online shopping issues – Website characteristics affectingonlinepurchasedecisions– Distributionandimplicationononlinemarketingmixdecisions.

UNITIII

Digitalmediachannels

Digital media channels – Search engine marketing – ePR – Affiliate marketing – Interactive displayadvertising – Opt-in-email marketing and mobile text messaging, Invasive marketing – Campaignmanagement using – Facebook, Twitter, Corporate Blogs – Advantages and disadvantages of digitalmedia channels–Metaversemarketing.

UNIT IV

Online consumer behavior

Online consumer behavior – Cultural implications of key website characteristics – Dynamics of online consumer visit – Models of website visits – Web and consumer decision making process – Data base marketing – Electronic consumer relationship management – Goals – Process – Benefits – Role – Next generation CRM.

UNIT V

Analytics and Gamification

Digital Analytics – Concept – Measurement framework – Demystifying web data - Owned social metrics – Measurement metrics for Facebook, Twitter, YouTube, Slide Share, Pinterest, Instagram, Snapchat and LinkedIn – Earned social media metrics – Digital brand analysis – Meaning – Benefits

– Components – Brand shared dimensions – Brand audience dimensions – Market influence analytics

– Consumer generated media and opinion leaders – Peer review – Word of mouth –

Influence analytics – Mining consumer generated media – Gamification and game based marketing –

Benefits

– Consumer motivation for playing online games.

Course Outcomes

- Explain the dynamics of digital marketing
- Examine online marketing mix
- Compare digital media channels
- Explain online consumer behavior
- Analyse social media data

Books for study:

1. Puneet Singh Bhatia, (2019) “Fundamentals of Digital Marketing”, 2nd Edition, Pearson Education Pvt Ltd, Noida.
2. Dave Chaffey, Fiona Ellis-Chadwick, (2019) “Digital Marketing”, Pearson Education Pvt Ltd, Noida.
3. Chuck Hemann & Ken Burbary, (2019) “Digital Marketing Analytics”, Pearson Education Pvt Ltd, Noida.
4. Seema Gupta, (2022) “Digital Marketing” 3rd Edition, McGraw Hill Publications Noida.
5. Kailash Chandra Upadhyay, (2021) “Digital Marketing: Complete Digital Marketing Tutorial”, Notion Press, Chennai.

6. Michael Branding, (2021) "Digital Marketing", Empire Publications India Private Ltd, New Delhi.

Books for reference:

1. Vandana Ahuja, (2016) "Digital Marketing", Oxford University Press, London.
2. Ryan Deiss & Russ Henneberry, (2017) "Digital Marketing", John Wiley and Sons Inc, Hoboken.
3. Alan Charlesworth, (2014), "Digital Marketing- A Practical Approach", Routledge, London.
4. Simon Kingsnorth, Digital Marketing Strategy, (2022) "An Integrated approach to Online Marketing", Kogan Page Ltd, United Kingdom.
5. Maity Moutusy, (2022) "Digital Marketing" 2nd Edition, Oxford University Press, London.

Web references:

1. <https://www.digitalmarketer.com/digital-marketing/assets/pdf/ultimate-guide-to-digital-marketing.pdf>
2. <https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/educational-technologies/all/gamification-and-game-based-learning>
3. <https://journals.ala.org/index.php/ltr/article/download/6143/7938>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	2	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	3
CO3	3	3	2	2	3	2	3	3	2
CO4	3	3	2	2	3	3	3	3	3
CO5	3	3	1	3	3	2	3	3	2

High –3

Medium–2

Low–1

SEMESTER-I

Course Code	Course Title	L	T	P	C
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23261CCII	CoreIII -BankingandInsurance	6	0	0	4

OBJECTIVES

- To understand the evolution of newer banking
- To explore the digital banking techniques
- To analyse the role of insurance sector
- To evaluate the mechanism of customer service in insurance and the relevant regulations
- To analyse risk and its impact in banking and insurance industry

UNIT-I

Introduction to Banking

Banking: Brief History of Banking - Rapid Transformation in Banking: Customer Shift - Fintech Overview - Fintech Outlook - The Financial Disruptors - Digital Financial Revolution - New Era of Banking. Digital Banking – Electronic Payment Systems – Electronic Fund Transfer System – Electronic Credit and Debit Clearing – NEFT – RTGS – VSAT – SFMS – SWIFT.

UNIT-II

Contemporary Developments in Banking

Distributed Ledger Technology – Blockchain: Meaning - Structure of Block Chain - Types of Block Chain - Differences between DLT and Block chain - Benefits of Blockchain and DLT - Unlocking the potential of Block chain – Crypto currencies, Central Bank Digital Currency (CBDC) - Role of DLT in financial services - AI in Banking: Future of AI in Banking - Applications of AI in Banking - Importance of AI in banking - Banking reimagined with AI. Cloud banking - Meaning - Benefits in switching to Cloud Banking.

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UNIT-III

Indian Insurance Market

History of Insurance in India – Definition and Functions of Insurance – Insurance Contract – Indian Insurance Market – Reforms in Insurance Sector – Insurance Organisation – Insurance organisation structure. Insurance Intermediaries: Insurance Broker – Insurance Agent – Surveyors and Loss Assessors – Third Party Administrators (Health Services) – Procedures – Code of Conduct.

UNIT-IV

Customer Services in Insurance

Customer Service in Insurance – Quality of Service - Role of Insurance Agents in Customer Service – Agent’s Communication and Customer Service – Ethical Behaviour in Insurance – Grievance Redressal System in Insurance Sector – Integrated Grievance Management System – Insurance Ombudsman - Insurance Regulatory and Development Authority of India Act (IRDA) – Regulations and Guidelines.

UNIT-V

Risk Management

Risk Management and Control in banking and insurance industries – Methods of Risk Management – Risk Management by Individuals and Corporations – Tools for Controlling Risk.

Course Outcomes

- Relate the transformation in banking from traditional to new age
- Apply modern techniques of digital banking
- Evaluate the role of insurance sector
- Examine the regulatory mechanism
- Assess risk mitigation strategies

Books for study:

1. Indian Institute of Banking and Finance (2021), “Principles & Practices of Banking”, 5th Edition, Macmillan Education India Pvt. Ltd, Noida, Uttar Pradesh.
2. Mishra MN & Mishra SB, (2016), “Insurance Principles and Practice”, 22nd Edition, S. Chand and Company Ltd, Noida, Uttar Pradesh.
3. Emmett, Vaughan, Therese Vaughan M., (2013), “Fundamentals of Risk and

Insurance”, 11th Edition, Wiley & Sons, New Jersey, USA.

4. [TheoLynn, JohnG.Mooney, PierangeloRosati, MarkCummins](#) (2018), *Disrupting Finance: FinTech and Strategy in the 21st Century* (Palgrave Studies in Digital Business & Enabling Technologies), Macmillan Publishers, New York (US)

Books for reference:

1. Sundharam KPM & Varshney P.N., (2020), “Banking Theory, Law and Practice”, 20th Edition, Sultan Chand & Sons, New Delhi.
2. Gordon & Natarajan, (2022), “Banking Theory, Law and Practice”, 9th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
3. Gupta P.K. (2021), “Insurance and Risk Management” 6th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
4. Susanne Chishti., & Janos Barberis (2016), *The Fintech book: The financial technology handbook for investors, entrepreneurs and visionaries.* John Wiley & Sons.

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1. <https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology>
2. [https://mrcet.com/downloads/digital_notes/CSE/IV%20Year/CSE%20B.TECH%20I%20V%20YEAR%20II%20SEM%20BCT%20\(R18A0534\)%20NOTES%20Final%20PDF.pdf](https://mrcet.com/downloads/digital_notes/CSE/IV%20Year/CSE%20B.TECH%20I%20V%20YEAR%20II%20SEM%20BCT%20(R18A0534)%20NOTES%20Final%20PDF.pdf)
3. https://www.irdai.gov.in/ADMINCMS/cms/frmGeneral_Layout.aspx?page=PageNo108&flag=1

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	2	2	1	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3
CO3	2	2	1	2	2	2	2	3	2
CO4	3	2	2	1	2	2	2	3	2
CO5	3	3	1	3	3	3	3	3	3

High –3

Medium–2

Low–1

SEMESTER-I

Course Code	Course Title	L	T	P	C
23261GDSI	Elective I A- Security Analysis and Portfolio Management	5	0	0	3

OBJECTIVES

- To become familiar with various Investment avenues and Portfolio Construction
- To understand the Equity Shares, Preference Shares and Bonds valuation models
- To learn about long-term and short-term investment analysis tools.
- To analyse with Portfolio theories.
- To gain knowledge in Portfolio performance methods.

UNIT-I

Investment and Portfolio Management

Investment – Meaning – Nature and scope of Investment – Investment vs Speculation – Type of Investors – Investment Avenues – Factors influencing the investment choice – Portfolio Management: Meaning and significance, Active Vs. Passive portfolio management - Strategic Vs. Tactical asset allocation - Factors Affecting Investment Decisions in Portfolio Management.

UNIT-II

Valuation of Securities

Bond: Introduction – Reasons for issuing Bonds – Features of Bond – Types of Bonds – Determinants of bond safety – Bond Prices, Yields and Interest Rates – Measuring Price Volatility of Bonds – Macaulay Duration and Modified Duration - Preference Shares: Introduction – Features of Preference Shares – Preference Shares Yield – Holding Period Return – Yield to Call – Concept of Present Value – Equity Share Valuation Models.

UNIT-III

Fundamental Analysis and Technical Analysis

Fundamental Analysis: Objectives – Economic Analysis, Industry Analysis, Company Analysis – Technical Analysis: Meaning – Assumptions – Pros and Cons of technical analysis – Differences between fundamental analysis and technical analysis – Dow Theory – Types of Charts – Chart Patterns – Trend Analysis – Support Line and Resistance Line – Volume Analysis – Indicators and Oscillators – Simple Moving Average – Exponential Moving Average – Relative Strength Index – Bollinger Band – Elliott Wave Theory.

UNIT- IV

Efficient Market Hypothesis

Efficient Market Hypothesis – Markowitz Model, Arbitrage Pricing Theory – Sharpe's Single Index Portfolio Selection Method – Capital Asset Pricing Model (CAPM).

UNIT-V

Portfolio Performance Evaluation

Portfolio Performance Evaluation – Meaning – Need for Evaluation – Methods of Calculating Portfolio Return – Sharpe's Ratio – Treynor's Ratio – Jensen's Differential Returns – Portfolio Revision – Need for Portfolio Revision – Formula Plans.

Course Outcomes

- Examine investment options and structure a portfolio
- Assess the value of Equity Shares, Preference Shares and Bonds
- Examine stock performance through fundamental and technical analysis
- Examine the various Portfolio Theories.
- Evaluate the portfolio performance.

Books for study:

<ol style="list-style-type: none"> 1. PrasannaChandra(2021),“InvestmentAnalysisandPortfolioManagement”,6th Edition,McGrawHill,Noida,UP 2. RustagiRP(2022),“InvestmentAnalysisandPortfolioManagement”,5thEdition,Sultan Chand&Sons,NewDelhi 3. BhallaV.K.(2019),“InvestmentManagement”,19thEdition,S.Chand&Co.Ltd., NewDelhi
<p>Booksforreference:</p> <ol style="list-style-type: none"> 1. DonaldE.Fischer,RonaldJ.Jordan,Ashwini.K.Pradhan(2018),“SecurityAnalysisPortf olioManagement”,7thEdition,PearsonPublication Pvt.Ltd.,India,Noida 2. AvadhaniV.A.(2016),“SecuritiesAnalysisandPortfolioManagement”,12thEdition,Hi malayaPublishingHouse,Mumbai 3. RanganathanM.andMadhumathiR(2012),“SecurityAnalysisandPortfolioManagemen t”,2ndEdition.,PearsonEducationIndia PvtLtd,Noida 4. Punithavathy Pandian (2019),“SecuritiesAnalysisandPortfolioManagement”,Himalaya PublishingHouse,Mumbai 5. Subrata Mukherjee(2021),“SecurityAnalysisandPortfolio Management”, S.Chand&Co.Ltd,NewDelhi
<p>Webreferences:</p> <ol style="list-style-type: none"> 1. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_SAPM_Lecture_Notes .pdf 2. https://www.studocu.com/in/document/galgotias-university/equity-portfolio-management/portfolio-management-lecture-notes-1-10/17701348 3. https://www.educba.com/fundamental-analysis-vs-technical-analysis

Note:Latest editionofthebooksmay beused

MappingofcourseoutcomeswithPOsandPSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	1	3	2	3	2	2	3
CO2	3	3	1	3	2	3	2	3	2
CO3	3	3	2	3	2	3	2	3	2
CO4	2	3	1	3	2	2	2	3	2
CO5	3	3	1	3	2	2	2	3	2

High –3

Medium–2

Low–1

SEMESTER-I

Course Code	CourseTitle	L	T	P	C
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23261GDSI	I B-Operations Research	5	0	0	3
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OBJECTIVES

- To outline the fundamentals of Operations Research
- To use OR models for problem solving
- To examine the role of sequencing and game theory
- To design and apply network analysis
- To apply modelling techniques

UNIT I

Introduction and Linear Programming Problem

Introduction to Operations Research – Uses and Limitations – Linear Programming Problem: Formulation, Solving LPP: Graphical method, Simplex method, the Big-M Method.

UNIT II

Transportation and Assignment Problems

Transportation problem: Introduction – Assumptions – Formulation of Transportation models – Basic feasible solution (North-West Corner Method, Least Cost Method, Vogel's Approximation Method) – Optimal solution (Stepping-Stone Method, Modified Distribution Method) – Degeneracy in Transportation problem. Assignment Problem: Introduction – Comparison with the Transportation problem – Formulation of assignment problems – The Hungarian method of solution.

UNIT III

Sequencing and Game Theory

Sequencing problem: Introduction – Assumptions – Processing of n jobs through one machine – Processing n jobs through two machines – Processing of n jobs through three machines. Game Theory: Introduction – Rules for Games theory – Two person zero sum game without saddle point – Mixed strategies ($2 \times n$ games, $m \times 2$ games) – Graphical method ($2 \times n$, $m \times 2$ games).

UNIT IV

Replacement and Network Analysis

Replacement: Introduction – Individual replacement problems – Group replacement problems. Network Analysis: PERT and CPM.

UNIT V

Decision Tree Analysis and Queuing Theory

Decision Tree analysis – Queuing: Introduction –

Applications of queuing models, Waiting time and idle time costs –

Single channel Poisson arrivals with Exponential Service, Infinite population model.

Course outcomes

- Apply Linear Programming
- Identify models for problem solving
- Apply sequencing and game theory
- Apply network analysis to enhance effectiveness
- Examine the models for decision making

Books for study:

1. Gupta P. K. and Hira D. S., (2022) “Operations Research”, 7th Edition, S. Chand, Noida (UP).
2. Kapoor V. K., (2014) “Operations Research”, 9th Edition, Sultan Chand, New Delhi.
3. Natarajan, Balasubramanian and Tamilarasi, (2014) “Operations Research”, 2nd Edition, Pearson Education India, Noida.
4. Kothari C. R., (2022) “An Introduction to Operational Research”, 3rd Edition, S. Chand, Noida (UP)

Books for reference:

1. Tulsian P. C. and Bharat Tulsian, (2022) “Fundamentals of Operations Research (Theory and Practice)”, 3rd Edition, S. Chand, Noida (UP).
2. Sharma J. K., (2016) “Operations Research”, 6th Edition, Lakshmi Publications, Chennai.
3. Nagarajan N., (2017) “Text Book of Operations Research: A Self Learning Approach”, New Age Publications, Chennai.
4. Rina Rani Rath, (2021) “Operations Research”, 2nd Edition, Bhavya Books, New Delhi.

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- 1) <https://www.bbau.ac.in/dept/UIET/EMER-601%20Operation%20Research%20Queuing%20theory.pdf>
- 2) [https://mdu.ac.in/UpFiles/UpPdfFiles/2021/Jun/4_06-11-2021_16-06-34_OPERATIONS%20RESEARCH%20TECHNIQUES\(20MAT22C5\).pdf](https://mdu.ac.in/UpFiles/UpPdfFiles/2021/Jun/4_06-11-2021_16-06-34_OPERATIONS%20RESEARCH%20TECHNIQUES(20MAT22C5).pdf)
- 3) <https://repository.up.ac.za/bitstream/handle/2263/25427/02chapter3.pdf?sequence=3>
- 4) <https://hbr.org/1964/07/decision-trees-for-decision-making>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs	PSOs

	1	2	3	4	5	6	1	2	3
CO1	3	3	2	3	3	2	2	3	3
CO2	3	3	1	3	3	3	3	3	3
CO3	3	3	1	3	3	2	3	3	2
CO4	3	3	2	3	3	3	3	3	3
CO5	3	3	1	3	3	2	3	3	2

High -3

Medium-2

Low-1

SEMESTER-I

Course Code	Course Title	L	T	P	C
23261GDSII	Elective IIA-Labour Laws	5	0	0	3

OBJECTIVES

- To Understand the provisions of Trade Unions Act
- To gain knowledge on various measures and provisions relating to employees as per the Factories Act and Equal Remuneration Act
- To become familiar with compensation payable to workmen under different situations and understand the provisions of the Employees State Insurance Act
- To learn different provisions relating to payment of wages and minimum wages to employees
- To understand employee welfare measures with respect to provident fund, gratuity and bonus

UNIT I

Introduction and The Trade Unions Act, 1926

Labour legislations: Origin – Nature – Scope – Need – Objectives – Principles – Labour policy and its special features – Constitution as the basis for labour legislation – The Trade Unions Act, 1926: Definition – Objectives – Deficiencies – Registration of trade union – Cancellation of registration and appeal – Duties and obligations – Rights and privileges – Dissolution.

UNIT II

The Factories Act, 1948 and Equal Remuneration Act, 1976

The Factories Act, 1948: Objects – Definition – Licensing and Registration of factories – Inspecting staff – Health, safety and welfare measures – Provisions relating to hazardous processes – Working hours – Holidays – Annual leave – Employment of women and young persons.
 Equal Remuneration Act – Payment of remuneration at equal rates to men and women workers – Advisory committee – Offences and penalties.

UNIT III

The Workmen's Compensation Act, 1923 and The Employees' State Insurance Act, 1948

The Workmen's Compensation Act, 1923: Definitions – Objectives – Disablement – Employer's liability for compensation – Amount of compensation – Disbursement of compensation – Notice and claims – Penalties – The Employees' State Insurance Act 1948: Objects – Definitions – Administration of ESI Scheme – ESIFund – ESICorporation – Medical benefit council – Benefits under the Act – ESI court.

UNIT IV

The Payment of Wages Act, 1936 and The Minimum Wages Act, 1948

The Payment of Wages Act, 1936: Object and Scope – Definition – Procedure regarding payment of wages – Deduction from wages – Mode of payment of wages.

The Minimum Wages Act, 1948: Objects – Scope – Definition – Items to be included in the minimum wages – Fixation and revision of minimum wages – Norms to be followed in the payments of minimum wages.

UNITY

The Provident Fund and Miscellaneous Provisions Act, 1952, The Payment of Gratuity Act, 1972 and The Payment of Bonus Act, 1965

Provident Fund and Miscellaneous Provisions Act, 1952: Definitions – Scope – Nature – Objects – Various schemes – The Payment of Gratuity Act, 1972: Definitions – Scope – Conditions and circumstances of payment – Wages for computing gratuity – Maximum gratuity – Nomination – Penalties – The Payment of Bonus Act: Applicability of the Act – Eligibility and rate of Bonus – Allocable surplus and available surplus – Set and set off – Offences and penalties.

Course Outcomes

- Recall the basic labour legislations pertaining to Trade Unions
- Explain various provisions of the Factories Act and Equal Remuneration Act
- Assess provisions relating to the workmen's compensation and state insurance.
- Examine provisions relating to payment of wages and minimum wages.
- Explain the provisions of provident fund, gratuity and bonus schemes.

Books for study:

1. Mishra S.N. (2018), "Labour & Industrial Laws", 29th Edition, Central Law

Publications, Classic Edition, Allahabad, UP.

2. Srivastava SC (2022), "Industrial Relations and Labour Laws", 8th Edition., Vikas Publishing, New Delhi
3. Tripathi PC, Gupta CB, Kapoor ND (2020), "Industrial Relations and Labour Laws", 6th Edition., Sultan Chand & Sons, New Delhi

Books for reference:

1. Sinha P.R.N., Sinha Indu Bala, Shekhar Seema Priyadarshini (2017), "Industrial Relations, Trade Unions and Labour Legislation", 3rd Edition., Pearson Education India Pvt. Ltd., Noida
2. Piyali Ghosh, Shefali Nandan (2017), "Industrial Relations and Labour Laws", 1st Edition, McGraw Hill, Noida
3. Sharma J.P. (2018), "Simplified Approach to Labour Laws", 5th Edition., Bharat Law House Pvt. Ltd.

Web references:

1. https://www.icsi.edu/media/webmodules/Labour_Laws_&_Practice.pdf
2. https://www.icsi.edu/media/webmodules/LabourLaws&Practice_June_2020.pdf

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	1	3	3	2	1	3	1	1	3
CO2	1	3	3	2	1	3	1	1	3
CO3	1	3	3	3	1	3	1	1	3
CO4	1	3	3	3	2	3	2	1	3
CO5	1	3	3	3	1	3	1	1	3

High –3

Medium–2

Low–1

SEMESTER-I

Course Code	Course Title	L	T	P	C
23261GDSII	IIB- Strategic Human Resource Management	5	0	0	3

OBJECTIVES

- To appreciate the importance of HRM as a field of study and as a central management function
- To understand the implication of HRM on Government regulations and corporate decisions
- To analyse the key elements of the HR functions
- To gain knowledge about the elements, key concepts and terminology of HRM
- To apply the principles and techniques of HRM to the discussion of major personnel issues in case studies.

UNIT I

Introduction to SHRM

SHRM-

Meaning, Features, Evolution, Objectives, Advantages, Barrier to SHRM, SHRM v/s Traditional HRM, Steps in SHRM, Roles in SHRM: Top Management, Front-line Management, HR - Changing Role of HR Professionals.

UNIT II

Model of SHRM

Models of SHRM – High Performance Working Model, High Commitment Management Model, High Involvement Management Model - HR Environment – Environmental trends and HR Challenges - Linking SHRM and Business Performance.

UNIT III

Strategic Planning and Compensation

Resourcing Strategy: Meaning and Objectives - Strategic HR Planning: Meaning, Advantages, Interaction between Strategic Planning and HRP, Managing HR Surplus and Shortages, Strategic Recruitment and Selection: Meaning and Need - Strategic Human Resource Development: Meaning, Advantages and Process - Strategic Compensation as a Competitive Advantage - Rewards Strategies:

Meaning, Importance - Employee Relations Strategy, Retention Strategies, Strategies for Enhancing Employee Work Performance.

UNIT IV

Human Resource Policies

Human Resource Policies – Meaning, Features, Purpose of HR Policies, Process of Developing HR Policies, Factors affecting HR Policies, Areas of HR Policies in Organisation, Requisites of Sound HR Policies–

Recruitment, Selection, Training and Development, Performance Appraisal, Compensation, Promotion, Outsourcing, Retrenchment, Barriers to Effective Implementation of HR Policies and Ways to Overcome these Barriers.

UNIT V

Latest trends in Strategic HRM

Mentoring-Employee Engagement–Meaning, Factors Influencing Employee Engagement, Strategies for Enhancing Employee Engagement - Competency based HRM: Meaning, Types of Competencies and Benefits of Competencies for Effective Execution of HRM Functions - Human Capital Management: Meaning and Role- New Approaches to Recruitment–Employer Branding.

Course outcomes:

- Recall the fundamentals of strategic Human Resource Management
- Examine the conceptual framework of strategic Human Resource Management Models
- Apply the knowledge of various strategies in Human Resource Management in the corporate arena
- Illustrate drafting of HR policies
- Analyse the latest trend in the strategic Human Resource Management.

Books for study:

1. [Mathur, SP](#) Strategic Human Resource Management 1st Edition 2015, New Age International (P) Ltd Publishers, New Delhi.
2. Catherine Truss, David Mankin & Clare Kelliher (2014), “Strategic Human Resource Management”, Oxford University Press, India.
3. Anuradha Sharma and [Aradhana Khandekar](#) (2006), “Strategic Human Resource Management: An Indian Perspective”, Sage Publications Pvt. Ltd, New Delhi.

<p>Books for reference:</p> <ol style="list-style-type: none"> 1. Jean M Phillips & Stan M Gully, "Strategic staffing", Pearson International Edition, India. 2. Ananda Das Gupta (2021), "Strategic Human Resource Management- Formulating and Implementing HR Strategies for a Competitive Advantage", Productivity Press; 1st edition, Routledge
<p>Web references:</p> <ol style="list-style-type: none"> 1. https://emeritus.org/in/learn/what-is-strategic-human-resource-management-shrm/ 2. https://www.shrm.org/resourcesandtools/tools-and-samples/toolkits/pages/practicingstrategichumanresources.aspx 3. https://www.cegid.com/en/blog/5-steps-for-developing-and-implementing-an-effective-hr-strategy-in-2021/ 4. https://www.managementstudyhq.com/hrm-evaluation-approaches.

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO 1	3	3	3	3	3	2	3	2	3
CO 2	3	3	3	3	3	2	3	2	3
CO 3	3	3	3	3	3	2	3	2	3
CO 4	3	3	3	3	3	2	3	2	3
CO 5	3	3	3	3	3	2	3	2	3

High -3

Medium-2

Low-1

Course Code	Course Title	L	T	P	C
23261SEC 1	Principles and Practice of Insurance	3	0	0	2

OBJECTIVES

To enable the students to understand how contract of insurance is entered into and the underlying principles of insurance.

Unit-I

Origin and Development of Insurance

Introduction-Concepts of Risks and Uncertainty-Nature of Insurance-Functions of Insurance-Need for Insurance-Enactment of Insurance Act, 1938.

Unit-II

Basic Principle of Insurance:

Introduction-Utmost Good Faith-Insurable Interest-Indemnity -Corollaries of Indemnity(Contribution and Subrogation)-Proximate Cause-Material Facts to be disclosed-Caveat Emptor - Essentials of Law of contract-Nomination and Assignment.

Unit-III

Life Insurance

Introduction-Present Organizational set-up of Insurance Companies in India-L.I.C. and Private Companies with foreign joint ventures-selling Insurance through Agents and Banks-Objectives of Life Insurance - Protection and Investment - Different types of Life Insurance Policies - Chief characteristics and similarity.

Unit-IV

Procedurefortakingapolicy

Introduction - Selection of the Plan - Consultation of Premium tables - Filling up of Proposal Form - Documentregardingproofofage-ImportantclausesofthePolicy–eg.SuicideClause–Nomination.

Unit-V

GeneralInsurance

Introduction - Relevance of General Insurance to Business - History of General Insurance in India - Items which couldbeinsured- Fire Insurance –Features - Types of Policies - Paymentof ClaimsandDocumentsrequired.

BooksRecommendedforReference:

- InsurancePrinciplesandPractice:M.N.Mishra.
- ElementsofInsurance: Malhotra.R.P.
- LifeInsuranceinIndia:Desai,G.R.
- HandbookofLifeInsurance.
- PrinciplesofInsuranceLaw:M.N.Sreenivasam.

Course Code	Course Title	L	T	P	C
23261CCIV	Core IV - Strategic Cost Management	6	0	0	5

OBJECTIVES

- To analyse the aspects of strategic and quality control management
- To analyse and select cost control techniques
- To apply activity based costing for decision making
- To utilise transfer pricing methods in cost determination
- To apply cost management techniques in various sectors

UNIT I

Introduction to Strategic Cost Management

Introduction to Strategic Cost Management (SCM)– Need for SCM – Differences between SCM and Traditional Cost Management- Value Chain Analysis: Meaning and steps- Quality Cost Management: Meaning of Quality and Quality Management– Cost of Quality– Indian Cost Accounting Standard 21 on Quality Control -Introduction to Lean System –Benefits of Lean System–Just in Time (JIT)–Kaizen Costing.

UNIT II

Cost Control and Reduction

Cost Management Techniques: Cost Control: Meaning and Prerequisites - Cost Reduction: Meaning and Scope – Differences between Cost control and cost reduction - Pareto Analysis: Meaning, importance and applications - Target Costing: Meaning, steps and Principles – Life Cycle Costing: Meaning, Strategies for each stage of product life cycle, Benefits– Learning Curve: Meaning, Learning curve ratio and applications.

UNIT III

ActivityBased CostManagement

ActivityBasedCostManagement:Concept,Purpose,Stages,Benefits,RelevanceinDecisionmakingandits ApplicationinBudgeting–Practicalproblems.

UNITIV

TransferPricing

Transfer Pricing: Meaning, Benefits, Methods: Pricing based on cost, Market price on transfer price,NegotiatedpricingandPricingbasedonopportunitycosts–PracticalProblems.

UNITV

CostManagementinAgricultureandITsector

Agriculture Sector: Features, Cost Structure, Cost Management, Tools to measure the performance,Minimum Support Price and International Perspective –Information Technology Sector: Features,CostStructure,CostManagementandInternationalPerspective.

CourseOutcomes

- ExplainstrategiccostmanagementandQC
- Choosetheappropriatetechniquefor costcontrol
- Makeuseofactivitybasedcostinginpractice
- Choosetransferpricingmethodstosolveproblems
- ConstructcoststructureforAgricultureandIT sector

Booksforstudy:

1. RaviMKishore(2018),“StrategicCostManagement”,5thEdition,TaxmannPublicationsPvt.Ltd,NewDelhi.
2. BandgarP.K.,(2017),“StrategicCostManagement”,1stEdition,HimalayaPublishingHouse PvtLtd,Mumbai.
3. SexenaV.K.,(2020),“StrategicCostManagementandPerformanceEvaluation”,1stEdition,SultanChand&Sons,New Delhi.

Booksforreference:

- 1.JohnKShankandVijayGovindarajan(2008),StrategicCostManagement,Simon&

Schuster; Latest edition, UK

- Jawahar Lal, (2015), "Strategic Cost Management", 1st Edition, Himalaya Publishing House Pvt Ltd, Mumbai.)
- Arora M.N., (2021), "A Text Book of Cost and Management Accounting", 11th Edition, Vikas Publishing House Pvt. Ltd., New Delhi.

Webreferences:

- <https://www.accountingtools.com/articles/strategic-cost-management.html#:~:text=Strategic%20cost%20management%20is%20the,it%20or%20have%20no%20impact.>
- <https://ca-final.in/wp-content/uploads/2018/09/Chapter-4-Cost-Management-Techniques.pdf>
- <https://resource.cdn.icai.org/66530bos53753-cp5.pdf>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	3	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	3	3
CO4	3	3	2	3	3	3	3	2	3
CO5	3	3	1	3	3	3	3	3	3

High -3

Medium-2

Low-1

Course Code	CourseTitle	L	T	P	C
23261CCV	CoreV -CorporateAccounting	6	0	0	5

OBJECTIVES

- To understand the accounting treatment for issue of shares
- To determine profits for fire and marine insurance
- To prepare consolidated financial statements
- To account for price level changes
- To adopt financial reporting standards

UNIT I

Issue of Shares and Final Accounts of Companies

Issue of Shares: ESOPs - ESPS - Sweat Equity Shares - Book Building- Buy-back of Shares - Conversion of debentures into shares - Final accounts of Companies as per Schedule III of the Companies Act, 2013 – Managerial remuneration.

UNIT II

Insurance Company Accounts

Insurance Company Accounts: Types of Insurance - Final accounts of life assurance Companies - Ascertainment of profit- Valuation Balance Sheet- Final accounts of Fire, Marine and miscellaneous Insurance Companies.

Unit III

Consolidated financial statements

Consolidated financial statements as per AS 21: Consolidated Profit and Loss Account – Minority interest – Cost of control – Capital reserve – Inter-company holdings – Preparation of consolidated Balance Sheet.

UNIT IV

Contemporary Accounting Methods

Accounting for price level changes – Social responsibility accounting – Human resource accounting – Forensic Accounting.

UNIT V

Financial reporting

Financial reporting: Meaning, Objectives, Characteristics – Indian Accounting Standards (AS 5, AS 10, AS 19, AS 20) – Corporate Social Responsibility: Meaning, Key provisions of Companies Act, 2013, Accounting for CSR expenditure, Reporting of CSR, Presentation and disclosure in the financial statements.

Course Outcomes

- Determine profit and financial position by preparing financial statements of companies as per schedule III of Companies Act, 2013
- Apply the provisions of IRDA Regulations in the preparation of final accounts of Life Insurance and General Insurance Companies.
- Determine the overall profitability and financial position by preparing consolidated financial statements of holding companies in accordance with AS 21.
- Analyse contemporary accounting methods
- Examine Financial Reporting based on appropriate Accounting Standards and provisions of Companies Act 2013 with respect to Corporate Social Responsibility.

Books for study:

1. Gupta R.L. & Radhaswamy M. (2021), "Corporate Accounting – Volume I & II", 14th Edition, Sultan Chand & Sons, New Delhi.
2. Maheshwari S.N., Sharad K. Maheshwari & Suneel K. Maheshwari, (2022), "Advanced Accountancy – Volume I & II", 11th Edition, Vikas Publishing House Pvt. Ltd., New Delhi.
3. Jain S.P., Narang K.L., Simmi Agrawal and Monika Sehgal (2019), "Advanced Accountancy – Corporate Accounting – Volume – II", 22nd Edition, Kalyani Publishers, New Delhi.
4. Reddy T. S. & Murthy A., (2022), "Corporate Accounting – Volume I & II", 17th Edition, Margham Publications, Chennai.

Books for reference:

1. Arulanandam M.A & Raman K.S., (2021), "Advanced Accounting (Corporate Accounting – II)", 8th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
2. Shukla M.C, Grewal T.S and Gupta S.C, (2022), "Advanced Accounts Volume II", 19th Edition, Sultan Chand & Sons, New Delhi.
3. Gupta R.L., (2022), "Problems and Solutions in Company Accounts", 2nd Edition, Sultan Chand & Sons, New Delhi.

Web references:

1. <https://resource.cdn.icai.org/66550bos53754-p1-cp9.pdf>
2. <https://resource.cdn.icai.org/66545bos53754-p1-cp4.pdf>
3. <https://resource.cdn.icai.org/66638bos53803-cp1.pdf>
4. <http://ppup.ac.in/download/econtent/pdf/MBA%201st%20sem%20Lecture%20note%20on%20forensic%20accounting%20by%20Anjali.pdf>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	2	3	3	3	3	3	3
CO2	3	3	3	3	2	3	2	3	3
CO3	3	3	2	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3

High –3

Medium –2

Low –1

SEMESTER – II

Course Code	Course Title	L	T	P	C
23261CCVI	Core VI -Setting up of Business Entities	6	0	0	4

OBJECTIVES

- To understand the startup landscape and its financing
- To analyse the formation and registration of Section 8 company
- To outline the concept of LLP and business collaboration
- To understand the procedure for obtaining registration and license
- To create awareness about the legal compliances governing business entities

UNIT I

Startups in India

Types of business organisations – Factors governing selection of an organisation – Startups – Evolution – Definition of a Startup – Startup landscape in India – Startup India policy – Fundings support and incentives – Indian states with Startup policies – Exemptions for startups – Lifecycle of a Startup – Important points for Startups – Financing options available for Startups – Equity financing – Debt financing – Venture capital financing – IPO – Crowd funding – Incubators – Mudra banks – Successful Startups in India.

UNIT II

Not-for-Profit Organisations

Formation and registration of NGOs – Section 8 Company – Definition – Features – Exemptions – Requirements of Section 8 Company – Application for incorporation – Trust: Objectives of a trust – Persons who can create a trust – Differences between a public and private trust – Exemptions available to trusts – Formation of a trust – Trust deed – Society – Advantages – Disadvantages – Formation of a society – Tax exemption to NGOs.

UNIT III

Limited Liability Partnership and Joint Venture

Limited Liability Partnership: Definition – Nature and characteristics – Advantages and disadvantages – Procedure for incorporation – LLP Agreement – Annual compliances of LLP – Business collaboration: Definition – Types – Joint venture: Advantages and disadvantages – Types – Joint venture agreement – Successful joint ventures in India – Special Purpose Vehicle – Meaning – Benefits – Formation.

UNIT IV

Registration and Licenses

Registration and Licenses: Introduction – Business entity registration – Mandatory registration – PAN – Significance – Application and registration of PAN – Linking of PAN with Aadhar – TAN – Persons liable to apply for TAN – Relevance of TAN – Procedure to apply for TAN – GST: Procedure for registration – Registration under Shops and Establishment Act – MSME registration – Clearance from Pollution Control Board – FSSAI registration and license – Trade mark, Patent and Design registration.

UNIT V

Environmental Legislations in India

Geographical Indication of Goods (Registration and Protection) Act, 1999: Objectives, Salient Features – The Environmental Protection Act, 1986: Prevention, control and abatement of environmental pollution – The Water (Prevention and Control of Pollution) Act, 1974: The Central and State Boards for Prevention and Control of Water Pollution – Powers and Functions of Boards – Prevention and Control of Water Pollution – Penalties and Procedure – The Air (Prevention and Control of Pollution) Act, 1981: Central and State Boards for The Prevention and Control of Air Pollution – Powers and Functions – Prevention and Control of Air Pollution – Penalties and Procedure.

Course Outcomes

- Compare the various avenues of acquiring finance to set up a business entity
- Recall the legal requirements for Section 8 Company
- Examine the provisions for LLP and joint venture
- Analyse the registration and licensing procedure
- Examine the compliance of regulatory framework regarding environment

Books for study:

1. Kailash Thakur, (2007) "Environment Protection Law and Policy in India", 2nd Edition, Deep & Deep Publication Pvt. Ltd., New Delhi.
2. Avtar Singh, (2015), "Intellectual Property Law", Eastern Book Company, Bangalore
3. Zad N. Sand Divya Bajpai, (2022) "Setting up of Business Entities and Closure" (SUBEC), Taxmann, Chennai
4. Amit Vohra & Rachit Dhingra (2022) "Setting Up Of Business Entities & Closure", 6th Edition, Bharath Law House, New Delhi

Books for reference:

1. Setting up of Business Entities and Closure (2021), Module 1, Paper 3, The Institute of Company Secretaries of India, MPPrinters, Noida
2. The Air (Prevention and Control of Pollution) Act, 1981, Bare Act, 2022 Edition, Universal/Lexis Nexis, Noida
3. The Water (Prevention and Control of Pollution) Act, 1974, Bare Act, 2022 Edition, Universal/Lexis Nexis, Noida
4. Cliff Ennico, (2005) "Small Business Survival Guide Starting Protecting and Securing your Business for Long-Term Success", Adams Media, USA
5. Daniel Sitarz, (2011) "Sole Proprietorship: Small Business Start-up Kit", 3rd Edition, Nova Publishing, USA

Web references:

1. https://www.icsi.edu/media/webmodules/FINAL_FULL_BOOK_of_EP_SBEC_2018.pdf
2. https://www.mca.gov.in/MinistryV2/incorporation_company.html#3
3. <https://legislative.gov.in/sites/default/files/The%20Limited%20Liability%20Partnership%20Act,%202008.pdf>
4. <https://legislative.gov.in/sites/default/files/A1999-48.pdf>
5. https://www.indiacode.nic.in/bitstream/123456789/6196/1/the_environment_protection_act%2C1986.pdf

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	3	3	3	3	3	1	3
CO2	3	2	2	3	2	3	2	3	3
CO3	3	3	2	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3

High -3

Medium-2

Low-1

SEMESTER-II

Course Code	Course Title	L	T	P	C
2326GDS III	Elective III A - Business Ethics and Corporate Sustainability	4	0	0	3

OBJECTIVES

- To understand the concept and importance of business ethics
- To enable ethical decision making based on various theories
- To gain knowledge on moral issues relating to business, marketing, advertising, finance, HR and environmental protection
- To understand the concepts of corporate sustainability
- To analyse sustainability information and prepare reports

UNIT I

Introduction to Business Ethics

Business Ethics- Meaning and Definition of Business Ethics - Nature of Business Ethics - Role and importance of Business Ethics and values in Business - Causes of unethical behaviour - Ethical issues.

UNIT II

Ethical Theories

Ethical Decision Making - Decision Making (Normal Dilemmas and problems) - Application of Ethical Theories in Business - Traditional Ethical Theories - Utilitarianism, - Ethical Egoism - Ethics of Duties - Normative Theories of Business Ethics - Stakeholder Theory - Stockholder Theory - Lawrence Kohlberg's Theory Model Development.

Unit III

Moral Issues in Business

Moral Issues in Business-Importance of moral issues and reasoning- Whistle Blowing- Kinds of Whistle Blowing- Ethical issues in functional areas of business.

Marketing and Advertising- Truth in Advertising- Manipulation- Coercion- Trade Secrets- Corporatedisclosure- Insider trading.

Finance- Fairness' and efficiency in Financial Market- Greenmail- Golden Parachute.

HR: Workers Rights and Duties- Workplace Safety- Sexual Harassment- Equal Employment Opportunity- Preferential hiring.

Environmental Protection- Safety and acceptable risk- Environmental Harm, Pollution and its Control- Product Safety and Corporate Liability.

UNIT IV

Corporate Sustainability

Corporate Sustainability- Concepts of sustainability- Social, Environmental and Economic dimensions - Sustainability in a business context.

Principles of Sustainable Development: History and emergence of the concept of Sustainable Development- Definitions, Environmental issues and crisis, Resource degradation, Greenhouse gases, Desertification, Social insecurity, Industrialization, Globalization and Environment.

UNIT V

Sustainability Reporting

Sustainability Reporting - Investors, customers, government and media- Disclosing sustainability information - report and website - Transparency and Accountability - One Report movement - Financial and non-financial together- Triple bottom line concept for Sustainable Business- Sustainability Reporting: Flavour of GRI, BRR, BRSR

Course Outcomes

- Apply the concepts of business ethics in practice
- Demonstrate ethical decision making by applying various theories
- Evaluate moral issues relating to business, marketing, advertising, finance, HR and environmental protection
- Explain the concepts of corporate sustainability
- Construct reports disclosing sustainability information

Books for study:

1. Muraleedharan K P and Satheesh E K (2021), "Fernando's Business Ethics and Corporate Governance", 3rd Edition., Pearson India Education Services Pvt. Ltd, Noida
2. John G. Cullen (2022), "Business, Ethics and Society: Key Concepts, Current Debates and Contemporary Innovations", Sage Publications Pvt. Ltd, New Delhi
3. Khanka S S (2013), "Business Ethics and Corporate Governance (Principles and Practice)", 1st Edition, S. Chand & Co. Ltd., New Delhi

Books for reference:

1. ICSI Study Material, "Governance, Risk Management, Compliance and Ethics", New Delhi
2. David Chandler (2016), "Strategic Corporate Social Responsibility: Sustainable Value Creation", 4th Edition., Sage Publications Pvt. Ltd, New Delhi
3. Mandal SK (2017), "Ethics in Business and Corporate Governance", 2nd Edition., McGraw Hill Education, India

Web references:

1. <https://www.icsi.edu/media/website/BUSINESS%20MANAGEMENT%20ETHICS%20&%20ENTREPRENEURSHIP.pdf>
2. <https://ddceutkal.ac.in/Syllabus/BECG-MBA.pdf>
3. <https://sdgs.un.org/topics/desertification-land-degradation-and-drought>
4. https://sdgs.un.org/sites/default/files/documents/1387bp_ccInNSDS.pdf
5. <https://wedocs.unep.org/handle/20.500.11822/9435>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
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CO3	3	3	3	2	2	3	2	1	3
CO4	2	2	2	3	3	3	3	3	3
CO5	2	2	2	3	3	3	3	3	3

High -3

Medium-2

Low-1

SEMESTER-II

Course Code	Course Title	L	T	P	C
2326GDS III	IIIB–AuditandDueDiligence	4	0	0	3

OBJECTIVES

- Tounderstanddifferenttypesofaudit
- Togainknowledgeonsecretarialaudit
- Tounderstandthebasicsofduediligence
- Toanalyseedifferenttypesofduediligence
- Tounderstandduediligencefortakeoversandduediligencereport

UNIT I

IntroductiontoAudit

Audit: Meaning – Types of Audit: Corporate Governance Audit: Meaning and scope; Corporate Social Responsibility Audit: Meaning and objectives; Insider Trading Audit: An introduction–Labour Law audit: Meaning, process and benefits – Environment Audit: Meaning and Need – Social Audit: Meaning and implications–IntroductiontoTakeoverAudit.

UNIT II

SecretarialAudit

Secretarial Audit: Meaning – Need – Applicability of Secretarial Audit under Companies Act, 2013 and SEBI (Listing Obligations and Disclosure Requirements) Regulations, 2015 – The process of Secretarial Audit–ScopeandBenefits of Secretarial Audit.

UNIT III

Introduction to Due Diligence

Due diligence: Meaning, Need, Objectives and Scope – Factors to be considered while conducting due diligence – Process of due diligence – Techniques of due diligence.

UNIT IV

Types of Due Diligence

Types of Due Diligence: Operational, Strategic, Financial, Technical, Legal, Management, Technical, Environmental, Human Resource.

UNIT V

Due Diligence for Takeovers and Due Diligence Report

Due diligence for Mergers and Amalgamation: Introduction and Process, Preparation of scheme of amalgamation - Due diligence for take overs - Guidance on diligence reporting – Format of diligencereport.

Course outcomes

- Compare different types of audit
- Assess the provisions relating to secretarial audit
- Recall the basics of due diligence
- Explain the various types of due diligence
- Examine due diligence for takeovers and prepare due diligencereport

Books for study:

1. Anoop Jain C.S, (2022), “Secretarial Audit, Compliance Management and Due Diligence”, 19th Edition, A J Publications Chennai, Tamilnadu.
2. William J Gole; Paul J Hilger (2009), “Due Diligence, An MA Value Creation”, John Wiley & Sons, Inc., New Jersey
3. Chatterjee B.D (2020), “A Practical Guide to Financial Due Diligence”, Bloomsbury Publications, 1st Edition, New Delhi
4. Anoop Jain CS (2022), “Governance, Risk Management, Compliance and Ethics” 15th Edition, A J Publications, Chennai, Tamilnadu.

Booksforreference:

1. NationalInstituteofSecuritiesMarket(April2022),“DepositoryOperations,Aneducationalinitiative ofSEBI”,TaxmannPublications,New Delhi
2. PeterHowson(2003),“CommercialDueDiligence”,GowerPublications,England
3. JustinJCamp(2002),“VentureCapitalDueDiligence”,Wiley&Sons,Incorporated,John, NewJersey.

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1. <https://www.icsi.edu/media/portals/70/241120123.pdf>
2. <https://www.icsi.edu/media/webmodules/publications/FULL%20BOOK-PP-DD&CCM-PDF%20FILE.pdf>
3. <https://www.sebi.gov.in/legal/regulations/jul-2022/securities-and-exchange-board-of-india-issue-of-capital-and-disclosure-requirements-regulations-2018-last-amended-on-july-25-2022-61425.html>
4. <https://www.icsi.edu/media/webmodules/pes/GUIDANCE%20NOTE%20ON%20DILIGENCE%20REPORT%20FOR%20BANKS.pdf>

Note:Latest editionofthebooksmay beused

MappingofcourseoutcomeswithPOsandPSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	2	3
CO4	3	3	3	3	3	3	3	2	3
CO5	3	3	3	3	3	3	3	2	3

High –3

Medium–2

Low–1

SEMESTER-II

Course Code	Course Title	L	T	P	C
23261GDSIV	Elective IVA-Rural and Agricultural Marketing	4	0	0	3

OBJECTIVES

- To understand the concepts of Rural marketing and its environments.
- To understand the buying behaviour of rural consumers
- To gain knowledge on strategies relating to rural product, branding, packaging, etc.
- To analyse the functioning of food processing industry including distribution and promotion in the rural market.
- To understand the principles and functioning of cooperative marketing

UNIT I

Introduction to Rural marketing

Rural marketing – Meaning – Definition – Concept and nature of rural marketing – Taxonomy of rural markets – Urban vs Rural marketing – Rural marketing environment – Becoming a successful rural marketer.

UNIT II

Rural buyer behaviour

Rural buyer behaviour – Aspects of rural buyer behaviour – Rural consumer decision making process – Environmental factors affecting rural consumers – Buyer characteristics and innovation adoption – Rural STP approach – Guidelines for effective segmentation and emerging rural market segments.

UNIT III

Rural product strategy and pricing

Rural product strategy – Rural product classification and decisions – Product innovation strategies – Customer value strategies – Rural branding and packaging strategies – Role of Agricultural Price Commission in India (APC)-Introduction to APC-Basic objectives of the Commission-Determination of Minimum Support Price (MSP) - Non price measures - Minimum support price of selected commodities -Benefit to the farmers -Rationale of support pricing-Limitations of MSP.

UNIT IV

Food processing industry infrastructure in India

Food processing industry infrastructure in India- Meaning of processing - Advantages of food processing-Processing of agricultural commodities (Wheat, Paddy, Pulses and Oilseeds)-Importance of cold chains - Rural distribution strategy – Rural distribution and logistics – Direct vs Indirect marketing –Organised rural retailing – Types of retail outlets – Rural malls – e-tailing and training for rural retailers – Rural supply chain management – ITC e-choupal – Rural promotion mix – Marketing communication challenge in rural markets.

UNIT V

Cooperative marketing

Cooperative marketing: Meaning-Role of cooperatives-Structure of cooperative marketing societies - Types of Co-operative marketing societies – Membership – Functioning – Agri export zones – Small Farmers Agri Business Consortium-eNAM –Tamil Nadu State Agricultural Marketing Board.

Course Outcomes

- Recall the concepts of rural marketing
- Analyse the buying behaviour of rural consumers
- Develop the strategies relating to rural product, branding, packaging, etc.

- Construct distribution and promotional mix in the rural market relating to food processing industry
- Explain the principles and functioning of cooperative marketing

Books for study:

1. Acharya S.S. Agarwal N.L., (2019), "Agricultural Marketing in India", 6th Edition., BS Publishers & Distributors Pvt Ltd, India
2. Ashok M.V (2021), "Emerging Trends in Agricultural Marketing in India", Brillion Publishing, New Delhi
3. Debarun Chakraborty, Soumya Kanti Dhara, Adrinil Santra (2021), "Rural Marketing in India: Texts and Cases", Atlantic Publishers and Distributors Pvt Ltd, Chennai

Books for reference:

1. Rahman KS (2019), "Rural Marketing in India", Himalaya Publishing House, Mumbai
2. [Dogra Balram](#) and [Karminder Ghuman](#) (2007), Rural Marketing: Concepts and Practices, McGraw Hill Education, Noida

Web references:

1. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_RM_NOTES_2.pdf
2. <https://www.mbaskool.com/business-concepts/marketing-and-strategy-terms/12992-cooperative-marketing.html>
3. <https://cacp.dacnet.nic.in/content.aspx?pid=32#content>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	2	2	1	2	3	3	3	1	3
CO2	3	3	3	3	3	3	3	1	3
CO3	3	3	3	3	3	3	3	1	3
CO4	3	3	2	3	3	3	3	2	3
CO5	2	2	2	3	3	3	3	1	3

High -3

Medium-2

Low-1

SEMESTER-II

Course Code	Course Title	L	T	P	C
23261GDSIV	IVB-Logistics and Supply Chain Management	4	0	0	3

OBJECTIVES

- To identify the primary differences between logistics and supply chain management
- To understand the individual processes of supply chain management and their interrelationships within individual companies and across the supply chain.
- To evaluate the management components of supply chain management
- To analyze the tools and techniques applied in implementing supply chain management.
- To create awareness about the professional opportunities in supply chain management.

UNIT I

Supply Chain Management

Supply Chain Management: Concept, Features, Evolution, Importance, Process and Barriers of Supply Chain Management – Principles, Supply Chain Strategies – Organizations, Coordination, Innovation and Forecasting- Supply chain intermediaries – Concept and Types, Channels of Distribution for Industrial Goods and Consumer Goods, Channels of Distribution at Services Level, Factors for selection of suitable channels.

UNIT II

Global perspectives

Global perspectives: Measuring and analyzing the value and efficiency of Global Supply Chain Networks, Global market forces, Types of global supply chain - Indian Perspectives: Measuring and Analyzing the value and efficiency of Domestic Supply Chain Networks, Economic effects of supply chains - Customer Perspectives: Customer values, Role of customers and Ways of improving customer services in SCM.

UNIT III

Framework of Logistics

Logistics: Introduction – Positioning of Information in Logistics and Supply Chain Management – Logistics Information System (LIS) - Logistics Management: Concept and Process, Competitive Advantages and Three C's, Changing Logistics Environment, Reverse Logistics, Importance of Inventory Control - Elements of inventory management – Inbound and out bound logistics, Bull-whip effect – distribution and warehousing management - Transport Functions and Participants in Transportation Decisions - Transport Infrastructure - Packaging and Materials Management: Consumer and Industrial Goods Packaging - Factors influencing Materials Planning, Preservation Safety and Measures of Materials Handling.

UNIT IV

SCM-Warehousing

Introduction – Concepts of Warehousing – Types of Warehouse – Functions of Warehousing – Strategic Warehousing, Warehouse Operations, Ownership Arrangements, Warehouse Decisions, Warehouse Management Systems, Packaging Perspectives, Packaging for Material Handling Efficiency, Materials Handling, Supply Chain Logistics Design: Global Strategic Positioning; Global SC Integration, SC Security, International Sourcing, Distribution control and evaluation.

UNIT V

SCM-Plan

SCM Plan: Demand Planning, Source of Procurement, Production or Assembly Steps, Sales return of defective or excess goods - Use of Internet in SCM: Role of computer/IT in supply chain management – E-market places, E-procurement, E-logistics, E-fulfillment - Operative Systems in SCM: Enterprise Resource Planning (ERP), Performance Modeling of supply chains using Markov chains, Inventory Control - Importance, Pareto's Law - Emerging Technologies in Logistics and Supply Chain Management: CRM Vs SCM, Benchmarking concept, Features and implementation, Outsourcing: Basic concepts, Value addition in SCM – Concept of demand chain management - Growth of Logistics and Supply Chain Management in national and international scenarios.

Course Outcomes

- Recall the concepts and features of SCM
- Summarise global and Indian perspectives of SCM
- Examine changing logistics environment pertaining to materials management, warehousing and distribution
- Explain strategic warehousing for SCM
- Outline the role of internet in SCM

Books for study:

1. Christopher Martin, "Logistics and Supply Chain Management" (2016) 5th Edition, FT Publishing International, India
2. Chopra, Sunil, Meindl, Peter and Kalra, D. V.; Supply Chain Management: Strategy, Planning and Operation; Pearson Education Pvt. Ltd, Noida

Books for reference:

1. Sahay, B.S., Supply Chain Management, 2nd Edition; Macmillan Publishers India
2. Ballou, R.H. Business Logistics Management. Prentice-Hall Inc.
3. Bowersox D.J., Closs D.J., Bixby Cooper. M., Supply Chain Logistics Management, (2002), 9th Edition, McGraw-Hill Higher Education, Noida

Web references:

1. <http://www.wisdomjobs.com/e-universit/production-and-operations-management-tutorial-295/principles-of-material-handling-9576.html>
2. <http://www.marketing91.com/logistics-activitiesw/>
3. <https://www.fcbo.com/services/warehouse-strategies>.
4. <https://cleartax.in/s/just-in-time-jit-inventory-management>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	1	3	2	2	3	1	2
CO2	2	2	3	2	3	3	2	2	1
CO3	2	1	2	3	2	2	3	3	3
CO4	1	3	1	2	1	1	2	2	2
CO5	3	2	2	2	2	2	1	1	1

High -3

Medium-2

Low-1

SEMESTER-II

Course Code	Course Title	L	T	P	C
23261RMC	Research Methodology	6	0	0	5

OBJECTIVES

- To understand the fundamentals of research
- To construct theoretical design and formulate hypotheses
- To evaluate the data collection techniques
- To perform parametric and non-parametric tests
- To enhance report writing skills and develop ethical conduct in research

UNIT I

Introduction to Research Methodology

Research: Definition – Objectives – Motivations for research – Types of research – Maintaining objectivity in research – Criteria of good research – Applications of research in business – Formulating a research problem – Literature Review – Reasons for review – Reference management tools – Identification of research gap – Framing of objectives.

UNIT II

Hypothesis Testing and Research Design

Hypothesis – Formulation of hypothesis – Testing of hypothesis – Type I and Type II errors – Research design – Types of research design - Methods of data collection: Census, Sample survey, Case study – Sampling: Steps in sampling design, Methods of sampling – Testing of reliability and validity – Sampling errors.

UNIT III

Data Collection

Variable: Meaning and types - Techniques of data collection – Primary data: Meaning, Advantages and limitations – Techniques: Interview, Schedule, Questionnaire, Observation – Secondary Data: Meaning and sources.

UNITIV

Data Analysis

Data Analysis – Uni-variate Analysis: Percentile, Mean, Median, Mode, Standard deviation, Range, Minimum, Maximum, Independent sample t-test – Bi-variate analysis: Simple correlation, Simple Regression, Chi-square, Paired samples t-test, ANOVA, Man-Whitney test – Wilcoxon signed rank test – Kruskal Wallis test (Simple problems)

Multi Variate Analysis: Multiple Correlation, Multiple Regression, Factor Analysis, Friedman's test, Cluster analysis, Confirmatory Factor Analysis (CFA), Structural Equation Modelling (SEM), Multiple Discriminant Analysis.

UNITV

Preparation of Research Report

Report preparation – Guidelines and precautions for interpretation – Steps in Report writing – Style of research reports (APA, MLA, Anderson, Harvard) – Mechanics of report writing – Ethics in Research – Avoiding plagiarism – Plagiarism check tools – Funding agencies for business research.

Course Outcomes

- Recall the research concepts and recognise the research problem
- Construct research hypothesis and determine the sample size
- Select appropriate method for data collection
- Interpret the results of statistical tests
- Construct research report avoiding plagiarism

Books for study:

1. Tripathi, (2014) "Research Methodology in Management and Social Sciences". Sult an Chand & Sons, New Delhi.
2. Kothari C.R and Gaurav Garg, (2020) "Research Methodology" – Methods and Techniques. New Age International (P) Limited, New Delhi.
3. Krishnaswami and Ranganathan, (2011) "Methodology of Research in Social Sciences", Himalaya Publishing House, Mumbai.

Books for reference:

1. Donald R. Cooper, Pamela S. Schindler and J. K. Sharma, "Business Research Methodology", 12th Edition, Tata McGraw Hill, Noida (UP).
2. Sashi K. Gupta and Parneet Rangi, (2018) "Research Methodology", Kalyani Publisher, Ludhiana.
3. Sharma R D and Hardeep Chahal, (2004) "Research Methodology In Commerce and Management", Anmol Publications, New Delhi

Web references:

1. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/In_research_method_final.pdf
2. <https://ccsuniversity.ac.in/bridge-library/pdf/MPhil%20Stats%20Research%20Methodology-Part1.pdf>
3. https://prog.lmu.edu.ng/colleges_CMS/document/books/EIE%20510%20LECTURE%20NOTES%20first.pdf
4. <https://www.statisticssolutions.com/academic-research-consulting/data-analysis-plan/>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	3	2	2	3	2	3	3
CO2	3	3	3	2	2	3	2	3	3
CO3	3	3	3	2	2	3	2	3	3
CO4	3	3	3	2	2	3	2	3	3
CO5	3	3	3	2	2	3	2	3	3

High –3

Medium–2

Low–1

SEMESTER-II

Course Code	CourseTitle	L	T	P	C
23261SEC 2	PrinciplesandPracticeofBanking	2	0	0	2

SEMESTER-II

Course Code	CourseTitle	L	T	P	C
	AbilityEnhancement-SoftSkills-II	2	0	0	2

SEMESTER-III

Course Code	Course Title	L	T	P	C
23261CCVII	Core VII -Taxation	6	0	0	5

OBJECTIVES

- To identify deductions from gross total income and computation of income for different classes of assesses
- To understand the procedure for filing of returns and tax planning
- To analyse the structure on international business taxation
- To assess Goods and Services Tax and filing GST returns
- To compute customs duty as per Customs Act

UNIT I

Assessment of persons

Tax Exemptions for Agricultural Income-Deductions to be made in computing total income (80G, 80GGB & 80GGC, 80IA, 80IAB, 80IAC, 80IB, 80IBA, 80ID, 80IE, 80JJA, 80JAA, 80LA, 80M, 80P, 80PA) – Assessment of Firms, AOP, BOI, Company and Co-operative society.

UNIT II

Tax Returns and Tax planning

Return of income: Statutory obligation, Return Forms, Time for filing of return, Revised return, Modified return – Assessment - Tax Deducted at Source - Advance payment of Tax: Persons liable to pay, Due date, Computation - Payment in pursuance of order of Assessing Officer, Consequences on non-payment. – Tax planning, Tax avoidance and Tax evasion - Tax planning and specific management decisions: Make or buy, Own or lease, Retain or replace, Shutdown or continue.

UNIT III

International business taxation

International business taxation - Taxation of Non-resident - Double taxation relief - Transfer pricing and other anti-avoidance measure - Application and interpretation of tax treaties - (Double taxation avoidance agreement-DTAA)-Equalization levy.

UNIT IV

Goods and Services Tax

Goods and Services Tax: GST Act, 2017 - Registration – Procedure for registration under Schedule III – Amendment of registration – Rates of Tax of IGST, CGST, SGST/UGTST- Assessment of GST- Self-assessment – Provisional assessment – Scrutiny of returns – Assessment of non filers of returns – Assessment of unregistered persons – Assessment in certain special cases – Tax Invoice – Credit and Debit Notes – Payment of Tax – Input Tax Credit - Anti profiteering – Filing of Returns- Penalties – Prosecution – Appeal and Revision.

UNIT V

Customs Act, 1962

Customs Act, 1962: Important Definitions – Basics – Importance of Customs Duty – Constitutional authority for levy of Customs Duty – Types of Customs Duty – Prohibition of Importation and Exportation of goods – Valuation of goods for Customs Duty – Transaction Value – Assessable Value – Computation of Assessable Value and Customs Duty.

Course Outcomes

- Apply the provisions of income tax to determine taxable income
- Plan taxes
- Illustrate the nuances of international business taxation
- Apply the provisions of GST
- Summarise the provisions of Customs Act

Books for study:

1. VinodSinghaniaandKapilSinghania,DirectTaxesLaw&PracticeProfessionalEdition,TaxmannPublications,New Delhi
2. MehrotraH.C.andGoyalS.P,IncomeTaxincludingTaxPlanning&Management,SahityaBhawanPublications,Agra
3. SekarG,“DirectTaxes”-AReadyRefresher,SitaramanC.&CoPvt.Ltd.,Chennai.
4. Balachandran V,(2021)Textbook of GSTandCustomsLaw,SultanChandandSons,NewDelhi
5. VandanaBangarandYogendraBangar,“ComprehensiveGuidetoTaxation”(Vol.IandII),Aadhyaprakashan,Prayagraj(UP).

Books for reference:

1. ShaR.G.andUshaDeviN.,(2022)“IncomeTax”(DirectandIndirectTax),HimalayaPublishingHouse,Mumbai.
2. GirishAhujaandRaviGupta,“PracticalApproachtoDirectandIndirectTaxes:ContainingIncomeTaxand GST”,WoltersKluwerIndiaPrivateLimited
3. SwethaJain, GSTLaw&Practice, TaxmannPublishersPvt.Ltd, Chennai.
4. DattV.S.,“GST-InputTaxCredit”,TaxmannPublishers,Chennai.
5. AnuragPandy,“Law&PracticesofGSTandServiceTax”-SumedhaPublicationHouse,NewDelhi.

Web references:

1. https://www.icsi.edu/media/webmodules/16112021_Advance_Tax_Laws.pdf
2. https://www.icsi.edu/media/webmodules/Final_Direct_Tax_Law_17_12_2020.pdf
3. https://www.icsi.edu/media/webmodules/TL_Final_pdf_25102021.pdf

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	2	2	3
CO3	3	3	3	3	3	3	3	2	3
CO4	3	3	3	3	3	3	3	2	3
CO5	3	3	3	3	3	3	3	3	3

High -3

Medium-2

Low-1

SEMESTER-III

Course Code	CourseTitle	L	T	P	C
23261CCVIII	Core VIII-ResearchMethodology	6	0	0	4

SEMESTER–III

Course Code	Course Title	L	T	P	C
23261CCIX	Core IX - Computers in Business	2	0	4	5

OBJECTIVES

- To understand the fundamentals of SPSS
- To compare the values obtained in t-test and ANOVA
- To perform regression and non-parametric tests
- To create company, groups and ledgers and obtain financial statements using Tally Prime
- To understand inventory management and account for goods and service tax

UNIT I

Introduction to SPSS

Opening a data file in SPSS – Variable view – Data view – Entering data into the data editor – Saving the data file – Table creation – Descriptive statistics: Percentile values, Measures of central tendency, Measures of dispersion, Distribution – Cronbach's Alpha test – Charts and graphs – Editing and copying SPSS output.

UNIT II

Parametric Tests in SPSS

Compare means: One-sample t-test, Independent Samples t-test, Paired-samples t-test and One-way ANOVA, Two-way ANOVA – Correlation: Bi-variate, Partial and Multiple. Simple linear regression.

UNIT III

Non-parametric Tests in SPSS

Chi-square test - Mann Whitney's test for independent samples – Wilcoxon matched pairs sample test – Friedman's test – Wilcoxon signed rank test – Kruskal Wallis test

UNIT IV

Introduction to Tally Prime

Tally Prime: Introduction – Starting Tally Prime – Creation of a Company - Selecting company - Shutting a company - Altering company – Creating Accounting groups and ledgers – Vouchers – Practical problems for a new and existing business and not-for-profit organisation. Accounting reports: Introduction – Displaying Trial balance, Profit and Loss Account, Balance sheet, Day book, Purchases register, Sales register, Cash flow/Funds flow and ratio analysis – Practical problems.

UNIT V

Inventory and GST in Tally Prime

Inventory: Introduction to Inventory Masters – Creation of stock group – Creation of Godown – Creation of unit of measurement – Creation of stock item – Entering inventory details in Accounting vouchers – Practical problems. GST: Introduction – Enabling GST – Defining tax details – Entries in Accounting vouchers – View invoice report – Practical problems.

Course Outcomes

- Construct data file in SPSS
- Examine Means of samples
- Apply non-parametric tests
- Construct a company, form groups and get automated financial statements
- Plan for automation of inventory

Books for study:

1. Sundara Pandian, P., Muthulakshmi, S. & Vijayakumar, T. (2022), Research Methodology & Applications of SPSS in Social Science Research, Sultan Chand & Sons, New Delhi
2. Morgan George, A., Barrett, C. Karen, Leech Nancy and Gloeckner, Gene W. (2019), IBM SPSS for Introductory Statistics, Routledge, 6th Edition, U.K
3. Official Guide to Financial Accounting using Tally Prime (2021), BPB Publication, Delhi
4. Chheda Rajesh, U. (2020), Learn Tally Prime, Ane Books, 4th Edition, New Delhi

Booksforreference:

1. Kulas John, Renata Garcia Prieto Palacios Roji, Smith Adams (2021), IBM SPSS Essentials: Managing and Analysing Social Sciences Data, 2nd Edition, John Wiley&Sons Inc.,NewYork
2. Rajathi.A,Chandran.P(2011),SPSSforYou,MJPPublishers,Chennai
3. SangwanRakesh(2022),LearnTallyPrimeinEnglish,AscendPrimePublication,Pilani
4. LodhaRoshan(2022),TallyPrimewithGSTAccounting,LawPointPublication,Kolkata

Webreferences:

1. <https://www.spss-tutorials.com/basics/>
2. <https://www.tallyclub.in/>
3. <https://tallysolutions.com/business-guides/inventory-management-in-tally-erp9/>

Note:Latest editionofthebooksmay beused

MappingofcourseoutcomeswithPOsandPSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	2	3	2	2	3	3	2	3	3
CO2	3	3	2	2	3	3	2	3	3
CO3	3	3	2	2	3	3	2	3	3
CO4	3	3	2	3	3	3	3	3	3
CO5	3	3	2	3	3	3	3	3	3

High -3

Medium-2

Low-1

SEMESTER-III

Course Code	Course Title	L	T	P	C
23261GDSV	Elective VA- Strategic Management (or) VB-International Financial Management	3	0	0	3

OBJECTIVES

- To understand strategic management and its levels and phases
- To analyse the dynamics of competitive strategic management techniques
- To familiarize with the business and functional level strategies
- To gain knowledge on organisational and strategic leadership
- To apply latest concepts in strategy implementation and control

UNIT I

Introduction to Strategic Management

Introduction to Strategic Management: Meaning and Nature of Strategic management, Framework of Strategic management, Strategic Levels in Organizations, Phases of strategic management, Benefits and challenges of strategic Management in global economy.

UNIT II

Techniques for Strategic Management

Dynamics of Competitive Strategy: Corporate governance- Role of Board of directors and top management in corporate governance; Agency and Stewardship theory, Situational Analysis- SWOT analysis, TOWS Matrix, Portfolio Analysis - BCG, GE, and ADL matrix - Strategic Management Process: Strategic Planning, Strategic Intent-

Vision, Mission and Objectives, Strategy Formulation - Corporate Level Strategies: Concepts and Nature of Corporate Strategy, Strategic Alternatives at Corporate Level- Growth, Stability, Expansion, Business Combinations-

Mergers and Acquisitions, Strategic Alliances, Turnaround, Retrenchment and Retreat, Corporate parent in g.

UNIT III

Different Levels of Strategies

Business Level Strategies: Competitive Strategies at Business Level, Michael Porter's Generic Strategies, Best-Cost Provider Strategy - Functional Level Strategies: Marketing Strategy, Financial Strategy, Operations Strategy, Human Resource Strategy, Research and Development.

UNIT IV

Organisation and Strategic Leadership

Organisation and Strategic Leadership: Organisation Structure, Strategic Business Unit, Strategic Leadership, Strategy Supportive Culture, Entrepreneurship and Intrapreneurship, Strategic Leadership across organizations.

UNIT V

Strategy Implementation and Control

Strategy Implementation and Control: Strategy Implementation, Strategic Choice, Strategic Control, Strategy Audit, Business Process Reengineering, Benchmarking, Six Sigma and contemporary practices in strategic management.

Course Outcomes

- Summarise strategic management principles at different levels and phases
- Explain the dynamics of competitive strategic management techniques
- Examine business and functional level strategies
- Identify strategic leadership and organisational skills
- Apply latest concepts in strategy implementation and control

Books for study:

1. Prasad L.M., (2018), "Strategic Management", 7th Edition, Sultan Chand & Sons, New Delhi.
2. Cherunilam, Francis, (2021), "Strategic Management" 8th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
3. John A. Pearce, Richard B. Robinson and Amita Mital, (2018) "Strategic Management" 14th Edition, McGraw Hill Education, New Delhi.
4. Gupta C. B. (2022), "Strategic Management" Latest Edition, S.Chand

andCompanyLtd,Noida,UttarPradesh.

Booksforreference:

1. Jeyarathanam M., (2021), “Strategic Management” 7thEdition, HimalayaPublishingHousePvt.Ltd,Mumbai
2. GhoshP.K.(2014),“StrategicManagement”,14thEdition,SultanChand&Sons,New Delhi
3. ChandanJ.S.andNitishSenGupta(2022),“StrategicManagement”,VikasPublishingH ousePvt.Ltd.,New Delhi
4. FredR.David,(2017),“StrategicManagementConceptsandCases”13thEdition,Prentic e Hall,PearsonEducation,London,England

Webreferences:

1. <https://resource.cdn.icai.org/66691bos53810cp2.pdf>
2. <https://resource.cdn.icai.org/66693bos53810cp4.pdf>
3. <https://resource.cdn.icai.org/66694bos53810cp5.pdf>
4. <https://resource.cdn.icai.org/66695bos53810cp6.pdf>
5. <https://resource.cdn.icai.org/66697bos53810cp8.pdf>

Note:Latest editionofthebooksmay beused

MappingofcourseoutcomeswithPOsandPSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	2	3	2	2	2	1	2
CO2	3	3	2	3	2	2	2	1	2
CO3	3	3	3	3	3	3	3	2	3
CO4	3	3	3	3	3	3	3	1	3
CO5	3	3	2	3	3	2	3	1	2

High -3

Medium-2

Low-1

SEMESTER-III

Course Code	Course Title	L	T	P	C
23261GDSV	VB-International Financial Management	3	0	0	3

OBJECTIVES

- To understand the importance and nature of international flow of funds
- To gain knowledge on the various features and transactions in the foreign exchange market
- To analyse the techniques of international investment decisions for building a better portfolio
- To understand the flow of funds in the international banks
- To become familiar with various international instruments

UNIT I

International Financial Management

International Financial Management: An overview – Importance – Nature and Scope – International flow of Funds – Balance of Payments – International Monetary System.

UNIT II

Foreign Exchange Market

Foreign Exchange Market: Features – Spot and Forward Market – Exchange Rate Mechanism – Exchange Rate determination in the Spot and Forward Markets – Factors Influencing Exchange Rate – Salient Features of FEMA – Market for Currency Futures and Currency Options – Hedging with Currency Future and Options.

UNIT III

International Investment Decision

Foreign Direct Investment – International Capital Budgeting – International Portfolio Investment: Meaning – Benefit of International Portfolio Investment – Problem of International Investment.

UNIT IV

International Financial Decisions

Overview of the International Financial Market – Channels for International Flow of Funds – Role and Functions of Multilateral Development Banks – International Banking: Functions – Credit Creation – Control of International Banks.

UNIT V

International Financial Market Instruments

Short-term and Medium-term Instruments – Management of Short-term Funds – Management of Receivables and Inventory – Factors behind the Debt Crisis.

Course Outcomes

- Explain the importance and nature of international flow of funds
- Analyse the fluctuations in exchange rate and impact on exchange markets
- Analyse the techniques of international investment decisions for building a better portfolio
- Explain the flow of funds in the international banks
- Examine various international financial market instruments

Books for study:

1. Vyuptakesh Sharan, (2010), "International Financial Management" 6th Edition, Prentice Hall India Learning Pvt. Ltd, Delhi
2. Seth AK and Malhotra SK, (2000), "International Financial Management" 2nd Edition, Galgotia Publishing Company, Delhi
3. Agarwal OP, (2021), "International Financial Management" 3rd Edition, Himalaya Publishing House Pvt Ltd, Mumbai
4. Apte PG, (2006), "International Financial Management" 4th Edition, MCGraw Hill (India) Pvt. Ltd., Noida, Uttar Pradesh
5. Varshney RL and Bhashyam S (2016), "International Financial Management An Indian Perspective", Sultan Chand & Sons, New Delhi

Books for reference:

1. Jeevanandam C, (2020), “Foreign Exchange Practice Concepts and Control”, 17th Edition, Sultan Chand & Sons, New Delhi
2. Kevin S, (2022), “Fundamentals of International Financial Management” 2nd Edition, Prentice Hall India Learning Pvt. Ltd, Delhi
3. Amuthan R, (2021), “International Financial Management” 3rd Edition, Himalaya Publishing House Pvt Ltd, Mumbai
4. Bhalla VK (2014), “International Financial Management (Text and Cases)”, Sultan Chand & Sons, New Delhi

Web references:

1. <https://iare.ac.in/sites/default/files/LECTURE%20NOTES-IFM.pdf>
2. <https://www.bauer.uh.edu/rsusmel/4386/ifm%20-%20lecture%20notes.pdf>
3. https://ebooks.lpude.in/management/mba/term_4/DMGT549_INTER_NATIONAL_FINANCIAL_MANAGEMENT.pdf

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	1	2	2	3	2	2	2	1	2
CO2	1	2	2	3	2	2	2	1	2
CO3	2	3	2	3	2	2	2	2	2
CO4	1	2	2	3	2	2	2	1	2
CO5	2	3	2	3	2	2	2	2	2

High –3

Medium–2

Low–1

SEMESTER-IV

Course Code	Course Title	L	T	P	C
23261CCX	Core X - Corporate and Economic Laws	6	0	0	5

OBJECTIVES

- To analyse current and capital account transactions and dealings in foreign currency under FEMA
- To understand unethical competitive practices and forums for redressal of consumer disputes under Competition Act and Consumer Protection Act
- To understand the procedure for obtaining patents and copyright under The Copyright and Patents Act
- To evaluate offences and punishment for money laundering under Prevention of Money Laundering Act
- To explain the registration and related procedures under Real Estate Act

UNIT I

Introduction to Foreign Exchange Management Act, 1999

Foreign Exchange Management Act, 1999: Introduction – Definitions – Current Account transactions – Capital Account transactions – Realisation, repatriation and surrender of foreign currency – Remittance of assets – Possession and retention of foreign currency or foreign coins – Authorised person – Adjudication and Appeal.

UNIT II

Competition Act, 2002 and Consumer Protection Act, 2019

Competition Act, 2002: Objective – Prohibition of Agreements, Prohibition of Abuse of Dominant Position - Regulation of combinations - Competition Commission of India: Duties, Powers and Functions of Commission - Appellate Tribunal.

The Consumer Protection Act, 2019: Objects; Rights of consumers – Consumer Dispute Redressal Commissions - Consumer protection councils – Procedure for admission to complaints – Appeal against orders.

UNIT III

Law relating to intellectual property rights

Law relating to intellectual property rights: Introduction - The Copyright Act, 1957: Works in which copyright subsist - Ownership of copyright and the rights of the owner - Assignment of copyright - Disputes with respect to assignment of copyright - Term of copyright - Registration of copyright - Infringement of copyright.

The Patents Act, 1970: Inventions not patentable - Applications for patents - Publication and examination of applications - Grant of patents and rights conferred - Register of patents. Trademarks Act, 1999: Conditions for registration - Procedure for and duration of registration - Effect of registration - Collective marks.

UNIT IV

Prevention of Money Laundering Act, 2002

Prevention of Money Laundering Act, 2002: Offence of money laundering - Punishment for money laundering - Attachment, adjudication and confiscation - Obligations of Banking Companies, Financial Institutions and Intermediaries - Summons, Search and Seizure - Appellate Tribunal.

UNIT V

Real Estate (Regulation and Development) Act, 2016

Real Estate (Regulation and Development) Act, 2016: Introduction - Salient features of the Act - Registration of Real Estate Project - Registration of Real Estate agents - Functions and duties of promoter - Rights and duties of Allottees - Offences, penalties and adjudication - Specimen agreement for sale to be executed between the promoter and the allottee.

Course Outcomes

- Recall important provisions of FEMA
- Examine the provisions of the Competition Act, 2002 and Consumer Protection Act to govern commercial competition and protect a consumer
- Summarise the process relating to obtaining copyrights and patents.
- Examine the provisions of Money Laundering Act
- Analyse the provisions relating to regulation of real estate

Books for study:

1. Munish Bandari (2022), A Textbook on Corporate and Economic Laws, 33rd Edition, Bestword Publications, New Delhi
2. Amit Vohra and Rachit Dhingra (2022), Economic, Business and Commercial Laws, 18th Edition, Bharat Book House, Siliguri
3. Pankaj Garg (2021), Taxmann's Corporate and Economic Laws, 7th Edition, Taxmann Publications, New Delhi

Books for reference:

1. Sekar Gand Saravana Prasath B (2022), Students' Handbook on Corporate and Economic Law, Commercial Law Publishers (India) Pvt. Ltd., New Delhi
2. Taxmann (2021), FEMA & FDI Ready Reckoner, 15th Edition, Taxmann Publications, New Delhi
3. Ahuja V.K. and Archa Vashishtha (2020), Intellectual Property Rights (contemporary Developments), Thomson Reuters, Toronto, (CAN)

Web references:

1. <https://resource.cdn.icai.org/67333bos54154-m3cp1.pdf>
2. <https://resource.cdn.icai.org/67335bos54154-m3cp3.pdf>
3. <https://resource.cdn.icai.org/68523bos54855-cp1.pdf>
4. <https://resource.cdn.icai.org/68524bos54855-cp2.pdf>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	2	2	3	3	3	2	3
CO2	3	3	3	2	2	3	2	2	3
CO3	3	3	2	2	2	3	2	2	3
CO4	3	3	3	3	3	3	3	2	3
CO5	3	3	2	2	3	3	3	2	3

High –3

Medium–2

Low–1

SEMESTER-IV

Course Code	Course Title	L	T	P	C
23261CCXI	Core XI -HumanResourceAnalytics	6	0	0	5

OBJECTIVES

- To understand the concept and framework of human resource analytics
- To evaluate the process of human resource analytics and the relevant research tools
- To illustrate the evolution, types and design of HR metrics
- To deal with data collection and transformation
- To adopt tools and techniques for predictive modelling

UNIT I

Introduction to Human Resource Analytics

Human Resource Analytics: Introduction – Concept – Evolution – Importance – Benefits – Challenges – Types of HR Analytics – HR Analytics Framework and Models.

UNIT II

Business Process and HR Analytics

Business Process and HR Analytics: Introduction – Data Driven Decision Making in HR - Data Issues – Data Validity – Data Reliability - HR Research tools and techniques – Statistics and Statistics Modelling for HR Research.

UNIT III

Introduction to HR Metrics

HR Metrics: Introduction – Historical Evolution of HR metrics – Importance – Types of HR Metrics – Types of data – HR Metrics Design Principles – HR Scorecard – HR Dashboards.

UNITIV

HRAnalyticsandData

HRAnalyticsandData:Introduction–HRDataCollection–Dataquality–BigdataforHumanResources–
ProcessofdatacollectionforHRAnalytics–TransformingdataintoHRinformation
– HRReporting–DataVisualization–Rootcauseanalysis.

UNITY

HRAnalyticsandPredictiveModelling

HRAnalyticsandPredictiveModelling:Introduction–HRPredictiveModelling–Differentphases
– Predictive analytic tools and techniques – Information for Predictive analysis - Software solutions -
PredictiveAnalyticModelsforQuantitativeData-Stepsinvolvedinpredictiveanalytics.

CourseOutcomes

- Examinetheconceptofhumanresourceanalytics
- ApplytheHRtoolsand techniquesindecisionmaking
- ExaminethedifferenttypesofHRmetricsandtheir relativemerits
- MakeuseofHRdatainreportpreparation
- Buildmodelsforpredictiveanalysis

Booksforstudy:

1. NishantUppal(2020),HumanResourceAnalyticsStrategicDecisionMaking,1stEdition,Pe
arsonEducationPvt.Ltd.,Chennai
2. SarojkumarandVikrantVerma(2022),HRanalytics,ThakurPublicationPvt.Ltd,Lucknow.
3. DipakKumarBhattacharyya(2017),HRanalytics:understandingtheoriesandapplications,1
stEdition,SagePublicationsIndiaPrivate Limited,NewDelhi

Booksforreference:

1. RameshSoundararajanandKuldeepSingh(2019),WinningonHRanalytics,Sagepublishing
,NewDelhi
2. AnshulSaxena(2021),HRanalytics:quantifyingtheintangible,1stEdition,
BlueRosepublishers,NewDelhi
3. MichaelJ.Walsh(2021),“HRanalyticsessentialsyoualwayswantedtoknow”,7th
Edition,Vibrantpublishers,Mumbai.

Webreferences:

1. <https://hbr.org/webinar/2017/06/leveraging-hr-analytics-in-strategic-decisions>
2. <https://www.mbaknol.com/human-resource-management/human-resource-metrics/>
3. <https://www.managementstudyguide.com/hr-metrics-and-workforce-analysis.htm>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	2	2	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	3	3
CO4	3	3	2	3	3	3	3	3	3
CO5	3	3	2	3	3	3	3	3	3

High -3

Medium-2

Low-1

SEMESTER-IV

Course Code	Course Title	L	T	P	C
23261CCXII	Core XIII - International Business	6	0	0	4

OBJECTIVES

- To understand the concepts of International Business and International Business Environment
- To analyse the different theories of International Business.
- To understand the legal procedures involved in International Business.
- To evaluate the different types of economic integrations.
- To analyse the operations of MNCs through real case assessment.

UNIT I Introduction to

International business

International Business -Meaning, Nature, Scope and Importance- Stages of internationalization of Business-Methods of entry into foreign markets: Licensing- Franchising- Joint Ventures- Strategic Alliances-Subsidiaries and Acquisitions- Framework for analyzing international business environment- Domestic, Foreign and Global Environment-Recent Developments in International Business.

UNIT II

Theoretical Foundations of International business

Theoretical Foundations of International Business: Theory of Mercantilism- Theory of Absolute and Comparative Cost Advantage-Haberler's Theory of Opportunity Cost- Heckscher- Ohlin Theory Market Imperfections Approach- Product Life Cycle Approach- Transaction Cost Approach- Dunning's Eclectic Theory of International Production.

UNIT III

Legal framework of International Business

Legal framework of International Business: Nature and complexities: Code and common laws and their implications to Business-International Business contract-Legal provisions, Payment terms.

UNIT IV

Multi-Lateral Agreements and Institutions

Multi-Lateral Agreements and Institutions: Economic Integration –

Forms: Free Trade Area, Customs Union, Common Market and Economic Union –

Regional Blocks: Developed and Developing Countries – NAFTA – EU – SAARC, ASEAN – BRICS – OPEC – Promotional role played by IMF – World Bank and its affiliates – IFC, MIGA and ICSID – ADB – Regulatory role played by WTO and UNCTAD.

UNIT V

Multinational Companies (MNCs) and Host Countries

Multinational Companies (MNCs) and Host Countries: MNCs – Nature and characteristics.

Decision Making – Intra Firm Trade and Transfer Pricing – Technology Transfer – Employment and labour relations – Management Practices – Host Country Government Policies – International Business and Developing countries: Motives of MNC operations in Developing Countries (Discuss case studies) – Challenges posed by MNCs.

Course Outcomes

- Recall the concepts of International Business and International Business Environment
- Analyzed different theories of International Business
- Explain the legal procedures involved in International business
- Explain the different types of economic integrations.
- Identify the operations of MNCs through real case assessment

Books for study:

1. Charles W.L. Hill, International Business: Competing in the Global Market Place, McGraw Hill, New York
2. Charles W.L. Hill, Chow How Wee & Krishna Udayasankar, International Business: An Asian Perspective – McGraw Hill, New York
3. Rakesh Mohan Joshi (2009), International Business, Oxford University Press

Books for reference:

1. Donald Ball, Michael Geringer, Michael Minor & Jeanne McNett, International Business: The Challenge of Global Competition, McGraw Hill Education, New York
2. Alan Rugman & Simon Collinson, International Business: Pearson Education, Singapore

Webreferences:

1. <https://www.icsi.edu/media/webmodules/publications/9.5%20International%20Business.pdf>
2. https://ebooks.lpude.in/commerce/mcom/term_3/DCOM501_INTERNATIONAL_BUSINESS.pdf
3. <https://www.shobhituniversity.ac.in/pdf/econtent/International-Business-Unit-1-Dr-Neha-Yajurvedi.pdf>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	1	3	1	2	2	2	3	1	2
CO2	3	2	3	1	3	3	2	2	1
CO3	2	1	2	3	2	2	3	3	3
CO4	1	3	1	2	1	1	2	2	2
CO5	3	2	2	2	2	2	1	1	1

High –3

Medium–2

Low–1

SEMESTER-IV

Course Code	Course Title	L	T	P	C
23261GDSVI	Elective VI A-Organisational Behaviour	4	0	0	3

OBJECTIVES

- To understand the various aspects of human behaviour at work.
- To understand the role of motivation and job satisfaction in organisational commitment
- To analyse different forms of organisational structure and contemporary communication tools.
- To analyse the importance of Transactional analysis in facilitating negotiations and conflict management.
- To gain knowledge on recent trends in organisational change and development.

UNIT I

Introduction to Organizational Behaviour and Learning

Introduction to Organizational Behaviour – OB Models – Challenges facing management – Personality – Perception – Attitudes – Values. Organisational Learning: Meaning, Theories (Chris Argyris and Donald Schon: Espoused theory, Theory-in-use, Three levels of learning) Introduction to learning organisation.

UNIT II

Motivation and Job Satisfaction

Motivation Theories –

Content theories (Maslow, Herzberg, ERG), Process Theories (Vroom, Porter and Lawler) –

Job Satisfaction – Organisational commitment.

UNIT III

Organisational structure and Communication

Organisational structure – Factors, Forms. Importance of virtual organisations –

Organisational communication –

Importance, Forms, Functions. Organisational climate and culture. Business communication: Harnessing Business Emails and Corporate Communication tools.

UNIT IV

Transactional Analysis and Organizational Conflicts

Transactional analysis: Meaning, Benefits, Levels of self-awareness, Analysis of transactions.

Organizational Conflicts – Process, Levels, Conflict management. Negotiation – Types and Process- Introduction to Workplace Spirituality.

UNIT V

Contemporary practices in Organisational Change and Development

International Organisational Behaviour Practices - Organizational Change and Change Management. Organisational Development – Meaning, Models and Interventions.

Course Outcomes

- Identify the effect of OB models and organizational learning on human behaviour
- Assess theories of motivation and their impact on job satisfaction.
- Examine effective communication tools for better organisational climate.
- Analyse interpersonal transactions at workplace.
- Analyse the various OB models for change management and development in the organization.

Books for study:

1. Aswathappa, (2021) "Organizational Behaviour (Text, Cases and Games)", 7th Edition, Himalaya Publication, Mumbai.
2. Subba Rao, (2021) "Organizational Behaviour", 6th Edition, Himalaya Publication, Mumbai.
3. S.S. Khanka, (2021) "Organizational Behaviour (Text and Cases)", 4th Edition, S. Chand, Noida (UP).
4. L.M. Prasad, (2016) "Organizational Behaviour", 6th Edition, Sultan Chand, New Delhi.

Books for reference:

1. Kavitha Singh, (2022) "Organizational Behaviour (Text and Cases)", 3rd Edition, Sulthan. Chand, New Delhi.
2. Fred Luthans, (2017) "Organizational Behaviour", 12th Edition, McGraw Hill International Edition, New York (USA).

3. Stephen P. Robbins, Timothy A. Judge, Eharika Vohra, (2018) "Organizational Behavior", 18th Edition, Pearson Education, London.
4. Mishra M.N. (2001), "Organizational Behaviour", 1st Edition, S. Chand, Noida (UP).

Webreferences:

1. <http://www.nwlink.com/~donclark/leader/leadob.html>
2. https://www.tankonyvtar.hu/hu/tartalom/tamop412A/20110023_Psychology/030300.scor1
3. <https://www.workvivo.com/blog/corporate-communication/>
4. <https://www.mbaknol.com/management-concepts/concept-of-workplacespirituality/>
5. <http://www.essentialtoolsseries.com/SpringboardWebApp/userfiles/estools/file/Chapter%202.pdf>

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	2	3	3	3	3	2	3
CO2	3	3	2	3	3	3	3	2	3
CO3	3	3	2	3	3	3	3	2	3
CO4	3	3	2	3	3	3	3	2	3
CO5	3	3	2	3	3	3	3	2	3

High -3

Medium-2

Low-1

SEMESTER-IV

Course Code	Course Title	L	T	P	C
23261GDSVI	VI B-Insolvency Law and Practice	4	0	0	3

OBJECTIVES

- To gain knowledge on Insolvency and Bankruptcy Code
- To gain knowledge of the recent developments in the arena of Insolvency Law and Bankruptcy code
- To understand the legal, procedural and practical aspects of Insolvency and its resolution
- To analyse cross border insolvency laws and insolvency resolution
- To evaluate code of conduct laid down for Insolvency practitioners

UNIT I

Introduction to Insolvency and Bankruptcy Code

Introduction to Insolvency and Bankruptcy Code: Concepts, Need for the Insolvency and Bankruptcy Code 2016- Important Definitions.

UNIT II

Corporate Insolvency Resolution Process

Corporate Insolvency Resolution Process: Legal Provisions; Committee of Creditors; Procedure; Documentation; Appearance; Approval. Insolvency Resolution of Corporate Persons: Contents of resolution plan; Submission of resolution plan; Approval of resolution plan – Resolution Strategies: Restructuring of Equity and Debt – Compromise and Arrangement; Acquisition; Takeover and Change of Management; Sale of Assets.

UNIT III

Liquidation and Adjudication of Corporate Persons

Liquidation of Corporate Person: Initiation of Liquidation; Powers and duties of Liquidator; Liquidation Estate; Distribution of assets; Dissolution of corporate debtor - Voluntary Liquidation of Companies: Procedure for Voluntary Liquidation; Initiation of Liquidation; Effect of liquidation;

Appointment; Remuneration; Powers and duties of Liquidator; Completion of Liquidation- Adjudication and Appeals for Corporate Persons: Adjudicating Authority in relation to insolvency resolution and liquidation for corporate persons; Jurisdiction of NCLT; Grounds for appeal against order of liquidation; Appeal to Supreme Court on question of law; Penalty of carrying on business fraudulently to defraud traders.

UNIT IV

Cross Border Insolvency

Cross Border Insolvency: Introduction; Global developments; UNCITRAL Legislative Guide on Insolvency Laws; UNCITRAL Model Law on Cross Border Insolvency; World Bank Principles for Effective Insolvency and Creditor Rights; ADB principles of Corporate Rescue and Rehabilitation; Enabling provisions for cross border transactions under IBC, Agreements with foreign countries.

UNIT V

Professional and Ethical Practices for Insolvency Practitioners

Professional and Ethical Practices for Insolvency Practitioners: Responsibility and accountability of Insolvency Practitioners; Code of conduct; Case laws; Case Studies; and Practical aspects.

Course Outcomes

- Recall the concepts, need for the insolvency and Bankruptcy Code 2016.
- Analyse the provisions relating to Corporate Insolvency Resolution Process, Insolvency resolution of corporate persons and Resolution strategies
- Analyse the legal provisions of Liquidation of Corporate Person, Companies and Adjudication and Appeals for Corporate Persons
- Summarise the provisions relating to Cross Border Insolvency
- Examine the Professional and Ethical Practices for Insolvency Practitioners

Books for study:

1. Prasad Vijay Bhat, Divya Bajpai (2022), "Corporate Restructuring Insolvency Liquidation & Winding-Up", 4th Edition, Taxmann, New Delhi
2. Ayush J Rajani, Khushboo Rajani and Alka Adatia (2022), "Comprehensive Guide to Insolvency and Bankruptcy Code, 2016 – Law & Practice", 3rd Edition, Bloomsbury Publishing India Pvt. Ltd., New Delhi.
3. Sumant Batra (2017), "Corporate Insolvency Law and Practice", 1st Edition, Eastern Book Company, Bangalore.

Books for reference:

1. Vats R.P., Apoorv Sarvaria, Yashika Sarvaria (2022), "Law & Practice of Insolvency & Bankruptcy", Taxmann, New Delhi
2. Taxmann's - Insolvency and Bankruptcy Law Manual Taxmann publications, New Delhi
3. ICSI Study Material on Insolvency - Law and Practice, New Delhi

Web references:

1. <https://www.mca.gov.in/Ministry/pdf/TheInsolvencyandBankruptcyofIndia.pdf>
2. <https://ibbi.gov.in/en/legal-framework/act>
3. https://www.indiacode.nic.in/handle/123456789/2154?sam_handle=123456789/1362

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	3	3	2	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	3	3
CO4	3	3	2	3	3	3	3	3	3
CO5	3	3	2	3	3	3	3	3	3

High -3

Medium-2

Low-1



**PONNAIYAH RAMAJAYAM INSTITUTE OF
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Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956

**SCHOOL OF LAW
PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)**

PROGRAM HANDBOOK

LL.B. (Hons.)

3 year course

[Regulation 2023]

[For the Candidates admitted from the academic year 2023 - 24 onwards]

**SCHOOL OF LAW
PONNAIYAH RAMAJAYAM INSTITUTE OF
SCIENCE & TECHNOLOGY (PRIST)
LL.B. (Hons.)**

(For the candidates admitted from the academic year 2023 - 24 onwards)

COURSE STRUCTURE

Course Code	Course Title	L	T	P	C	Marks
SEMESTER - I						
23L3LLBH1	General English	5	1	0	3	100
23L3LLBH2	Jurisprudence	5	1	0	5	100
23L3LLBH3	Law of Contracts – I	5	1	0	5	100
23L3LLBH4	Law of Torts	5	1	0	6	100
23L3LLBH5	Family Law – I	5	1	0	6	100
23L3LLBH6	Law of Crimes	5	1	0	6	100
	Total	30	6	0	31	
SEMESTER-II						
23L3LLBH7	Law of Contracts – II	5	1	0	3	100
23L3LLBH8	Property Law	5	1	0	5	100
23L3LLBH9	Constitutional Law	5	1	0	5	100
23L3LLBH10	Family Law II	5	1	0	6	100
23L3LLBH11	Practical – I (Professional Ethics, Accountancy for Lawyers, Bar – Bench Relations)	5	1	0	6	100
	Total	25	5		25	
SEMESTER-III						
23L3LLBH12	Constitutional Law – II	5	1	0	5	100
23L3LLBH13	Land Laws	5	1	0	5	100
23L3LLBH14	Interpretation of Statutes	5	1	0	6	100
23L3LLBH15	Company Law	5	1	0	6	100
23L3LLBH16	Banking Law including Negotiable Instruments Act	5	1	0	6	100
	Total	25	5		28	
SEMESTER-IV						
23L3LLBH17	Law of Evidence	5	1	0	5	100
23L3LLBH18	Administrative Law	5	1	0	5	100

23L3LLBH19	Labour Law – I	5	1	0	6	100
23L3LLBH20	International Law	5	1	0	6	100
23L3LLBH21	Practical II (Arbitration & ADR Systems)	5	1	0	6	100
	Total	25	5		28	
SEMESTER – V						
23L3LLBH22	Civil Procedure Code	5	1	0	5	100
23L3LLBH23	Criminal Procedure Code	5	1	0	5	100
23L3LLBH24	Environmental Laws	5	1	0	6	100
23L3LLBH25	Labour Law II	5	1	0	6	100
23L3LLBH26	Taxation Laws	5	1	0	6	100
	Total	25	5		28	

SEMESTER – VI						
23L3LLBH27	Criminology & Penology	5	1	0	5	100
23L3LLBH28	Intellectual Property Law	5	1	0	5	100
23L3LLBH29	Human Rights Law	5	1	0	6	100
23L3LLBH30	Practical III – Moot Court Internship	5	1	0	6	100
23L3LLBH31	Practical IV – Drafting, Pleading and Conveyancing	5	1	0	6	100
	Total	25	5		28	

LL.B.(Hons.) (Three Year Course)

I-SEMESTER

23L3LLBH1 - General English

(The Theory Paper shall be of 60 marks and of 3 hours duration. The question asked may be objective and subjective both or subjective only. 40

Marks have been assigned for sessionals)

Unit - I Prose

1. The Divisions of the Law
2. Mechanism of Scholarship

3. Methods of Study
 4. Case Law Technique
 5. Working out Problems
 6. Moots and Mock Trials
- from Learning the Law by Glanville Williams
7. Part-I: Keeping the streams of Justice Clear and Pure from The Due Process of Law by Lord Denning

Unit - II Linguistics

1. Phonetics - Speech Sounds - Vowels, Diphthongs & Consonants
Transcription

2. Language Acquisition - Uses and Problems, Language Register, Jargon, Dialectal Variation of Language

Unit - III Logic

General Principles of Logic - Deductive and Inductive Logic, Syllogism, Rules of Syllogism; Proposition, Distribution of Terms and Fallacies.

Unit - IV Essays

Essay Writing on topics of Legal Interest

Books for Reference

1. Glanville Williams : Learning the Law (14th Edition)
2. Lord Denning ; The Due Process of Law
3. David Annousamy ; Answers to Language problems
4. K. Sreedhara Variar ; Logic
5. W. Bedford Soloman ; Pre-University Logic
6. Daniel Jones ; English Pronouncing Dictionary
7. Sasikumar V. and ; Spoken English: A Self-earning P.V. Dhamija, 1993 Guide to Conversation Practice. 34th Reprint Tata McGraw Hill, New Delhi.
8. Lewis, Norma, 1991 ; Word Power Made Easy - Pocket Books

LL.B.(Hons.) (Three Year Course)

I-SEMESTER

23L3LLBH2 - Jurisprudence

(The Theory Paper shall be of 60 marks and of 3 hours duration.

The question asked may be objective and subjective both or subjective only. 40 Marks have been assigned for sessionals)

Unit - I Nature and definition of Jurisprudence.

Unit - II The various schools of jurisprudence and their methodology.

Unit - III Nature and definitions of law - Different kinds, and classification, Imperative theory of law - Constitutional law and International law - their nature.

Unit - IV The concept of State and Sovereignty - a general outline.

Unit - V Sources of law - Legislation, Precedent and Custom.

Unit - VI Administration of Justice.

Unit - VII Juristic Concepts of Rights and Duties, Title, Persons, Liability, Ownership, Possession, Property and Obligation.

Books for Reference :

1. Salmond - Jurisprudence
2. Paton - Jurisprudence.
3. Monica David - Jurisprudence.
4. G.C.V. Subba Rao - Jurisprudence.
5. Avatar Singh - Jurisprudence
6. Mahajan - Jurisprudence

LL.B.(Hons.) (Three Year Course)

I-SEMESTER

23L3LLBH3 – Law of Contract I

(The Theory Paper shall be of 60 marks and of 3 hours duration.

The question asked may be objective and subjective both or subjective only. 40 Marks have been assigned for sessionals)

Unit - I Introduction to General Principles of contract : Basis and Nature of Contracts.

Unit - II Privity of Contract - Development of Contract - Development of Specialised Contract.

Unit - III Types of Contract - Void. Voidable and Unenforceable Contracts: Express and Implied Contracts, Unilateral and Bilateral Contracts - e - Contracts - Analysis of Contract - Theory Consensus - Essential Elements of a Contract.

Unit - IV Formation: Offer and Acceptance - Offer and Invitation to Treat - Fact of Acceptance - acceptance in case of tender - communication of acceptance - Acceptance in Person, By Post, Telephone, Telegram etc. - Revocation of Acceptance, termination of offer.

Unit - V Terms Of Contract: Warranty, Condition, Fundamental Obligation - Ticket Cases.

Unit - VI Consideration - Definition Indian and English, Executed - Executory and Past - must move from the promises – Adequacy and Reality of Consideration - Performance of Existing Duty - Consideration in Discharge of Contract - Rule in Pinnels case, High Trees case, Composition with Creditors - Difference between English and Indian Law.

Unit - VII Intention to Create Legal Obligation

Unit - VIII Capacity to Contract: (i) Infants; (ii) Lunatic; (iii) Drunken Persons; (iv) Alien Enemies; (v) Corporation; (vi) Foreign Sovereigns and Ambassadors; (Vii) Married Women, Contract of Necessaries - Basis of such Contracts - Infant Relief Act of 1874 - Beneficial Contracts of Service Equitable Doctrine of Restitution - Delictual Liability - English and Indian Law.

Unit - IX Flaw in Consent: Mistakes of Fact and Law - As to identify As to title - As to the existence the Non-Subject matter - As to „quality - As to written contract (non est factum) Error in Verbis-Error in „Causa“ difference between English and Indian Law.

Unit - X Misrepresentation: Innocent or Fraudulent - Elements of an Effective Representation - Can Silence Amount to Representation which is a Term of Contract or Mere Representation - Condition or Warranty.

Unit - XI Limits or Rights to Rescind.

Unit - XII Coercion - Duress. Undue Influence, Unconscionable bargains.

Unit - XIII Unlawful Agreements: By Common Law (Public Policy) Stiffing of Prosecution, Maintenance, Champerty – Agreements which tend to affect the Freedom or Security of Marriage - Immoral - Agreement - Outside, The Jurisdiction of Courts - Restraint of Trade - Wagering Contracts Restraint of Parental Right, Restraint of Personal Liberty, Consequences of Illegality Impari Delicto - Difference between illegal and Void Contract.

Unit - XIV Limits of Contractual Obligation : Privity of Contract - Strangers to a Contract sue or cannot be bound by its terms. Agreement of Contractual Rights and Liabilities.

Unit - XV Discharge of Contracts: By Performance – Tender by express Agreement - Accord and Satisfaction - Bilateral and Unilateral Discharge - The Doctrine of Frustration - Theories of Frustration-Operation of Doctrine, Effect of Doctrine Difference between English and Indian Law.

Unit - XVI By Breach: Anticipatory Breach.

Unit - XVII. Remedies for Breach of Contract – Measure of Damages, Remoteness of Damages, Penalty and Liquidated Damages, Mitigation of Damages.

Unit - XVIII Quasi Contract: Definition - Historical Basis - Quantum Meruit, Obligation, Resembling those created by Contract under Indian Act.

Unit - XIX Miscellaneous: Contingent Contracts – Appropriation of Payments - Time and Place of Performance - Joint Promises and Reciprocal Promises.

Unit - XX Specific Relief Act: Recovering Possession of Property specific performance of contracts - Contracts which can be specifically enforced contracts which can be specifically enforced - Persons for or against whom contracts may be specifically enforced – Discretionary Powers of Court, Ratification or Instruments - Rescission of Contract, Cancellation of Instruments - Declaratory Degree - Preventive Relief - Injunction Generally - Perpetual Injunction.

Statutory Materials with Amendments

1. The Indian Contract Act. 1872
2. Specific Relief Act, 1963.
3. Information Technology Act, 2000

Books for Reference

1. Anson - Contracts
2. Pollock and Mulla - Contracts (Students Edition)
3. Prof. Subba Rao, G.C.V. - Specific Relief Act.

4. Avtar Singh - Law of Contracts.
5. Cheshire - Law of Contracts
6. Venkatesan - Law of Contracts
7. Krishna Nair - Law of Contracts
8. N.D. Kapoor - Mercantile law

LL.B.(Hons.) (Three Year Course)

I-SEMESTER

23L3LLBH4 – Law of Torts

Unit - I General Principles

Origin and Development of Torts Definition of Tort-distinction between Tort and Crime - Tort and Contract, Tort and breach of Trust - Foundation of Tortious Liability - Fault as a condition of liability. Essential condition of liability in Tort - Duty of Care - Damnum sine injuria, Injuria sine damno-Relevance of malice - The impact of Insurance on Tort Liability - Individual and Collective - Motor Accidents Claims.

Unit - II General Defences

Volenti - Non fit injuria - Inevitable Accident, Necessity – Private Defence - Mistake, Statutory Authority - Act of God.

Unit - III Parties and their capacity

The State and its Subordinate Officers of State- Minors, Lunatic and Drunkards - Married Women, Corporation Union Corporate Bodies - Foreign Ambassadors. Unit - IV Masters and Servants Servant Independent Contractors, Course Employment and Common Employment - Master's Duties to Servant and vice versa.

Unit - V Joint Tortfeasors.

Unit - VI Remedies.

Unit - VII Remoteness of Damage - Novus Actus Interveniens.

Unit - VIII Successive actions on the same facts - Effect of Merger and

Death. Unit - IX Specific Torts:

(a) Wrong to Persons and Reputation - Death, Assault, Battery false, Imprisonment, Nervous shock, Defamation, Status.

(b) Wrongs to Property to Land and Chattels.

(c) Negligence.

(d) Nuisance - Nuisance and Injury of Servitude's Highways etc.

(e) Strict & Absolute Liability - Liability for dangerous chattels animals and structures or Premises.

(f) Conspiracy, Interference with freedom of contractual and Business relationship - Injurious falsehood slander of title or of goods - Passing off - Abuse of legal procedure.

(g) Foreign Torts - Miscellaneous and Doubtful Torts Invasion of

Privacy. Unit -X Discharge of Torts.

Books for Reference

1. Winfield : Law of Torts.

2. Salmond : Law of Torts.
3. Ramasamy Iyer. S : Law of Torts.
4. Mitra : Motor Vehicles Act.
5. V.N.Shukla : Law of Torts.
6. B.M.Gandhi : Law of Torts. 7.
- P.S.A.Pillai : Law of Torts. 8.
- Ratanlal Dhirajlal : Law of Torts.
9. R.K.Bangia : Law of Torts

LL.B.(Hons.) (Three Year Course)

I-SEMESTER

23L3LLBH5 – Family Law – I

Unit - I

Source: Traditional and modern sources of personal Laws. Evolution of the Hindu Joint Family - The Classical schools.

Unit - II

Law of Marriage: Hindu, Muslim and Christian Laws of marriage and divorce. The nature of the institution of Marriage and its development, the capacity, nuptial rights and the effect of void and voidable marriage under the aforesaid systems of law. Hindu law of marriage and divorce with reference to the changes brought about by modern legislation. Muslim law of marriage and divorce will include Law of Dower.

Unit - III

Law of Adoption: Hindu law of Adoption with special reference to the juristic concept and development of case laws and changes brought about by the Hindu Adoption and Maintenance Act, 1956. The Muslim Laws of Legitimacy. Parentage and the Doctrine of Acknowledgement of paternity.

Unit - IV

The Law of Guardianship: The Hindu Law of Minority and Guardianship and Maintenance and changes brought about by modern legislation. Muslim Law of minority and Guardianship and Maintenance.

Unit - V

Maintenance: The Hindu, Muslim and Christian law relating to Maintenance.

Statutory Materials with Amendments

1. Hindu Widows Re Marriage Act, 1956.
2. Child Marriage Restraint Act, 1929.
3. Special Marriage Act, 1954.
4. Hindu Marriage Act, 1955.
5. Hindu Adoptions and Maintenance Act, 1956.
6. Hindu Minority and Guardianship Act, 1956.
7. Hindu Women's Right to separate Residence Act, 1956.
8. Prohibition of Child Marriages Act, 2006
9. Guardianship and Wards Act, 1890.
10. Guardianship Act.
11. Personal laws (Amendment Act) 2010.
12. Indian Majority Act, 1875.
13. The dissolution of Muslim Marriage Act, 1939.
14. The Christian Marriage Act, 1872.
15. Indian Divorce Act, 1896.

Books for Reference

1. Mulla - Hindu Law
2. N.R. Raghavachari - Hindu Law
3. Mulla - Mohammedan Law
4. A.A. Fyzee - Outlines of Mohammedan Law
5. S.N. Gupta - Maintenance and Guardianship Act
6. M.N.Srinivasan - Hindu Law

LL.B.(Hons.) (Three Year Course)

I-SEMESTER

23L3LLBH6 – Law of Crimes

Unit - I Crime Introduction Crime - Concept – Constituent Elements of Crime - Actus reas and mensrea - Types – Strict Responsibility in Criminal Law - Mensrea in Statutory Offences.

Unit - II General Defences - Conditions - Negative Criminal Responsibility, Mistake of Fact, Judicial Acts, Accident, Doctrine of Necessity, Infancy, Insanity, Intoxication, Consent, Compulsion, Duress, Triviality, Right of private Defence.

Unit - III Parties to a Crime - Joint and Constructive Liability - Group Liability - Abetment - Conspiracy, Attempt - Corporate Liability Accessories after the fact.

Unit - IV Jurisdiction - Personal, Territorial, Extra - Territorial,

Admiralty. Unit - V Punishment - Objective, Basis and Types.

Unit - VI Specific Crimes

(a) Offences affecting public.

(i) Against State (Sedition)

(ii) Against Public Peace - Unlawful Assembly, Rioting, Affray.

(iii) Against Public Administration - Bribery, Personation.

(b) Offence against Administration of Justice Giving and Fabricating false statement

(c) Offences against Persons - Homicide (murder, culpable homicide and negligent homicide), Hurt and grievous hurt, Wrongful restraint and confinement, Kidnapping and abduction Sexual assault, rape, stalking, voyeurism, etc.,

(d) Offences against Property- Theft, Extortion, Robbery, Dacoity, Criminal misappropriation and Breach of trust, Cheating, Forgery, Mischief and Criminal Trespass.

(e) Offences relating to Marriage and Religion.

(f) Defamation, Criminal insult, Criminal intimidation etc.,

(g) Cyber crimes

Unit - VII Law of Attempt.

Statutory Materials with Amendments

1. The Indian Penal Code, 1860.
2. Criminal Law Amendment Act, 2010 & 2013.

Books for Reference:

1. Kenny : Outlines of Criminal Law (Chapters relating to General Principles).
2. Ratanlal : The Indian Penal Code.
3. Gour, K.D. : Criminal Law
4. Dr.H.S.Gour : Penal Law of India 5.
- Raghavan V.V. : Law of crimes 6.
- Atchutham Pillai : Criminal law 7.
- B.M.Gandhi : Indian Penal Code. 8.
- Glanavile Williams : Criminal law crimes.
9. Russel : Criminal law
- 10.Ejaz : Law of crimes
11. Nigam : Law of crime

LL.B.(Hons.) (Three Year Course)

II-SEMESTER

23L3LLBH7 – Law of Contract II

Unit - I Indemnity

1. Definition - English and Indian
- 2.. Rights of the Indemnity holder
3. Rights of the Indemnifier.
4. Rights of Indemnity dealt with Sections 59,145,164 and 222 of the Contract Act. 5. Codification not exhaustive - principles of equity applicable

Unit - II Guarantee

1. Definition - English and Indian definitions
2. Essentials and nature of guarantee
3. Distinction between guarantee and indemnity – guarantee and Insurance 4. Elements of consideration in a contract of guarantee
5. Nature and quantum of surety's liability
6. Kinds of guarantee and their incidents
7. Surety ship arises on contract and not on notice-position in English Law 8. Duty of disclosure in guarantee
9. Rights of surety against principal debtor - credit or - co - sureties - difference in English Law - Circumstances which a surety discharges

Unit - III Bailment

1. Definition - Indian and English definitions
2. Essentials of bailment and classification of bailment
3. Distinction between bailment and pledge - deposit - sale - agency 4. Rights and duties of the bailor and bailee - difference in English Law
5. Pledge - definition - Rights of the Pawner and Pawnee
6. Pledge by non - pawners
7. Lien - kinds of lien - their nature and incidents - how lost

Unit -IV Sale Of Goods

1. Definition of sale and agreement to sell - distinction between sale and agreement to self -contract of work and layout. Hire purchase agreement - Bailment - Exchange - Gift.

2. Definitions - goods - specific goods - future goods - Mercantile agent - Documents of title of goods.
3. How is sale made - rules for fixing price and effect of goods getting damages or perished in a contract of sale.
4. Stipulation as to time and other stipulation
5. Conditions and warranties - effect of breach - ex - post facto Warranty - when condition is treated as warranty
6. Implied conditions and warranties - in a contract of sale - Exemption clauses - effect of fundamental breach
7. Rule as to passing off property
8. Sale by non - owners - exception to Nemo data quod non habet.
9. Rules as to delivery
10. Unpaid vendor - His rights or lien and stoppage in transit
11. Remedies available to seller and buyer
12. Auction sales
13. Competition law

Unit -V Agency

1. Definition of contract of agency - Creation of agency – kinds of agency
2. Distinction between Agent and servant and independent contractor
3. Who may be an agent - kinds of Agents - Authority of the different kinds of Agents - authority of Agents – Ostensible and emergency - delegation of authority - delegatus non potest delegare - sub agent - substituted agent
4. Essentials of ratification and its effect
5. Effect to notice to agent - necessary conditions to bind Principal
6. Principal and third parties - The doctrine of undisclosed - Principal and concealed Principal
7. Termination of agency and when it becomes irrevocable

Unit -VI Partnership

1. Definition of partnership - Essentials of partnership – Joint Hindu - partner ship
2. Distinction between partnership and co-ownership – Joint Hindu family - Incorporation companies - contract of service - legal notion and mercantile notion
3. Kinds of partners and duration of partnership
4. Natural rights and duties of partnership.
5. Minor as a partner - difference in English Law
6. Rights of Legal Representative and surviving partners
7. Authority of partners implied and emergency
8. Liability of the partners for the acts of the firm and for the wrongful acts of other partner - nature of liability - limited liability partnership.
9. Principles of agency in partnership
10. Partnership property - Tests
11. Settlement of accounts - Goodwill and its disposal - distribution of assets
12. Retirement of partners
13. Dissolution of firm and modes and circumstances
14. Effect of non - registration of firm

Unit -VII Consumer Protection

1. History of Consumer Protection movement in India
2. Consumer Protection Act. Definition of Complainant, Complaint, Consumer, Goods Restrictive Trade practice, Service, unfair Trade Practice
3. Consumer Protection councils - its organization, objects and procedure
4. Consumer disputes redressal agencies - kinds, establishment, composition, jurisdiction
5. Complaint - manner in which made, procedure on receipt of Appeals, Limitation period, dismissal of frivolous or vexatious complaints.
6. Orders of the Consumer Disputes Redressal Agencies – findings of the forum -

finality of orders, enforcement of orders, penalties.

Statutory Materials with Amendments

1. Indian Contract Act, 1872
2. Sale of goods Act 1930
3. Indian Partnership Act, 1932
4. Consumer Protection Act, 1986
5. Limited liability of Partnership Act, 2008
6. Indian Partnership (Tamil Nadu Amendment Act No. 21 of 1959)
7. Competition Act, 2002

Books for Reference

1. Avatar Singh - The Law of Contracts
2. Mulla - Sale of goods
3. Krishna Nair - Law of Contracts
4. Anson - Law of Contracts
5. Avatar Singh - Competition Law
6. Avtar Singh - Law of Consumer Protection (Principles & Practice)
7. P.K. Majumdar - Law of Consumer Protection in India
8. S.S. Gulshan - Consumer Protection & Satisfaction
9. Leela Krishnan - Consumer Protection & Legal Control
10. Avtar Singh - Law of Contracts (Indemnity Guarantee, Bailment & Agency)

LL.B.(Hons.) (Three Year Course)

II-SEMESTER

23L3LLBH8 – Property Law

Unit - I Introduction

General principles relating to transfer of property in India Nature and interest in property, subject matter of transfer restrictive covenants, future interest, conditional transfers -transfer to unborn persons, capacity to transfer, doctrines of elections, holding out, holders under defective titles, lis pendens part, performance -Fradulent transfer, Benami Transactions Doctrine of priority

Unit - II Specific Transfers Specific transfers - Sales, Mortgage, lease, exchange, gift and actionable claims

- (a) Definition of Sale
- (b) Difference between sale and contract for sale, in English Law and Indian Law with reference to decided cases, rights and liabilities of buyers and seller
- (c) Doctrine of marshalling in English and Indian Law
- (d) Different types of mortgages - simple mortgages, mortgages by conditional sale, usufructory mortgage, English Law and Indian Law with reference to decided cases.
- (e) Mortgage when to be by assurance
- (f) Rights and liabilities of mortgagator
- (g) Rights and liabilities of mortgages both with reference to English Law and Indian Law
- (h) Doctrine of clog, clog on the equity of redemption in English Law and Indian Law
- (i) Doctrine of redemption and mortgagor's right therein.
- (j) Accession to mortgage properties in English and Indian Law
- (k) Doctrine of priority in English Law and Indian Law.
- (l) Doctrine of marshalling and doctrine of contribution in English Law and Indian Law.
- (m) Redemption by persons other than the mortgagator.
- (n) Doctrine of subrogation

(o) Doctrine of tackling in English Law and Indian Law

Unit - III Charge

- (a) Definition of charge
- (b) Doctrine of notice and tender ,,

Unit - IV Lease

- (a) Definition of lease
- (b) Definition of lessor, lessor premium and rent.
- (c) Leases - how made and kinds of leases - Distinction between a lease and license
- (d) Right and liabilities of lessor
- (e) Rights and liabilities of the lessee both in English law and Indian Law with reference to decided cases

Unit - V Gift And Exchange

- (a) Definition of Exchange, rights and liabilities of parties – Exchange of money in Indian and English Law
- (b) Definition of gifts - its ingredients
- (c) Gift of existing and future property. Gift to several of whom one does not accept.
- (d) Suspension and revocation of gifts. Onerous gifts, Universal donee. Donatio mortis causa and Mohammedan Law. Application in English and Indian Law.
- (e) Transfer of policy of marine insurance with reference to Indian and English Law.

Unit - VI Easements - Easements generally - imposition – acquisition and transfer of easement - incidence of easement - Disturbance, extinction, suspension, revival of easements.

Unit - VII Licences - Difference between Easements and Licences.

Statutory Materials with Amendments

1. The Transfer of Property Act, 1882.
2. The Indian Easement Act, 1882.
3. Benami Transactions Prohibition Act, 1988

Books for Reference:

1. G.Sanjiva Row - Commentaries on Easements and license
2. Vepa Sarathi - Law of Transfer of Property Act
3. Shah - Principle of Transfer.
4. Mulla - The Transfer of Property
5. Krishna Menon - The Transfer of Property
6. G.C.V. Subba Rao - The Transfer of Property
7. A.I.R. Commentaries - The Transfer of Property
8. W.Friedmann - Law in a changing society
9. Mitra - Transfer of Property
10. Goyle - Transfer of Property
11. C.L.Gupta - Law of Transfer of Property
12. Khatiar - Law of Easements
13. AIR Commentaries

LL.B.(Hons.) (Three Year Course)

II-SEMESTER

23L3LLBH9 – Constitutional Law I

Unit - I Constitution - • Definition - Constitutional Law - Classification of Constitution
* Difference between Constitutional Law and Administrative Law.

Unit - II Historical Background - Framing of the Constitution of India.

Unit - III Outstanding Features of the Indian Constitution - Nature of the Indian Constitution.

Unit - IV The Philosophy of the Constitution - Preamble and The Objective Resolution.

Unit - V The Union and its Territory - Territory of India - 35th & 36th Amendment - Formation of New States and Alteration of Boundaries, etc. - Procedure for Reorganization of States – Cession of Territory.

Unit - VI Citizenship - Meaning - Citizenship of India – Citizenship under the Citizenship Act, 1955 - Loss of Indian Citizenship.

Unit - VII Fundamental Rights - General Individual Rights and Fundamental Rights - Origin and Development of Fundamental Rights - Difference between Fundamental Rights and Rights secured by other provisions of the Constitution. Fundamental Rights in England and in the USA - Exceptions to Fundamental Rights – Amendability of Fundamental Rights -Suspension of Fundamental Rights - Classification of Fundamental Rights -Parliament’s Power to Modify or Restrict Fundamental Rights - Enforcement of Fundamental Rights - A Guarantee against State Action - Definition of State (Article 12) - Laws Inconsistent with Fundamental Rights - Power of Judicial Review - Effect of Pre-Constitutional Laws - Waiver of Fundamental Rights.

Unit - VIII Fundamental Rights - Part III of the Constitution of India - Right to Equality - Right to Freedoms - The Six Freedoms - Protection in respect of Conviction for Offences - Protection of the Life and Personal Liberty - Safeguards against Arbitrary Arrest and Detention - Right against Exploitation - Right to Freedom of Religion - Culture and Educational Rights - History of Right to Property under the Constitution of India - The 44th Amendment, 1978 - Vestiges of the Right to Property - Right to Constitutional Remedies.

Unit - IX Directive Principles of State Policy - Object of the Directives-Scope of the Directives - Directives compared with Fundamental Rights - Non-Justiciability - Conflict between Fundamental Rights and Directive Principles - Sanction behind the Directives - Utility of the Directives - Implementation of the Directives - Directives contained in other parts of the Constitution - Classification of the Directives - Social and Economic Charter – Social Security Charter - Community Welfare Charter.

Unit - X Fundamental Duties - Need for Fundamental Duties - Source of Fundamental Duties - Enforcement of Fundamental Duties.

Statutory Materials with
Amendments 1. Constitution of
India, 1950

Books for Reference:

1. V.N. Shukla - Constitutional Law of India
2. V.N. Panday - Constitutional Law of India
3. P.M. Bakshi - Constitutional Law of India
4. Seervai H.M. - Constitutional Law of India
5. D.D. Basu - Shorter Constitution of India 6.

M.P. Jain - Indian Constitutional Law 7.
Kashyap S.C. - Basic Constitutional Values.
8. Tope T.K. - Constitution of India.

LL.B.(Hons.) (Three Year Course)

II-SEMESTER

23L3LLBH10 – Family Law II

Unit - I Inheritance, succession, survivorship and management of Joint Family property and Marumakkathayam law - Law of Hindu joint family, Legal problems relating to debts and partition and impact of Modern Legislation - Law of Stridhana and changes brought about by legislation on Hindu joint Family system - Law of inheritance in Mithakshara and Dayabhaga Schools and changes brought about by modern legislation. Mohammedan law of inheritance with special reference to Shia and Sunni Schools - Hindu and Muslim Law of Wills - Relevant Portions of Indian Succession Act. Dealing with intestate succession of Christians Charitable and Religious Endowments and Wakfs - Gifts and Preemption.

Unit - II Administration of Estates in Mohammedan Law.

Statutory Materials with Amendments

1. Hindu Inheritance Disabilities Removal Act, 1928.
2. Hindu Law of Inheritance (Amendment) Act, 1929.
3. Hindu Gains of Learning Act, 1930.
4. Hindu Women's Right to Property Act, 1937.
5. Hindu Succession Act, 1956. as amended in 2005.
6. Hindu Succession Act, 1925.
7. The Wakf Act, 1954, as amended in 1995, 2013.
8. The Hindu Married Woman Right to Separate Residence and Maintenance Act, 1946
9. Hindu Succession (TamilNadu Amendment Act,) 1989

Books for Reference:

1. Dr.Paras Diwan - Family law
2. Paruk - Indian Succession Act
3. R.Swaroop - Hindu Law Of Succession
4. Mulla - Hindu Law
5. N.R. Raghavachari - Hindu Law
6. Mulla - Mohammedan Law
7. A.A. Fyze - Outlines of Mohammedan Law
8. K. Sreedhara Variar - Marumakkathayam Law
9. Mitra - Indian Succession Act

LL.B.(Hons.) (Three Year Course)

II-SEMESTER

23L3LLBH11 – Practical – I (Professional Ethics, Accountancy for Lawyers, Bar-Bench Relations)

Assessment Scheme

- i. Project on Professional Ethics
(Written Submission) : 25 Marks

ii. Case Study

(BCI, High Court and SC Judgements) : 25 Marks

iii. Tests (Internal) : 25 Marks iv. Viva Voce on Project and Case Study
: 25 Marks TOTAL 100 Marks

Unit - I Professional Ethics :

Professional Ethics - meaning and nature – Professional misconduct - meaning and ambit - Organisation, powers and jurisdiction of State Bar Councils and Bar Council of India - Disciplinary Committee of state Bar Councils and Bar Council of India - Organisation, procedure and powers - Remedies against order of punishment.

Unit - II Bar Bench Relations:

Contempt of Courts Act - Contempt of Court - Meaning and Nature - Categories of contempt of Court - Contempt Jurisdiction of the Subordinate Courts, High Courts and Supreme Court – Procedure - Punishment for contempt of Court - Remedies against Punishment.

Selected opinions of the disciplinary Committee of the Bar Council of India on Professional Misconduct:

1. Jagdish Singh and others v. T. C. Sharma.
2. Babulal v. Subash Jain
3. Balswaroop soni v. Babulal soni
4. Indure Ltd v. Deo Raj Guptha.
5. Commissioner of Civil Supplies and Consumer Protection Department v. V. Balakrishnan.
6. A. Banumurthy v. Bar Council of Andhra Pradesh
7. Dr. D. V. P. Raja v. D. Jayabalan
8. G. M. Hirmani v. Ishwarappa.
9. N. S. (Appellant) v. N. V. (Respondent)
10. P. R. (Complainant) v. V. I. (Respondent)
11. Ashok Kumar Yadhav v. Bar Council of India (19/1/2015).
12. C.Ravichandran Iyer v. Justice A.M.Bhattarcharjee (Disciplinary Power of Bar Council-Conduct of a Judge).
13. Supreme Court Bar Association v. Union of India and others (17 th April 1998)
14. An Advocate v. Bar Council of India and another on 29th September 1998.
15. D.P.Chadha v. Tiriyugi Narain Mishra and others December 2000

Selected Cases relating to Professional Misconduct and Contempt of

- Court: 1. Pawan Kumar Sharma v. Gurdial Singh (A.I.R. 1999 S.C. 98)
2. Mahabir Prasad Singh v. M/S Jacks Aviation Pvt. Ltd. (A.I.R. 1999 S.C. 287)
3. Supreme Court Bar Association v. Union of India (A.I.R. 1998 S.C. 1895)
4. P. D. Gupta v. Ramamurthy (A.I.R. 1998 S.C. 283)
5. Robtas Singh v. Commissioner Agra Division (A.I.R. 1997 S.C. 278)
6. Harish Chander Singh v. S. N. Tripathi (A.I.R. 1997 S.C. 879)
7. Hikmatali Khan v. Ishwar Prasad Aiyar (A.I.R 1997 S.C. 864)
8. Prahalad Saran Gupta v. Bar Council of India (A.I.R 1997 S.C. 1338)
9. Dr. Haniraj L. Chusani v. Bar Council of Maharashtra (A.I.R 1996 S.C. 1708)
10. Inre Dr. D. C. Saxend and. U. Saxena v. Hon^{ble} Chief Justice of India (A.I.R. 1996 S.C. 2491).
11. Sambhu Ram Yadhav v. Hanuman Das Khattry (2001 16 SCC 165).
12. B.M.Verma v. Uttarkhand Regulatory Commission (Appeal No.156 of 2007).
13. R.K.Anand v. Registrar of Delhi High Court (2009 85 SCC 106).
14. Harish Uppal v. Union of India (2003 (1) ACC MR (SC) 1169).
15. J.S. Jadhav Mustafa v. Haji Mohammed Yusuf (AIR 1993 SC 1608)

Accountancy for Lawyers:

Accountancy for lawyers - Purpose of keeping accounts - Important aspects relating to accountancy - Legal requirements for maintaining books of accounts - Accounts of Professionals.

Statutory Materials with Amendments

1. Advocate Act, 1961
2. Contempt of Courts Act, 1971
3. The Bar Council Code of Ethics.
4. Bar Council of India Rules 1975.

Books for Reference:

1. K. V. Krishnaswami Aiyar - "Professional conduct and Advocacy".
2. Dr. Kailash Rai - Legal Ethics, Accountancy for Lawyers and Bar Bench Relations.
3. Nabhi's Publications - Business and Professional Accounts.
4. Prof. B.N.B. Aliga - Traditions of the Bar - A. I. R. 1991 Journal 161
5. Mr. Justice M. M. Ismail - Professional Ethics and Etiquette Madras High Court Centenary Celebration
6. Professional Ethics, M.C.Setalvad.
7. Judicial Accountability, K.K.Venugopal
8. Professional Conduct, Taikad Subramanilyer.
9. The Lawyer's Strike And The Duty Of The Supreme Court, H.M.Seervai.
10. Role of Bar, H.R.Khanna.
11. The Indian Bar, P.P.Rao.
12. The American Bar Association Organization And Activities.
13. Bench-Bar Relations-Crisis Of Credibility, P.P.Rao.
14. Temper on The Bench, C.P.Singh.

LL.B.(Hons.) (Three Year Course)

III-SEMESTER

23L3LLBH12 – Constitutional Law II

Unit - I Organization of Executive Power - The President -Governors - Powers and Functions - Immunities – Pardoning Power - Ordinance Making Power - Judicial Decisions.

Unit - II Organization of Legislative Power - Parliament and the State Legislatures - Office of the Speaker - Chairperson of Rajya Sabha and Legislative Councils - Legislative Privileges – Judicial Interpretations - Qualifications and Disqualifications - X Schedule.

Unit - III Organization of Judicial Power - Supreme Court - High Courts - Appointment, Transfer and Removal – Independence of Judiciary - Tribunals.

Unit - IV Organization, Powers and Functions of the CAG, ECI and the Public Service Commissions - Constitutional Safeguards for Civil Servants.

Unit - V Constitutional Review - Need and extent of Review - Constitutional Review Committee's Report

Unit - VI Concept of Federalism - Necessity and Justification for Federal Governments - Essential Features of Federal Form of Government.

Unit - VII Legislative Relations under Indian Constitution - Doctrine of Territorial

Nexus - Doctrine of Pith and Substance - Colourable Legislation - Implied and Residuary Powers – Central Control over State Legislation - Areas of Conflict.

Unit - VIII Administrative Relations between Union and States - “Full Faith and Credit Clause” - Central and Inter-State Conflict Management.

Unit - IX Fiscal Relations between the Centre and States - Sharing of Taxes and Grants in Aid - Restrictions on the Power of State Legislature as Fiscal Powers - Doctrine of Immunity of Instrumentality - Role of Finance Commission - Borrowing Powers - Constitutional Limitations.

Unit - X Freedom of Trade and Commerce - Exceptions - Implications of the Concept of Federation.

Unit - XI Federalism and Emergency Situations - Types of Emergency and their Impact on the Federal Structure.

Unit - XII Amendment of the Constitution - Powers and Procedure for Amendment.

Statutory Materials with Amendments

1. Constitution of India, 1950.

Books for reference:

1. Dr. V. N. Shukla - Constitution of India
2. P. M. Bakshi - Constitution of India
3. Pandey - Constitution of India
4. Constituent Assembly Debates
5. Palanidurai .G - Dynamics of New Panchayatraj systems
6. D.N.Banerjee Some aspects of Indian constitution
7. Seervai H.M. - Constitutional Law of India
8. D.D. Basu - Shorter Constitution of India
9. M.P. Jain - Indian Constitutional Law
10. Dr. Anirudh Prasad - Centre - State Relations in India
11. S.N. Jain, Subash C. Kashyap and N. Srinivasan - The Union and the States
12. Dr. K.P. Krishna Shetty - The Law of Union-State Relations and India Federalism
13. Kashyap S.C. - Our Parliament
14. A.G. Noorani - The Presidential System: The Indian Debate
15. Venkatraman R. - My Presidential Years
16. Verinder Grover - Federal System, Centre – State Relations and State Autonomy
17. Kashyap S.C. - Basic Constitutional Values
18. Tope T.K. - Constitution of India

LL.B.(Hons.) (Three Year Course)

III-SEMESTER

23L3LLBH13 – Land Laws

Unit – I Historical Sketch of Land Reforms/land laws:

Concept of land : Kinds, Ownership and Possession of land – land reforms and constitutional history : Eminent domain –Right to Property under Article 31A,31B,31C of the constitution-Article 300A:Protection of personal property - Nineth Schedule-Early Revenue Administration in Tamil Nadu-Grants-Inams Zamindari system: Permanent settlement-Ryotwari: Rights and liabilities Of Ryotwari Pattadar –Tamil Nadu Estates (Abolition and Conversion into Ryotwari)Act,1948.

Unit – II Acquisition of Land

Land Acquisition Act, 1894 (repealed) - Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR Act, 2013) - Need for new land acquisition law - Definitions: affected family land, landowner, holding of land etc., Safeguards against indiscriminate land acquisition - Compensation - Rehabilitation and Resettlement - LARR Authority Apportionment of compensation - Payment of compensation Temporary Occupation of Land - Amendment Ordinance 2014 - Time to time amendments.

Unit – III Enactments and Cultivating Tenants

The Tamil Nadu Cultivating Tenants Protection Act, 1955 : Definitions landlord not entitled to evict the tenant - Right to restoration of Possession - Special provision for member of armed forces - Bar of Jurisdiction of Civil Courts - Revision by High courts - The Tamil Nadu Cultivating Tenants arrears of rent relief Act, 1972, 1980 - Tamil Nadu Cultivating Tenants Protection from Eviction Act, 1983, 1989.

The Tamil Nadu Cultivating Tenants (Payment of Fair Rent) Act, 1956: Definitions Interpretations - Right and liabilities of cultivating tenants and land owner - Fair rent Alteration or Revision of Fair Rent - Kaiaeruvaramdar and Mattuvaramdar - Rent Court and Rent Tribunals - Exception - Powers of High Court. The Tamil Nadu Agricultural Land Record of Tenancy Right Act, 1969: Definition - Preparation of Records of Tenancy Rights - Record Officer - Advisory Committee - Modification of entries in the draft and approved record of tenancy rights. Appeals - Revision - Penalty for failure to furnish information - cognizance of offence.

The Tamil Nadu Occupants of Kudiyruppu and Conferment of Ownership Act, 1971: Definitions - Occupant - Conferment of Ownership - Alternative Site - Prohibition of alienation - authorised Officer - compensation - Offences by companies.

Unit – IV Law and Land Ceiling

Tamil Nadu Land Reforms Fixation of Ceiling on Land Act, 1961 and Amended act 1971: Preliminary - Definitions: Ceiling area, Family, Stridhana Property, Standard Acre, etc., Fixation of Ceiling on land holdings - Land Board - Industrial undertakings - Publication of statement - Land Tribunal - Authorised officer - Determination of Compensation - Exemptions - Special Appellate Tribunal - Courts - Penal Provisions.

Unit – V Law and Buildings

Tenancy law: The Tamil Nadu Buildings (lease and rent control) Act, 1960: Introduction - Definitions - Fixation of Fair rent - Changes in Fair Rent - Agreed rent - Procedure for avoid default in payment of rent - Grounds for eviction of tenant Jurisdiction of the Rent Controller - Execution Proceedings by Legal representatives or against Legal representatives - Appeal. Tamil Nadu Apartment Ownership Act, 1994 : Definition Ownership, Heritability and transferability of Apartment - Deeds of Apartment and its Registration - Societies or Association of Apartment Owners, its bye-laws and Functions.

(Note: Statutory Materials with Amendments All Acts specified in the above units.)

Books for Reference

1. K. Venkata Rao - The Tamil Nadu Land Reforms Act.
2. V.N. Krishnamoorthy - The Tamil Nadu Building Lease and Rent Control Act, 1960.
3. Prof. A. Chandrasekar - Land Laws of Tamil Nadu
4. Beverly. H - Commentaries on the Land Acquisition Acts
5. Maheswaraswamy - "Land Laws"
6. Maheswaraswamy - Land Law Under the Constitution of India

7. V.G.Ramachandran - Land of Land Acquisition and Compensation.
LL.B.(Hons.) (Three Year Course)

III-SEMESTER

23L3LLBH14 – Interpretation of Statutes

Unit - I

Introduction: What is a Statute? - Different parts of a Statute Commencement, Repeal & Revival of Legislation – Codification & Consolidation.

Unit- II

Interpretation: Meaning - Significance of Interpretation – Need for interpretation - Object of Interpretation - General principles of Interpretation - Literal or Grammatical - Logical Interpretation – Rules of Interpretation - Literal or Plain Reading Rule - Mischief Rule - Golden Rule - Subsidiary Rules.

Unit -III Construction:

Beneficial Construction - Restrictive Construction - internal Aids & External Aids - The Different Parts of the Statutes in Interpretation.

Unit -IV Interpretation of Taxing Statutes- Strict Construction - Beneficial Construction.

Unit -V Construction of Penal Statutes - Strict & Beneficial Interpretation - Interpretation Regarding Punishments - Mensrea.

Unit -VI Interpretation of Imperative Statutes and Directory Statutes.

Unit - VII Constitutional Interpretation

a) Interpretation of Constitution: Preamble as a tool for Interpretation - In re Berubari Union & Exchange of Enclaves case - Doctrine of Pith & Substance – Doctrine of Colourable Legislation - Presumption in favour of Constitutional Validity of Legislation.

b) Interpretation of Fundamental Rights: Menaka Gandhi's case - E.R Royappa's case - Keshavanada Bharati's case etc. - Fundamental Rights & Directive Principles – Harmonious Construction - Human Rights & Fundamental Rights.

Unit - VIII

General Clauses Act 1897: Definition - General Rules of Construction - Provisions relating to Order & Rules.

Books for Reference :

1. M .P Tandon : Interpretation of Statutes and Legislation
2. Maxwell : Interpretation of Statutes
3. Singh G. P. : Interpretation of Statutes
4. Vepa P. Sarathi : Interpretation of Statutes
5. Cross : Interpretation of Statutes
6. Craires : Statutory Interpretation.
7. Bindra : Interpretation of Statutes
8. T. Bhattacharyas : Interpretation of Statutes
9. General Clauses Act : Bare Act.
10. D. D. Basu : Shorter Constitution of India (2 Vols.)

LL.B.(Hons.) (Three Year Course)

III-SEMESTER

23L3LLBH15 – Company Law

Unit - I Introduction

Corporate personality- Definition of a Company – Characteristic of a Company and other types of Associations - Illegal Association - Classes of companies- Lifting or Piercing the Corporate Veil – One Person company

Unit - II Formation:

Formation- Formation of a Company- Promoters, Registration Incorporation, Memorandum of Association, Articles of Association, Prospectus and deposits - application for registration.

Unit - III Corporate Financing

Shares-Application and allotment of shares, members and share holders, share and shares capital, debentures, charges and debentures holders, dividends, borrowings, lending investments , contracts.

Unit - IV Corporate Governance

Directors-Independent directors, woman directors and managerial personnel, meetings, accounts and audits , internal auditing, National Financial Reporting Authority, e-filing and Information Technology Act,2000,corporate social responsibility, majority powers and minority rights ,prevention of oppression and mismanagement, investigation, powers of inspectors , powers of NCLT, Insider trading

Unit - V Compromises, Arrangements and winding up Compromises, Arrangements and Amalgamations-Mergers and acquisitions, winding up and kinds of winding up – Administration of NCLT and CLAT and Special courts –Powers of liquidators, removal of names of companies from Register of companies, Defunct companies and restoration, revival and rehabilitation of sick companies.

Unit - VI Securities Exchange Board of India

Securities Exchange Board of India (SEBI) Act,1992 - Amendments 2014
Establishment of Securities Board of India – Powers and Functions of Board –
Prohibition of Manipulative and Deceptive Devices, Insider Trading and Substantial Acquisition of Securities or control - Penalties and Adjudication-Securities Appellate Tribunal-Miscellaneous

Statutory Materials with Amendments

1. The Companies Act, 2013.
2. Information Technology Act 2002.
3. Securities Exchange Board of India,1992.

Books for Reference :

1. Shah's Lectures on - Company Law.
2. Gower - Company Law.
3. Basu N.D. - Company Law.
4. Dutt - Company Law

LL.B.(Hons.) (Three Year Course)

III-SEMESTER

23L3LLBH16 – Banking Law

Unit - I Nature and Development of Banking :

History of Banking in India and England - Different types of Banks and specific laws relating to them - Banking by individuals, Partnership firms, Cooperatives, Companies, Foreign Companies; Scheduled and Non scheduled Banks - Nationalization of Banks.

Unit- II Banker and Customer:

Definition of „Banker“ - Business permitted and prohibited for a Banking

Company. Definition of „Customer“- General Relationship between Banker and

Customer.

Special types of Bankers, Customers - Minors, Lunatics, illiterates, Executors, Hindu Joint Family, Partnership firms, Joint Stock companies, clubs, Societies, Charitable Associations, Trustees etc

Banker as Borrower - Forms of Borrowing, Discounting of bills, Different types of deposits, payment before due date and Repayment of different types of deposits, attachment of deposits by the Courts and income tax authorities.

Different types of accounts - Formalities involved for opening accounts, operating accounts, legal aspects of entries in pass books, effect of false entries, closing of a bank account.

Duties of a Banker: To honour Cheques, To maintain secrecy, To disclose information, Countermanding of Cheques by customers.

Rights of a Banker- General lien, set off, to combine accounts, to charge interest and service charges, appropriation (Rule in Clayton’s case)

Banking instruments: Bank notes, Banker’s drafts, deposit receipts, letters of credit, indemnities, travellers Cheques, postal orders, dividend warrants, bonds.

Unit - III Paying Banker:

Precautions to be taken by the paying banker-when banker must refuse payment, statutory protection given to the paying banker, Banker as payer of domiciled bills, Recovery of money paid by mistake.

Unit - IV Collecting Banker:

Collecting banker as Holder for value - collecting banker as agent, conversion by collecting banker; duties and liabilities of a collecting banker; statutory protection given to the collecting banker.

Unit - V Laws Relating To Loans, Advances And Investments By Banks : Subsidiary business operations of bankers with special reference to Safety Deposit Lockers - Liability of banker in case of bank robberies and fraud by bank employees - Vicarious liability of the bank - Recovery of loans and advances - Recovery of debts due to banks, Financial Institutions Act, 1993. The Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002 - Debt Recovery Tribunal-Banking and Insurance ombudsman.

Unit - VI Miscellaneous:

RBI's control over commercial banks - Special Status of RBI and State Bank of India - Subsidiary Banks - Effect of winding up of Banking companies - Rights of customers on winding up of companies - Necessity for reforms in Indian Banking Law to meet global challenges. E-Banking- ATM-CDM-Smart Cards-Net Banking Electronic clearance system-Legal Issues, Regulating E-transactions, Reserve Bank of India's contribution, e-bank issues, International transactions, credit cards and internet related laws, secure electronic transactions

Negotiable Instruments :

Unit - VII Definition And Characteristics:

Definition, Characteristics and categories of Negotiable Instruments, Definition and Characteristics of Promissory Note, Bill of Exchange and Cheques, Distinctions between them, Different Kinds of Bills, Hundis, Letters of Credit.

Unit - VIII Parties to Negotiable Instruments:

Holder, holder in due course, Rights and Privileges of a Holder in Due Course, Capacity of parties.

Unit - IX Presentation:

Presentation for Acceptance, Types of Acceptance, Presentation for payment; Maturity, when presentation is excused and when is it unnecessary. Effects of non presentation.

Unit - X Negotiation:

Negotiation of Negotiable instruments, Negotiation distinguished from Assignment. Modes of Negotiation, kinds of Endorsements, negotiation by unauthorized persons.

Unit - XI Discharge And Dishonour :

Discharge of instrument, Modes in which parties are discharged, Material alterations, dishonour of a bill of exchange; Modes of dishonour, Notice of Dishonour, Effect of dishonour, Noting, Protest, Compensation, Acceptance for Honour, Payment for Honour, Drawee in case of need.

Unit - XII Liability:

Liability of various parties -Drawer, Maker, Drawee, Endorser; Liability for unjustified dishonour. When a banker is justified in refusing payments on a Cheque. Liability of transfer by delivery. Liability under Accommodation bills, Liability on Foreign instruments.

Unit - XIII Presumptions in favour of Negotiable Instruments.

Unit - XIV Cheques :

Crossing of a Cheque, Different types of crossing, who may cross, payment of crossed Cheques, Rights of Holder against Banker.

Unit - XV Dishonour of Cheques

Civil and Criminal Liability for dishonour of Cheques under section 138 to section 142 of the Amended Negotiable Instruments Act.

Statutory Materials with Amendments

1. Consumer Protection judgements Act, 1986
2. The Banking Regulation Act, 1949
3. The Reserve Bank of India Act, 1934
4. The State Bank of India Act, 1955- The State Bank of India (Subsidiary Banks) Act,

1959

5. Negotiable Instruments Act, 1881
6. Bill of Exchange Act, 1882
7. The Cheques Act, 1957
8. Limitation Act, 1963
9. Information Technology Act, 2002
10. The Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002

Books for Reference:

1. Tanna's - Banking law and Practice in India (India law house, New Delhi)
2. Banking law and Practice - PN. Varshney (Sultan Chand & Sons, New Delhi-110 002)
3. Negotiable Instruments - By Bhashyan & Adiga (Bharat law house pvt. Ltd. New Delhi)
4. The Negotiable instruments Act. - Khargamvala - Edited by M.S. Parthasarathy (N.M. Tripathi Private Ltd, Bombay)
5. Dishonour of Cheques, Liability Civil & Criminal By S. N. Gupta (Universal law publishing Co. Pvt. Ltd. G. T. Karnal Road, Delhi -110 033)
6. Negotiable Instruments By Avtar Singh (Eastern Book Co. 34 Zallagh, Lucknow - 226 001)
7. Sir John Paget - Law of Banking
8. H. P. Sheldon - The practice and law of Banking.

LL.B.(Hons.) (Three Year Course)

IV-SEMESTER

23L3LLBH17 – Law of Evidence

Unit - I Introduction

The Indian Evidence Act, 1872-Applicability and exclusion. Lex Fori- Statutory definitions - The Indian Law of Evidence compared with the English Law of Evidence - Exceptions same; rules of evidence applicable to civil and criminal proceedings - Doctrine of corpus delict - presumptions of laws - and presumptions of fact.

Unit - II

Matters of which proof is allowed - Relevancy and admissibility Resgesta – Motive preparation, opportunity and subsequent conduct - introductory and explanatory facts of relevant facts - Acts of conspirators - facts otherwise relevant -Facts determining quantum of damages - Existence or exercise of custom- Statement of bodily or mental condition similar facts-course of business-Admission and confession statement of persons who cannot be called as witnesses. Disposition of former proceedings relevant in public records, maps, charts, Act or notifications, Law books and law reports – judgment opinions of witnesses - Character of parties - Civil and Criminal cases - Previous conviction of parties - General reputation of parties.

Matters of which proof is not required - Judicial Notice – Law and Custom - Public Administration - Common knowledge –Facts formerly admitted presumptions - Rebuttal of presumptions.

Matters of which proof is not allowed - Facts which parties are stopped from proving - stopped by record, deed and conduct.

Unit -III

Proof - oral evidence - Rule against hearsay - The evidence rule - Admissions, confessions, declaration statement in Public documents - Documentary evidence, primary and secondary evidence - Digital evidence - Genuineness of documents - Proof of public documents by certified copies or by records of the documents, etc. Presumptions as to documents - parol Evidence respecting. Documents as substitute for documents - variation or contradiction or contradiction in aid of interpretation.

Unit - IV

Production and Effect of Evidence : Burden of proof - quantum of proof - cogency of evidence competency of witness - compellability - oath or affirmation – Examination in chief cross examinations questions in cross Examination - re-examination. Hostile witness - Discredit of opposing witness - contradiction of witness- dental privilege - Affairs of State Information Legal Professional Communications between spouses accomplices - Discretion of witness - Admissibility of evidence - witness called by judge - corroborations - Refreshing memory - Judges power to put questions – Appeal against improper admission and rejection of evidence.

Statutory Materials with Amendments

1. The Indian Evidence Act, 1872.
2. Criminal Law (Amendment) Act, 2013.
3. Information Technology Act, 2000.

Books for Reference

1. Ratanlal - The Law of Evidence.
2. Sarkar - Law of Evidence
3. R.D. Agarwal - Commentaries on Indian Evidence Act. 4. Sir James Fitz Stephen - An Introduction to the Indian Evidence Act. 5. Abhinav Mishra's - Indian Evidence Act

LL.B.(Hons.) (Three Year Course)

IV-SEMESTER

23L3LLBH18 – Administrative Law

Unit -I Introduction

Definition, Nature, Scope - Origin and Development in UK., U.S.A., France and India – Sources- Administrative Law and Constitutional law -Rule of Law Concept, Evaluation Of Dicey's concept of Rule of Law, Modern conception of Rule of Law, Rule of Law IN U.K.,U.S.A, and India, Rule of Law vis-à-vis Administrative Law Doctrine of Separation of Powers-Meaning, Origin, Montesquieu's Doctrine of Separation of Powers, System of Checks and Balances, Position in U.K.,U.S.A., and India- Parliamentary Sovereignty in U.K., Limited Legislative Powers in U.S.A. and India- Classification of Administrative Action..

A. Nature of Powers – Executive, Legislative and Judicial

B. Legislative Function-Quasi Legislative Functions-Administrative Directions C.

Judicial Function – Quasi Judicial Function – Tribunals and Administrative Justice.

Executive Function-Ministerial Functions and Discretionary Functions

Unit - II Delegated Legislation:

Meaning , Nature, Origin , Development and Growth of Delegated Legislation, Types of Delegated Legislation and Constitutionality of Delegated Legislation-Delegated Legislation and Conditional Legislation, Sub-Delegation –Restraints on Delegation of Legislative Power, Doctrine of Excessive Delegation- Control over Delegated Legislation-Judicial, Procedural and Legislative Control-Administrative Directions and Delegated Legislations.

Unit -III Procedural Fairness and Judicial Review

Principles of Natural Justice- Concept, Parameters and Application of the Principles of Natural Justice-Rule against Bias Audi Alteram Partem or the Rule of Fair Hearing Meaning, Object, Ambit and ingredients of Fair hearing, Institutional Decision, Post decision hearing –Reasoned decisions-Exceptions to the rule of Natural Justice Effects of Breach of Natural Justice.

Administrative Process and Judicial Review –Meaning and need for Judicial Review Scope of Judicial Review, Jurisdiction of Supreme Court-Writ Jurisdiction-Appeal by Special Leave (Art. 136)-Scope and Object of Article136-Jurisdiction of the High Court- Judicial Review of Administrative Action through writs-Scope of the Writ Jurisdiction – against whom the writ lies-Territorial extent of Writ Jurisdiction Relief against an Interim order –Interim Relief (Art.226 (3)- - Locus standi – Kinds of Writ Grounds for issue of Writs-Principles for the exercise of Writ Jurisdiction, Alternative Remedy Laches or Delay Res Judicata-Public Interest Litigation and Locus Standi Doctrine of Legitimate Expectation and Doctrine of Proportionality.

Statutory Remedies- Injunction-Declaration against the Government-Exclusion of Civil Suits:

Privileges and Immunities of Government in legal Proceedings Privilege to withhold documents-Miscellaneous Privileges of the Government – Notice, Limitation, enforcement of court order- Binding nature of Statutes over the states action Promissory Estoppel - Right to information
Judicial Control of Administrative Discretion- Meaning , Nature and Need of administrative Discretion-Ground and Extent of Judicial Review- Fundamental Rights and Discretionary Power Liability of the state –Liability of the State in Torts and Contracts.

Unit- IV Ombudsman, Lokpal, Lokayakta and Central Vigilance Commission

Meaning, Object, Main Characteristics, Need and Utility –Origin and Development of the Institution-Ombudsman in New Zealand – Ombudsman in England (Parliamentary Commissioner)-Ombudsman in India- Lokpal-Lokayukta in States-Central Vigilance Commission.

Unit - V Administrative Tribunals and Public Undertaking :

Administrative Tribunals-Meaning, Nature, Main Characteristics, Origin and Development (U.S.A, U.K, and India)-Franks Committee Tribunal and court, similarity and difference- Reason for growth of Administrative Tribunals-Merit and Demerits of Administrative tribunals-Procedure and Powers of Administrative Tribunal (U.K., U.S.A. and India) Tribunal under Constitution-High Court's Superintendence over Tribunals-Appeal to Supreme Court by Special Leave- Working of the Administrative Tribunal-Administrative Tribunals under Administrative Tribunals Act, 1985-Administrative Procedure Act in U.S.A-Domestic Tribunal.

Public Undertaking- Object, Importance, Characteristics, Classification, Reason for the growth-Working of Public Corporation Rights , Duties and Liabilities of Public Corporations-Control over Public Corporations, Government Control, Parliamentary Control, Judicial Control, Public Control-Role of Ombudsman in Public Undertaking.

Books for Reference

1. M.P.Jain and S.N.Jain - Principles of Administrative law.
2. S.P.Sathe - Administrative
3. I.P.Massey - Administrative Law
4. C.K.Takwani - Administrative Law
5. Kailash Rai - Administrative Law

6. Wade - Administrative Law
7. De Smith - Administrative Law
8. Foulkes - Administrative Law
9. Indian Law Institute - Cases and Material of Administrative Law.
10. Markose - Judicial Control of Administrative Action
11. Griffith and Street - Administrative Law.
12. Report of the Law Commission- First Report, Second Report, Fourteenth Report
13. Report on the committee of Minister's Power - Franks Committee Report.

LL.B.(Hons.) (Three Year Course)

IV-SEMESTER

23L3LLBH19 – Labour Law – I

Unit I Introduction

Labour Legislation: Origin and Development of Labour legislation
 Object and Nature of Labour Legislation- Evolution of concept of Master and Servant relationship
 Theory of Laissez Faire and State Regulation of Labour Legislation and Its Special Features-Role of International Labour Organization in setting Labour Standards.
 Liberalization-Privitization and Globalization(LPG).

Unit II Trade Union Act, 1926

Definitions-History of Trade Union Movement-Registration of Trade Unions-Rights and Liabilities of Trade Unions - Immunities and Privileges of a Registered Trade Union-Trade Union Funds Collective Bargaining-Amalgamation and Dissolution of Trade Unions Recognition of Trade Unions.

Unit III Industrial Disputes Act, 1947

Scope, Applicability and Definitions - Appropriate government: Workmen: Industry: Industrial Disputes: Award: Settlement: Public Utility Services: Strike: Lock Out Retrenchment: Lay Off: Closure Machinery for Settlement of Industrial Disputes Work Committees, Conciliation Officers-Board of Conciliation, Court of Inquiry Labour Court, Industrial Tribunal National Industrial Tribunal-Reference Power of the Government Voluntary Arbitration-Unfair Labour Practices.

Unit IV Industrial Employment (Standing Orders) Act, 1946: Scope and Definitions - Procedure for Certification of Standing Orders - Duration; Modification of Certified Standing Orders - Domestic Enquiry and disciplinary proceedings.

Unit V Law Relating to Wages Minimum Wages Act, 1948: Theories of Wages and Wage Policy - Concept of Wages - Living Wage, Fair Wage and Minimum Wage - Fixation of Minimum Rates of Wages-Methodology, Procedure: Advisory Boards Inspectors, Powers, Claims - Exceptions and Offences - Equal Remuneration Act Payment of Wages Act, 1936: Definitions-Deductions-Authorities under the Act Inspectors and their powers-Penalty.

Statutory Materials with Amendments

1. Industrial Disputes Act, 1947.
2. Trade Union Act, 1926
3. Industrial Employment (Standing Orders) Act, 1946
4. Minimum Wages Act, 1948
5. Payment of Wages Act, 1936.

Books for Reference

1. Madavan Pillai - Labour and Industrial Law
2. S.N.Mishra - Labour and Industrial Law
3. V.G.Goswami - Labour Law
4. O.P.Malhotra - Industrial Disputes Act
5. K.D.Srivatsava - Law Relating to Trade Union
6. K.D.Srivatsava - Payment of Wages Act,1936.
7. K.D.Srivatsava - Payment of Minimum Wages Act,1948.

LL.B.(Hons.) (Three Year Course)

IV-SEMESTER

23L3LLBH20 – International Law

Unit - I Introduction :

International Law- Definition; Basis; nature and Weakness - Differences between Public International Law and Private International Law - Codification.

Unit - II Sources of International Law.

Unit - III International Law and Municipal Law- Relationship.

Unit-IV Subjects of International Law :

State as a Subject - Rights and Duties or Responsibilities of State - Individual as a Subject of International Law.

Unit - V State Succession and Liability.

Unit - VI Territorial Sovereignty - Modes of Acquisition and Loss of Territory; Jurisdiction; Law of Sea; law of the Air.

Unit - VII Extradition and Asylum; Nationality Acquisition and Loss Related Problems - Refugees - Nuremberg Trial – Disarmament Weapons of Mass destruction - Peaceful use of chemistry.

Unit - VIII Diplomatic Agents - Consular Missions – their Position, Privileges and Immunities.

Unit - IX International Treaties - Negotiations - Conclusion of Treaties - Various Stages - Reservation; Observance of Treaties - Interpretation of Treaties - Suspension and Termination of Treaties.

Unit - X International Organizations - UNO - General Assembly; Security Council; International Court of Justice – International Tribunals.

Books for Reference :

1. Starke - International Law
2. S.K. Kapoor - International Law
3. K.K. Bhattacharya - International Law
4. Agarwal - International Law
5. Oppenheim - International Law
6. Briely - International Law
7. Schwarzenegger - International Law

LL.B.(Hons.) (Three Year Course)

IV-SEMESTER

23L3LLBH21 – Practical – II (Alternative Dispute Resolution

System) Unit - I - Domestic Arbitration

1. General Provisions - Definition Clause - Meaning of Arbitration, Valuer, Experts, Valuation, Dispute, Dispute of Civil Nature, Tort matters, Contract of Apprenticeship, Assignment, Powers under agreement - Arbitration and litigation – Reference under Arbitration Agreements.

2. Arbitration agreement - Agreement to be in writing – No prescribed form of agreement-Tenders containing arbitration clauses - Telex - Fax - Arbitration Agreement and reference clauses having the effect of arbitration agreement – Rent review clause. Agreement of reference in the shape of option - Reference of time - Barred claim etc.

3. Composition of Arbitral Tribunal - and all its attendant

provisions. 4. Jurisdiction of Tribunal

5. Conduct of Arbitral Proceeding.

6. Making of Arbitral Award and Termination of Proceedings.

7. Recourse against Arbitral awards - Finality and enforcement of Arbitral

awards. 8. Appeals and Miscellaneous Provisions.

Unit - II: Enforcement of Certain Foreign Awards

a. International and Commercial Arbitration : Commercial choice of place and proper law of Arbitration - Governing law of arbitration – Foreign award - International arbitration – New York convention awards - Binding force of foreign awards - enforcement of foreign awards-Appealable orders.

b. Geneva Convention Awards: Foreign awards for purposes of this convention - II Schedule & III Schedule - All Implications Relating to the Geneva Convention Awards.

Unit- III : Conciliation

a. Meaning - Number and qualification of conciliators -Appointment of conciliators - Principles of Procedure - Procedure of Conciliation.

b. Settlement : Settlement of Disputes - Status and effect of settlement agreement - Restrictions on the role of conciliators -Termination of Conciliation Proceedings - Resort to Arbitral or Judicial Proceedings - Costs - Deposits.

Unit IV Mediation:

Unit V Schedules

a. First Schedule : Convention on the Recognition and Enforcement of Foreign Arbitral awards.

- b. Second Schedule : Protocol on Arbitration Clauses.
- c. Third Schedule : Convention on the Execution of Foreign Arbitral Awards.

Statutory Materials with Amendments

1. The Arbitration and Conciliation Act, 1996.
2. Arbitration (Amendment) Act, 2011.
3. United Nations Convention of Recognition and enforcement of Foreign awards (New York 1958).
4. Brussels Convention.
5. European Convention on International Commercial Arbitration.
6. Tamil Nadu Mediation Rules, 2010.

Books for Reference :

1. Law of Arbitration and Conciliation by Dr. Avtar Singh - Published by Eastern Book Co. Lucknow.
2. The Arbitration and Conciliation Act, 1996 (Act 26 of 1996) by P. S. Narayana, Advocate, Published by ALT Publications, High Court Premises, Gate No. 2, High Court of A. P. Hyderabad – 2 (A. P.)
3. Mani's- Digest on Arbitration and Conciliation (1996-2014)
4. Justice. Saraf- The Arbitration and Conciliation (2012 Edition)
5. P.C. Markanda, & Sri Ram Panchu's Mediation Practise and the law 6. Law relating to Arbitration and Conciliation (II Volumes) by M.A. Sujana Published by Universal Law Publishing Pvt. Ltd, Delhi.
7. Law of Arbitration and Conciliation by S. K. Roy Chowdhury and H. K. Saharay (4th Edition 1996) published by Eastern Law House, New Delhi.

Assessment Scheme

1. Case Study in Arbitration Centre (Practical /Simulation Exercises)
3 exercises - 20 Marks each : 60 Marks
2. Tests (Written) : 20 Marks
3. Presentation / Viva Voce : 20 Marks

TOTAL 100 Marks

LL.B.(Hons.) (Three Year Course)

V-SEMESTER

23L3LLBH22 – Civil Procedure Code

Unit - I Introduction

The Law relating to procedure in civil courts as enacted in the Civil Procedure Code of 1908 read with the orders and rules made there under as amended up to date, by High Court of Madras with emphasis on the following:

Unit - II Jurisdiction

Jurisdiction of Civil Courts, the choice of the forums of action and the doctrine of resjudicata.

Unit - III Institution of suits

Institution of suits and framing of the pleadings with reference to the general rules relating to pleadings under Orders VI to VIII and Rules relating to misjoinder of parties and cause of action as laid down in Orders I and II.

Unit - IV Procedure - Conduct of a suit

A brief survey of the procedure followed in the conduct of a suit commencing from service of summons, appearance of parties and consequences of non-appearance, discovery and inspection, production of documents, settlements of issues, summoning of witnesses and the pronouncement of judgement and contents of a decree.

Unit - V Modes of Execution

Modes of execution of decrees passed by Civil courts and the outline of the procedure to be followed relating to execution as laid down in Order XXI.

Unit - VI Suits against the Government

Procedure to be followed in instituting suits against the Government or Public Officers, suits by aliens and by or against foreign Rulers and Dignitaries and suits relating to Public matters.

Unit - VII Procedure - Filing appeals

Procedure to be followed in filing appeals against original decrees: Appellate decrees, Appealable orders and Appeals to the Supreme Court.

Unit - VIII Reference, Review and Revisions.

Unit - IX Procedure - Interlocutory proceedings

Procedure and law relating to interlocutory proceedings for issuing commissions, arrest and attachment before judgement, temporary injunction and interlocutory order, appointment of Receivers as laid down in orders, XXVI, XXVIII, XXXIX & XLI and preparation affidavits.

Unit - X Suits appeals by indigent person. Suits and appeals by indigent person.

Unit - XI Suits minors and persons of unsound mind Suits by or against minors and persons of unsound mind.

Unit - XII Inter pleader suits.

Unit - XIII Summary suits on negotiable instruments.

Unit - XIV Abatement of suits Abatement of suits and bringing on record legal representatives of the parties to a suit.

Unit - XV Limitation Act :

Limitation Act Definitions, limitations of Suits Appeals, Computation of Period of Limitation - acquisition of ownership by possession

Statutory Materials with Amendments

1. Civil Procedure Code, 1908.
2. Limitation Act, 1963.

Books for Reference :

1. Mulla - Civil Procedure Code
2. Takwani - Civil Procedure Code
3. Tandon - Civil Procedure Code
4. S. N. Singh - Civil Procedure Code
5. Bare Act – Limitation

LL.B.(Hons.) (Three Year Course)

V-SEMESTER

23L3LLBH23 – Criminal Procedure Code

Unit - I

Important definitions under the Code of Criminal Procedure, 1973 (Act 2 of 1974).
Constitution of Criminal Courts and Officers - Court of Session - Assistant Sessions
Judges - Judicial Magistrates & Executive Magistrates - Public Prosecutors - Assistant
Public Prosecutors.

Powers of Police Officers - Aid and information by Public.

Arrests of persons without warrant by Magistrate - by private persons - search - pursuit
of offenders - seizure of offensive weapons - Medical examination of arrested persons
- Procedure to be followed on arrest.

Unit - II Pre - trial Processes :

Processes to compel appearance summons -service of summons -warrant of arrest -
Search warrant - proclamation and attachment - bond for appearance – impounding
documents – process to compel the production of things.

Unit - III

Information to the police and their powers to investigate - procedure on investigation -
and recording of statements - recording of confession and statement - powers of
Police officers on investigation - inquiry by Magistrate into cause of death.

Unit - IV

Jurisdiction of the criminal courts in inquiries and trials - conditions requisite for
initiation of proceedings - cognizance of offences by Courts of Sessions - Prosecution
in special cases. Complaints - Procedure on receipt of complaints.

Unit - V

The charge form and contents of charge - effects of errors - joinder of charges.

Unit - VI Trial Procedure:

Trial before a court of session- framing of charge - discharge - acquittal - judgement
of acquittal or conviction - trial of warrant cases by Magistrates - Upon Police Report
or otherwise Procedure-Trial of summons cases - Withdrawals - Summary trials -
attendance of persons confined in prison.

Unit - VII

Evidence in enquiries and trials - commission for examination - record of evidence in
absence of accused - General provisions as to enquiries and trials - legal aid to
accused at State expense in certain case - tendering pardon to accomplice - power to
examine the accused - competence of accused to be a witness - compounding of
offences - withdrawals from prosecution.

Unit - VIII Preventive provisions in the Criminal Procedure Code: Security for
keeping the peace and for good behavior - Suspected persons - habitual offenders -
imprisonment in default of security - Order for maintenance of wives, children and
parents - Procedure - Alteration in allowance - enforcement of order of
maintenance - maintenance of public nuisance - injunction pending enquiry - urgent
cases of nuisance or apprehended danger. Disputes regarding immovable property -
procedure for local enquiry - preventive action to the police - cognizable offences.

Unit - IX Miscellaneous and Legal Aid:

Special provisions as to accused persons of unsound mind - provisions as to offences affecting the administration of justice - judgement -order to pay compensation - confirmation of death sentences.

Unit - X

Appeals, Reference and Revision - Transfer of Criminal cases.

Unit - XI

Execution, suspension, Remission and commutation of sentence - Death sentences - Imprisonment - levy of fine. Provisions as to bail and bonds - disposal of property - Limitation for taking cognizance of certain offences - inherent powers of the criminal courts.

Unit - XII The Probation of Offenders Act, 1958. Object of Probation of offenders Act - Power of Court to release offenders after admonition and on probation of good conduct - Procedure in case of offenders failing to observe conditions of bond - Appointment and duties of probation officers - Probation officers to be Public servants - Sec. 360 of CRPC not to apply in certain areas.

Unit XIII The Juvenile Justice (Care and Protection of Children Act, 2000)

Object of Juvenile Justice (Care and Protection of Children Act, 2000)

Juvenile Justice Board - Procedure - Powers.

Observation Homes - Special Homes.

Bail of Juvenile.

Orders that may be passed regarding Juvenile - Orders that may not be passed against Juvenile.

Child in need of care and protection.

Rehabilitation and Social Re-Integration

Statutory Materials with Amendments

1. The Code of Criminal Procedure 1973
2. The Probation of Offenders Act, 1958
3. The Juvenile Justice (Care and Protection of Children) Act, 2000
4. T.N. Victim Comparisation scheme 30th Nov 2013.
5. Criminal Law (Amendment) Act, 2013.

Books for Reference :

1. Sohoni's The Code of Criminal Procedure, 1973 (5 Volumes) (Act 2 of 1974) by R. Nagaratnam, Advocate, Published by the Law book Company (P) Ltd.
2. B. B. Mitra on the Code of Criminal Procedure, 1973 (2 Vol) Edited by S. R. Roy Judge, (Retd) High Court, Published by Kamal Law House 8/2, K.S. Roy Rd, Calcutta.
3. Outlines of Criminal Procedure - R. V. Kelkar.
4. The Code of Criminal Procedure, 1973 - Ratanlal
5. Criminal Procedure Code, 1973 - Durga Das Basu.
6. The Juvenile Justice Act, 1986 with important Judgements (Acts 53 of 1986) by Dr. S. K. Awasthi, Advocate, Published by Law vision 971/1, Tulsipur, Allahabad - 211003
7. Juvenile Justice Act. - S. Sambandam.

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V-SEMESTER

23L3LLBH24 – Environmental Law

Unit - I

Bio - Geographical aspects of our Environment.

Unit - II

Socio - Economic dimensions of our Environment.

Unit - III

Problems affecting the Environment and factors responsible for environmental degradation.

Unit - IV

Policies of the State for abatement of Pollution and for conservation.

Unit - V

Constitutional obligation to protect the natural environment.

Unit - VI

Right to live in a healthy environment - Evolution and principles / Doctrines propounded by the Judiciary.

Unit - VII

History of evolution of law to handle pollution and other environmental problems in India.

Unit -VIII

Remedies for environmental pollution available under common law and Statute law (Remedies under law of torts, Indian Penal Code, Criminal Procedure Code, Civil Procedure Code)

Unit - IX

Laws relating to control of pollution:

Unit - X

National Green Tribunal

Unit - XI

Water pollution - meaning - authorities under the water act. - powers and functions of Central and State Pollution Control Boards - activities prohibited and regulated under the Air Act. - Penalties for violation

Unit - XII

Air Pollution - meaning - authorities under the Air Act - Powers and functions of Central and State Pollution Control Boards - activities prohibited and regulated under the Air Act. - Penalties for violation.

Unit - XIII

Noise Pollution - Law relating to noise pollution - provisions under the Police Act - Noise Rules 2000.

Unit - XIV

Pollution of Land - waste management - issues relating to use of plastics - Hazardous waste management rules - Bio-medical waste Management Rules.

Unit - XV

Ground water pollution - management of ground water resources - Madras Metropolitan area Ground water Regulation Act. 1987.

Unit - XVI

Law relating to Conservation of Forest and Wild Life.

Unit - XVII

Law relating to Prevention of Cruelty to Animals.

Unit - XVIII

Environmental Protection Act and Rules made there under- Notifications issued under the Act.

Unit - XIX

Role of Social movements in Environmental Management.

Unit - XX

International Environmental Law - Significance of various international conventions to protect the environment and the principles declared in the Conventions.

Unit – XXI

Region Specific environmental problems - Status report of environmental problems in the state of Tamil Nadu.

Statutory Materials with Amendments

1. Wild life (Protection) Act. 1972.
2. Prevention of cruelty to Animals Act, 1960.
3. The Water (Prevention and Control of Pollution) Act,1974.
4. Forest (Conservation) Act. 1980.
5. The Air (Prevention and Control of Pollution) Act,1981.
6. Environmental (Protection) Act, 1986.
7. Public Liability Insurance Act, 1991.
8. National Green Tribunal Act, 2010

Books for Reference :

1. Armin Rosencranz Etal (ED), Environmental Law and Policy in India. - Tripathi, Bombay.
2. Armin Rosencranz Etal (ED), Environmental Law and Policy in India: Cases, Materials and Statutes, Tripathi, Bombay.
3. Centre for Science and Environment, The State of India's Environment - A Citizens' Report, Delhi.
4. Indian Law Institute, Environmental Protection Act: An Agenda for Implementation, Tripathi, Bombay.
5. Jaswal Ps.and Nishtha Jaswal, Environmental Law , Pioneer Publications, Faridabad, Harayana.
6. Lal's Commentaries on Water, Air Pollution and Environment (Protection) Law, Law Publishers (India) Pvt. Ltd.
7. Sahasranaman, Pb, Law of Environment Protection (1997) Classic Publications, Bangalore.
8. W.Bernie, Patricia and Boyle, Alan, Basis Documents on International Law and the Environment (1995), Oxford University Press.
9. Paras Diwan, Environmental Law Volume (1,2,3).
10. P. Leelakrishnan - Environmental law in India.
11. S. K. Shukla - Environmental protection laws.
12. L. Agarwal - Legal control and Environmental pollutions.
13. S. Shanthakumar - Environmental law

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V-SEMESTER

23L3LLBH25 – Labour Law II

Unit - I Introduction: Social Security and Labour Welfare Concept, Evolution and Constituents of Social Security – Object of Social Security Laws - Social Security and Constitution - ILO on Social Security.

Unit - II Social Security: Industrial Injuries

The Employees' Compensation Act, 1923: Scope, Objects, Coverage and Definitions
Liability of the Employer to Pay Compensation - Personal Injury, Accident arising out of and in the Course of Employment, Doctrine of Notional Extension and Occupational Diseases - Determination and Distribution of Compensation - Principal Employer's Right of Indemnity - Commissioner's Powers and Functions.

Unit - III Social Security: Social Insurance

The Employee's State Insurance Act, 1948: Objects, Applications and „Seasonal Factory“ - Definitions - E.S.I. Corporation - E.S.I. Funds, Payment of Contributions - E.S.I. Benefits - Adjudication of Disputes - E.S.I. Court - Penalties.

Unit - IV Other Social Security Legislations

The Maternity Benefits Act, 1961: Object and Application - Eligibility and Maternity Benefits - Notice of Claim Prohibition against Dismissal, Wage Deduction - Powers and Duties of Inspectors. The Employee's Provident Funds and Miscellaneous Provisions Act, 1952: Scope, Coverage, Application and Definitions - Authorities, their Powers and Functions Contributions - Employees Provident Fund Scheme, Employees' Pension Scheme and Deposit Linked Insurance Scheme -Penalties.

The Payment of Bonus Act, 1965: Bonus Commission - Definitions and Coverage - Kinds of Bonus - Eligibility and Extent of Bonus - Calculation of Bonus - Available Surplus, Allocable Surplus, Set On Set Off - Forfeiture of Bonus - Prior Charges - Machinery.

Payment of Gratuity Act, 1972: Background, Object and Definitions - Eligibility for Payment of Gratuity - Forfeiture, Exemption, Determination - Controlling Authority - Penalties.

Unit - V Labour Welfare Legislations

Factories Act, 1948: Background and Definitions – Formalities to start a Factory - Health, Safety and Welfare Measures – Working Hours - Employment of Young Persons - Annual Leave with Wages - Special Provisions.

The Tamil Nadu Shops and Establishment Act, 1947: Applicability and Person covered by this Act, - Opening and Closing Hours - Employment of Young Persons - Working Hours, Public Holiday, Safety, and Cleanliness - Leave and Annual Leave with Wages.

Statutory Materials with Amendments

1. The Employees' Compensation Act, 1923
2. The Employees' State Insurance Act, 1948
3. The Maternity Benefit Act, 1961.
4. The Payment of Bonus Act, 1965.
5. Payment of Gratuity, 1972.
6. Factories Act, 1948.
7. The T.N. Shops and Establishment Act, 1947.

Books for Reference

1. S.N.Mishra - Labour and Industrial Law
2. V.G.Goswami - Labour Law
3. Madhavan Pillai - Labour and Industrial Law
4. S.C.Srivastava - Social Security and Labour Laws
5. K. D. Srivastava - The Employees' Compensation Act, 1923
6. K.D. Srivastava - The Employees' State Insurance Act, 1948
7. K. D. Srivastava - The Employees' Provident Funds and Miscellaneous Provisions Act, 1961.
8. K. D. Srivastava - The Payment of Bonus Act, 1965
9. K. D. Srivastava - Payment of Gratuity, 1972
10. K. D. Srivastava - Factories Act, 1948

LL.B.(Hons.) (Three Year Course)

V-SEMESTER

23L3LLBH26 – Taxation Law

Unit - I

General Principles of Taxation

(a) Definition- Concept - Purpose of Taxation-Nature and Characteristics of Taxation - Distinction between tax, fee and fine- Mutual relationship between Tax laws and Finance Act (Amended Act) –Canons of Taxation- Kinds of Taxes- Progressive Proportional- Regressive and Digressive- Eminent Domain Principle- Theory and Basis of Taxation-Scope and Limitations of Taxation- Inherent limitations-Requisites of a Valid tax (b) Double taxation- Sec-90 and Sec.91 of the I.T. Act.- Importance of OECD guidelines in International Taxation- Black money – Causes and Effect.

Unit - II

Constitutional basis and Taxing powers:

(a) Constitutional Taxing Powers - Constitutional Amendment 101- Amendment of Art.246A - Amendment of Art.248A- Art.249 and Art.250– Art.243H-Art. 243Z - Art.250- Art.268-Art.269- Art.269A – Amendment of Art.270-271- Art.286- Amendment of Seventh Schedule- Art.366- Art.368- Amendment of Sixth Schedule and Seventh schedule-Constitutional amendment 101- Art. 279 A- GST Council- Constitutional Limitations.- Significance of Union Territory Goods and Services Act, 2017- Significance of the Goods and Services Tax (Compensation to States) Act, 2017.

(b) Historical Development of Tax on supply of Goods and services -Exemptions to the levy of Goods and Services Tax to petroleum products- alcoholic liquor for human consumption- Powers of the GST Council to regulate these goods by notification.- Present status of Central Sales Tax Act,1957 and Central Excise Act-Customs Act and Tamil Nadu Value Added Tax Act 2006.

Unit - III

Direct Taxation:

Income Tax Act, 1961.

Preliminary concepts; Income, „Agricultural Income „ Casual Income,“ person – Assessee Residential Status- Previous year- Assessment year – General Charging Section- and Specific Charging Section- Income- Received- Arising – Accrual- Scope and Total Income – Exempted Income : Tax Liability under Specific Heads i) Income from Salaries ii) Income from House Property iii) Income from Business or Profession iv) Income from Capital Gains. V) Income from other sources : Clubbing of Income: Income of other persons in assessee's total Income – Treatment of Losses

Set off and carry forward of losses-Procedure for assessment- Deduction allowed in certain cases- Chapter VI A Deductions- Assessment of Special Class of Assessee.

Unit - IV

Indirect Taxation:

A) The Taxation Laws (Amendment) Act,2017- Customs tariff- Central excise – Central Sales Tax- Miscellaneous – Schedule.

a) Central Goods and Services Tax Act,2017 – Definition clauses-Administration Levy and Collection of Tax-Time and Value of Supply-Input Tax Credit-Registration Tax Invoice credit and debit notes.-Accounts and records>Returns- Payment of Tax- Refunds- Assessment- Audit-Inspection- Search Seizure and Arrest-Demands and Recovery- Liability to pay in certain cases-Advance –Appeals and Revision-Offences and Penalties

b). Tamil Nadu Goods and Services Tax Act, 2017- Definition commencement Officers under the Act- Powers and functions-Levy and collection of Taxes- Chap III XI scope of supply- Tax liability on composite and mixed supplies- Levy and Collection-Composition Levy- Power to grant exemption from tax. Time and value of supply- input credit tax- Registration-Tax invoice – debit and credit notes- Accounts and Records- Returns- Payment of Tax – Refunds-Assessment – Audit- Inspection – Search- Seizure and Arrest- Demands and Recovery- Liability to pay in certain cases Chap XII-XIX-Advance Ruling-Appeals and Revision-Offence and Penalties – Transitional Provisions- Miscellaneous Provisions-Schedules.

c) Integrated Goods Services Tax and Rules of States and Union : Collection and Levy of Integrated General Services Tax- Determination of Nature of Supply -Cross Utilization of credit-Utilization of IGST credit. Inter- state supply and Intra-state supply- Location of supply- Place of supply of goods and services or both. Refund of integrated tax to International tourist.- Zero rated supply-Appportionment of tax and settlement of funds-Miscellaneous Provisions.

Unit - V

Customs Act -1962 with amendments -Role of customs in international trade important terms and definitions– Assessable value Baggage – Bill of entry Dutiable goods Duty Exporter – Foreign going vessel – Aircraft goods – import – import Manifest – Importer – Prohibited goods – Shipping bill – Store – Bill of lading – export manifest – Letter of Credit – Kinds of duties – Basics auxiliary - Basics of levy – Advalorem – Specific duties – Prohibition of export and import of goods and provisions regarding notified and specified goods – Import of goods - Free import and restricted imports – Type of import – import of cargo, import of personal baggage, import of stores..

Statutory Materials, Relevant acts with Amendments :

(Note: Students to prepare answer for illustrative problems)

Bare Acts of all statutory materials.

1. Back ground Material on GST Acts and Draft rules 2017.
2. Black Money (undisclosed foreign income and assets) and Imposition of Tax Act, 2015.
3. Mohammed Rafi - Indirect Taxation.
4. Manoharan - Income Tax Act
5. Singhanni Guide to Income Tax Act.
6. Bhagawathi Prasad Income Tax Law and Practice
7. N.A.Phalkiwala- Income Tax.
8. Sukumar Bhattacharya - Income Tax Law Practice
9. Wolters Kluwer - Step by Step guide to GST

10. Wolters Kluwer - GST Acts ,Rules and Forms.
11. Sita Raman and Company - GST Law and Practice.
12. Bharat - GST rates of Tax and Compensation CES
13. Bharat - Central GST Laws
14. Bharat - GST Ready reckoner .
15. V. Nagarajan - Indirect Taxes
16. D.P. Mittal - Indian double Taxation Agreement.

LL.B.(Hons.) (Three Year Course)

VI-SEMESTER

23L3LLBH27 – Criminology & Penology

Unit- I Introduction

Meaning and Significance of Crime-Concept of Crime and basis of Criminalization
 Definition of Crime -Criminology-Criminological Reminiscence: Global Scenario
 Renaissance-Modern Age-Focus on the need for Criminological Study -Ingredients of
 Crime-Distinguish Crime from Non-Crime - Classification of Crimes -Development
 of Criminal Law-Sources of Crime Data-Crime Reporting-Uses of Crime Data
 Schools of Criminology.

Unit- II Crime Causation

Individual Centric Causes -Societal Centric Causes- Theories on Crime Causation
 Juvenile Delinquency-Legislation- Juvenile Justice (Care and Protection of Children)
 Act, 2000- Statutory Bodies and Procedure-Reformative Institutions under the Act
 Rehabilitation Process-Case Law.

Unit - III Types of Crime

White-Collar Crime and Blue-Collar Crime: Implications of White Collar Crimes
 White Collar Crimes in India-Santhanam Committee Report- Wanchoo Committee
 Report - 47th Law Commission Report- Detection and Investigation-Trial of White
 Collar Crimes-Case Law.

Crime and Women: Dowry Prohibition (Amendment) Act, 1986 - Female
 Criminality-Crimes of Passion-New Legislation-Prostitution -Immoral Traffic
 Offender (Prevention) Act- Medical Termination of Pregnancy Act- Pre Conception
 and Pre Natal Diagnosis Techniques (Regulation) Act- Domestic Violence Act
 Criminal Law Amendment Act,2013.

Terrorism: Definition– Nature of Terrorism-Causative Factors - Funds for Terrorism
 Kinds of Terrorism-Terroristic Spectrum- Punishments and Measures for Coping with
 TADA-POTA-Criticism- Anti-Terrorist Measures-Communal Violence-Causes and
 Cures.

Marginal and Victimless Crimes: Social Deviance and Marginal Crimes-Kinds of
 Marginal Crimes -Victimless Crimes-Hidden victims- Drug and Crime-Depiction of
 Offences and Punishments-NDPS Act. Modern Crimes and International Crimes:
 Computer Crime –Kinds of Computer Crimes - Definition of Computer Crime
 Information Technology Act, 2000-Human Organ Crimes-International Crime
 Environmental Crimes.

Unit - IV The Police and Criminal Justice System

Police: Organizational Structure of Indian Police-Police Bureaucracy -Police Setup
 Custodial Deaths-Modernization in Police- Crime Records Management - Traditional

Vis-a-Vis Modern Crime Records Management - Police Community Relations-Thana Level Committee-Police Advisory Committees-Media and Police-Discipline and Lawlessness-Interpol.

Criminal Justice System: Objectives of Criminal Justice System- Rights of Accused and Arrested person-Plea Bargaining-Human Rights and Administration of Criminal Justice.

Unit - V Correctional Institution and Crime Prevention

Probation and Parole: Origin -Salient features of Probation of Offenders Act, 1958 - Parole -Parole Regulations-Parole Recommendations.

Prison: Prison System in India- Problems of Prisoners-Organised Setup -Prison Discipline-Prison Labour-Prison Education-Open Prison-The Prison Community Prison Reform in India-Dr. Wreckless Committee Report-International Perspective.

Crime Prevention: Theories of Punishment-Kinds of Punishment- Recidivism-Variou forms of Recidivist- Prevention of Crime and Delinquency.

Books for Reference

1. Ahamed Siddique - Criminology Problems and Perspectives
2. Dr. M. Ponnian - Criminology and Penology
3. Dr. Rajendra K. Sharma - Criminology and Penology
4. Dr. Sirohi - Criminology
5. Paranjape - Criminology
6. Bames and Teeters - New Horizons of Criminology
7. Sutherland - Criminology
8. Taft and England - Criminology
9. Siegel – Criminology

LL.B.(Hons.) (Three Year Course)

VI - SEMESTER

23L3LLBH28 – Intellectual Property Law

Unit - I Introduction:

Property - tangible and Intangible property - meaning of intellectual property - concept of intellectual property - need to protect intellectual property - protection against unfair competition – various kinds of intellectual property and their difference.

Unit - II Copy Right (Indian Copy Right Act 1957 with amendments) Definition of copy right - meaning of publication - subject matter of copy right literary, Dramatic & Musical works, Artistic works and cinematography - Author and ownership of copyright - Right conferred by copy right-Term of copy right Assignment; Transmission and Relinquishment of copy right- Licenses.

Unit - III Patent Right (Indian Patents Act 1970 with amendments) Definition - Concept of patents - Basic principles underlying patent law in India - Inventions patentable and not patentable.

Procedure to obtain patent specifications – opposition -Examination and disposal of application for patent power of the controller.

Secrecy of inventions grant and sealing of patents lapse and restoration of patents - Right and obligations of patentee.

Working of patents - Revocation and surrender of patents - Licenses - Compulsory License and acquisition of invention by Government.

Infringement of patents and the remedies therefore.
Patent agents - Loss or destruction of patents.

Unit - IV Industrial Designs Act, 2000 with amendments
Introduction - Registrable and Non- registrable design – novelty and originality - publication.

Infringement of copyright in a design - civil remedies against piracy defences - Action for groundless threat.

Unit -V Confidential Information.
Introduction - Principles of law - Employer and employee relationship - Industrial and trade secrets - know how - Remedies.

Unit - VI Trade and Merchandise Marks
a. Rational of Protection of Trade Mark as (a) and aspect of commercial and (b) of Consumer rights.
b. Definition - Concepts of Trade Marks.
c. Marks registrable and not registrable.- Geographical indications of goods conditions for registration-prohibition of registration of certain geographical indications
d. Registration of trade marks - opposition - Disclaimer- Defensive Registration Certification - Duration of registration - Effect of Registration.
e. Distinctiveness - Deceptive similarity - concurrent registration - Rectification Assignment and Transmission – Registered Users.

f. Infringement - Action for infringement Remedies - Passing off action - offence and penalties.

Unit - VII Global Trends
Origin and functions of World Trade Organisation (WTO) - Agreement of Trade related Intellectual property rights (TRIPS) - Effects of Trips on Trade mark, patent and copyright law in India.

Statutory Materials with Amendments

1. Indian Copyright Act, 1957 as amended in 1999.
2. Indian Patents Act, 1970 as amended in 1999.
3. Trade and Merchandise Marks Act, 1958.
4. The Design Act, 2000.
5. Berne Copy right convention.
6. International convention for the protection of Industrial Property (Paris Convention).

LL.B.(Hons.) (Three Year Course)

VI -SEMESTER

23L3LLBH29 – Human Rights Law

Unit - I Human Rights - Origin and Development
General - Origin and development - The middle ages – The Magna Carta - Bill of right - Petition of right - The social contract theory - American Revolution - The French Revolution - Opposition to the concept of natural rights - Universalization of

human rights - The Atlantic Charter - Nature, Meaning and Concept of Human Rights - Philosophical approach - Pragmatic approach - Classification of Human Rights - The right to self determination – The right to development - The right to peace - Interdependence of three categories of Human Rights - Right to information.

Unit - II The United Nations and Human Rights

United Nations Charter based institutions - Centre for Human Rights United Nations specialized agencies - Origin and preparation of international bill of Human Rights - Adoption of the International Covenants on Human Rights and Protocols thereto - Universal declaration of Human Rights - International covenant on economic, social and cultural rights - International covenant on civil and political rights - Instrumentality of enforcement of the covenants.

Unit - III Civil and Political Rights - International Instruments - Part- III of the Constitution of India

A. The right to life, liberty and security of person - Provision of the United Nations Instruments - Right to life does not include right to die - Meaning and content of personal liberty in Article 21 - Second optional protocol to the international covenant on civil and political rights - Problem of extralegal execution – Provisions of Human Rights Instruments - Constitution and Powers of Designated Court - Procedure and power of the Designated Court - Power to grant bill - Maintainability of Writ Petition in High Court - The Nuclear Arms Race and Right to life and liberty.

B. Abolition of slavery and slavery-like practice - Abolition of certain types - forced or compulsory - Provisions of the United Nations Instruments - ILO Forced Labour Convention 1930 and 1957 - Exploitation of Children: Article 24 of the Constitution.

C. Protection against torture and other forms of cruelty inhuman or degrading treatment or punishment - Constitution of the committee against torture - Protection of prisoners in India.

D. Protection against arbitrary arrest and detention - Provisions of International Human Rights Instruments - Indian Constitution - Right to be produced before a Magistrate within 24 hours of his arrest - Right not to be detained beyond twenty four hours without the authority of Magistrate - Prevention detention - Communication of the grounds of detention - Detenu's right of representation - Subjective satisfaction of the detaining authority.

E. Freedom of thought, Conscience and Religion or Belief Provisions of the United Nations Instruments – Conscientious objection to military service - Conscientious objection to military or police service which were used to enforce apartheid - Elimination of intolerance and discrimination based on religion or belief - Freedom to manage religious affairs.

F. Freedom of association including trade union rights – Provisions of the United Nations Human Rights Instruments. – The International Covenant on Civil and Political Rights – The Convention on the right of the child - Provisions of ILO Instruments - Scope of right to form association - Freedom to form association vis-a-vis armed forces and police – reasonable restrictions.

G. The right of everyone to take part in the Government of his country - Right to vote - Right to contest election – Election Commission - Representation of the People's Act - Elections to Local self-Government.

H. Human Rights in the administration of Justice - United Nations standards and norms - Strategies for effective implementations - Guidelines on the role of prosecutions - Declaration of basic principles of justice for victims of crime and abuse

of power - Equality before the law and equal protection of laws - Prohibition of discrimination on certain grounds – Prohibition of discrimination in the matter of public employment – Gender equality in the matter of public appointment - Equal pay for equal work - Exceptions to the rule of equal opportunity in the matter of public employment - Enabling provisions for weaker section of the society - Special provisions, for women and children - Special provisions for advancement of socially and educationally backward classes and Scheduled case and Scheduled tribes.

I. The right of everyone to leave any country including his own and to return to his country - Externment orders an freedom of movement - Deportation of Indian citizens - Police surveillance - The inalienable right of all displaced inhabitants to return to their homes.

Unit - IV Social, Economic and Cultural Rights – International Instruments

A. Right to work - Provisions on ILO Instruments International Covenants - The declaration of elimination of discrimination against women.

B. Right to education - UNESCO - Conventions - Educational rights of women and children.

C. Right to health - WHO - Global Strategy - Health and women and children - Vulnerable groups - International Instruments – World Medical Association - Declaration of Helsinki – CIOMS : Proposed International Guidelines for Bio Medical research involving human subjects - Council of Europe :Recommendation No. R(90) 3 concerning Medical Research on human beings.

D. Right to culture - Declaration of the principles of cultural cooperation - UNESCO recommendations.

E. Right of family - Fractured societies.

Unit - V Human Rights and Vulnerable Groups

A. Rights of women - Objective equality - UN Development Fund for Women - World Conferences on Women – Nairobi Strategy.

B. Rights of the Child - 1959 Declaration - UN Children’s Fund - UNICEF - Convention of right of the child - Right against exploitation -1990 Declaration.

C. Rights of the Disabled persons - Mentally retarded persons - Aged persons etc.

D. Rights of Minorities - National, ethnic, religious, linguistic etc.

Unit -VI Enforcement of Human Rights- Adjudication and Enforcement A. How and by whom are human rights violations identified – By whom and how are human rights cases judged (1) Global level (2) Regional level (UN: Africa) and (3) Country level.

B. By whom and how are decisions and judgements about human rights enforced - National sovereignty: The ultimate issue.

C. Inter-state complaint-mechanism and individual complaint

mechanism. D. European Court of Human Rights - Jurisdiction -

Procedure etc.

E. Human Rights Act, 1993 - National Human Rights Commission - India - Powers, Functions, Officers, Staff etc.

Unit - VII International Humanitarian Law

Origin and development of International Humanitarian Law – Geneva Conventions - Defenseless persons, wounded, sick, medical personnel etc. - Repatriation - Prisoners of War - International armed conflicts - Obstacles.

Unit - VIII Refugee Law

Origin and development - Rights, responsibilities of refugees - Juridical status - UNRWA and UNHCR - Legal status of refugees in India - Resettlement.

References:

Human Rights (Major source documents) - The United Nations Charter, The Universal Declaration of Human Rights - The 1947 Principles of Nuremberg - The Geneva Conventions of 1949 – UN Covenant on Civil and Political Rights - UN Covenant on Economic, Social and Cultural Rights - The European and American Conventions on Human Rights. United Nations Charter.

Statutory Materials with Amendments

1. The Human Rights Act, 1993.
2. Human Rights (Amendment) Act, 2006

Books for Reference

1. Gransten - Human Rights Today
2. Galius Esejoifer - Protection of Human Rights under the Law
3. John Locke - Civil Government
4. Richtel - Natural Rights
5. Raphael D.D., McMillan - Human Rights old and new
6. R. Dworkin - Taking rights seriously
7. Dr. U. Chandra - Human Rights, Allahabad Law Agency Publications
8. Paras Diwan - Human Rights and Law, Universal Publications.

LL.B.(Hons.) (Three Year Course)

VI - SEMESTER

23L3LLBH30 – Practical – III Moot Court Internship

i. Moot Court

(Atleast 3 Moot Problems one each in Constitutional Law ; Criminal law & Civil Law with 10 marks each i.e. 5 marks for written submission & 5 marks for oral advocacy) 30 Marks

ii. Observance of Trial (Atleast 2 Cases: Civil - 1; Criminal - 1)(Student shall Attend two trials in the Course of the Last two or three years of B.A.B.L., Degree Course and Maintain a record and enter the various steps observed during their attendance of different days in the court assignment.) 30 Marks

iii. Interviewing Techniques and Pre-Trial Preparations and Internship Diary (Student shall observe two interviewing sessions of clients at Lawyer's Office/Legal Aid Office and record proceedings in a diary, Which will carry 15 marks. Further, student shall observe the preparation of documents and court papers by the Advocate and the procedure for the filling of the suit / petition and record the same in the diary, which will carry 15 marks) 30 Marks

iv. Viva Voce Examination (on all the above 3 aspects) 10 Marks TOTAL 100 Marks

LL.B.(Hons.) (Three Year Course)

VI-SEMESTER

23L3LLBH31 – Drafting Pleading Conveyancing

Assessment Scheme

- i. 15 Practical exercises in drafting of pleadings (2 Marks for each) : 30 Marks
 - ii. 15 exercises in drafting of conveyancing : 30 Marks
 - iii. Internal Tests : 30 Marks
 - iv. Viva Voce Examination : 10 Marks
- TOTAL 100 Marks

Unit - I Drafting:

General principles of drafting and relevant substantive rules shall be taught.

Unit - II Pleading:

Civil: I). Plaint ii) Written Statement iii) Interlocutory Application iv) Original petition v) Affidavit vi) Execution petition and vii) Memorandum of Appeal and Revision viii) petition under Article 226 and 32 of the Constitution of India.

Unit - III Conveyancing:

1. Sale Deed 2. Mortgage Deeds. 3. Lease Deed 4. Gift Deed 5. Promissory note. 6. Power of Attorney 7. Will.

Unit - IV Original side and Appellate side Rules of High court.

Unit - V The Indian Registration 1908 Act With Amendments

Unit - VI The Indian Stamp Act 1899 With Amendment

Books for Reference

1. Shivgopal - Conveyancing Precedents & Forms.
2. Mogha (P. C .) - The Law of Pleading in India.
3. Mogha (P. C .) - The Indian Conveyances
4. Desouza's - Forms and Precedents of Conveyancing.