DEPARTMENT OF MATHEMATICS

MEETING OF BOARD OF STUDIES IN MATHEMATICS.

(30.07.2020)

MINUTES OF THE MEETING

The Board of Studies meeting for the department of **MATHEMATICS** was held on 30.07.2020 at 2.00 p.m Video Conference Media: ZOOM, PRIST Deemed to be University, Thanjavur under the chairmanship of **Dr. S.SUBRAMANIAN.**

The following Members were present:

S.No.	Name of the Member	Position	Role
1.	Dr.S.Subramanian	HOD	Chair Person
2.	Dr.V.Ramadoss	Professor	Internal Member
3.	Prof. A.Panneer Selvam	Associate Professor	Internal Member
4.	Dr.N.Latha	Associate Professor	Internal Member
5.	Dr.M.Gayathri	Assistant Professor	Internal Member
6.	Dr.K.Selvaraj	Assistant Professor	Internal Member
7.	Dr.N.Saivaraju	Professor	External Member
8.	Dr.A.Mohan	Professor	External Member

The Chairman, Board of Studies in the Department of Mathematics welcomed the members and briefed about the existing curriculum and syllabi for B.Sc. Mathematics, M. Sc. Mathematics and M. Phil. Mathematics progammes.

After thorough review of the existing curriculum and syllabi for various programmes offered by the department and also the feedback on curriculum collected from various stakeholders during 2019-20, the members of the Board of Studies have unanimously passed the following resolutions:

1. Resolved to introduce the following Audit Courses in the B.Sc.(Mathematic) programme curriculum with effect from 2020-21

   Semester I: Universal Human Values - 2 credits

   Semester II : Communication Skills- 2 credits

   Semester III: Office automation- 2 credits

   Semester IV: Leadership and Management Skills- 2 credits

   Semester V: Professional Skills- 2 credits

   Further resolved to approve the syllabus copy for the above mentioned Audit Courses as given in **Annexure-I**

2. Resolved to introduce the following Audit Courses on Soft Skills in the B.Sc.(Mathematic) programme curriculum with effect from 2020-21

   Year I: Basic Behavioral Etiquette: 2 Credits

   Year II : General Aptitude and Qualitative Ability: 2 Credits

   Year III: Interview Skills Training and Mock Test: 2 Credits

   Further resolved to approve the syllabus copy for the above mentioned Audit Courses on Soft Skills as given in **Annexure-II**

3. Resolved to introduce an Audit Course on "Community Engagement" with one credit in the 3rd year of B.Sc.(Mathematic) programme curriculum with effect from 2020-21Annexure-III

4. Resolved to drop the courses on Communicative English Laboratories, Skill Based Elective Courses and Course on Extension Activities from the existing curriculum of B.Sc.(Mathematics)programme with effect from 2020-21.

5. Resolved to introduce a course on "Research and Publication Ethics" with 2 credits in the M.Phil. (Mathematics) programme curriculum with effect from 2020-21. Further resolved to approve the syllabus for the same as given in **Annexure-IV**

Also members of the board updated the panel of examiners and submitted the same to the Academic Counsel for its approval.

The Meeting concluded with thanks from Board of Studies Chairman.

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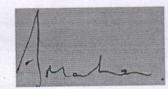
Signature of the Chairman& Members

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SCHOOL OF ARTS AND SCIENCE

Department of Mathematics

B.Sc. Mathematics Syllabus

[Regulation 2020]

B.Sc., Graduate Attributes

- Information Literacy
- Problem Analysis
- Design/development of solutions
- Modern tool usage
- Professional and Ethical understanding

B.Sc. - Programme Educational Objectives (PEO)

PEO1 - To provide students with knowledge, abilities and insight in mathematics and related fields.

PEO2. -To enables them to work as a mathematical professional, or qualify for training as scientific researcher.

PEO3 - To develops the ability to utilize the mathematical problem solving methods such as analysis, modeling, programming and mathematical software applications in addressing the real world problems and heuristic issues.

PEO4 - To enables students to recognize the need for and the ability to engage in life-long learning.

PE05 - To understand the relationship of Mathematics with other technical fields and develop competence in the application of Mathematics in one or more areas.

PE06 - To formulate and solve problems from a Mathematical perspective.

B.Sc.- Programme Specific Outcomes (PSO)

PSO1 - To think in a critical manner.

PSO2 - To 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.

PSO3 - To formulate and develop mathematical arguments in a logical manner.

PSO4 - To acquire good knowledge and understanding in advanced areas of mathematics

and statistics, chosen by the student from the given courses.

PSO5. To understand, formulate and use quantitative models arising in social science, Business and other contexts.

PSO6. Been capable of executing research and research projects

B.Sc. Programme Outcomes (PO)

PO1 - To understand and apply the knowledge of mathematical science to solve real life problems.

PO2 - To design the methodology suitable to the problem on hand.

PO3 - To analyze and interpret solution outputs and generate new ideas based on the Outputs.

PO4 - To lead, work in team and give priority to the success of the aim of the team.

PO5 - To recognize and learn the importance of life-long learning.

PO6 - Ability to pursue advanced studies and research in pure and applied mathematical science.

PO7 - Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.

SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF MATHEMATICS
B.Sc., MATHEMATICS - REGULATION 2020

COURSE STRUCTURE

SEMESTER – I

Course Code	Course Title	L	T	P	C
THEORY					
20110AEC11/ 20111AEC11/ 20132AEC11/ 20135AEC11	Tami – I/Advanced English-I/Hindi-I/ French - I	4	0	0	2
20111AEC12	English-I	4	0	0	2
20112AEC13	Differential Calculus and Vector Calculus	5	0	0	3
20112AEC14 Trigonometry, Analytical Geometry 3D and Calculus		5	0	0	3
20120AEC15	Programming in C	6	0	0	5
PRACTICAL					
20120AEC16L	Programming in C Lab	0	0	3	2
	Total	24	0	3	17
AUDIT COURSE					
201ACLSICN	Indian Constitution	-	-	-	2
201ACLSUHV	Universal Human Values	-	-	-	2

SEMESTER – II

Course Code	Course Title	L	T	P	C
THEORY					
20110AEC21/ 20111AEC21/ 20132AEC21/ 20135AEC21	Tamil – II/ Advanced English-II/Hindi-II/ French – II	4	0	0	2
20111AEC22	English-II	4	0	0	2
20112AEC23	Integrals & Differential Equations	5	0	0	3
20112SEC24 Sequence and series		5	0	0	4
20120AEC25	Web Programming	5	1	0	5
PRACTICAL					
20120AEC26L	Web Programming Lab	0	0	3	2
RESEARCH SKILL BASED COURSE					
20112RLC27	Research Led Seminar	-	-	-	1
	Total	23	1	3	18
AUDIT COURSES					
201ACLSCOS	Communication Skills	-	-	-	**2**
201ACSSBBE	Basic Behavioral Etiquette	-	-	-	**2**

SEMESTER – III

Course Code	Course Title	L	T	P	C
THEORY					
20110AEC31/ 20132AEC31/ 20111AEC31/ 20135AEC31	Tamil – III/Hindi-III/Advanced English-III/ French – III	4	0	0	2
20111AEC32	English-III	4	0	0	2
20112AEC33 Number Theory		4	0	0	3
20112AEC34	Numerical Analysis	4	0	0	3
20118AEC35	Mathematical Statistics-I	5	1	0	5
PRACTICAL					
20118AEC36L	Mathematical Statistics-I Lab	0	0	3	2
RESEARCH SKILL BASED COURSE					
20112RMC37	Research Methodology	2	0	0	2
	Total	23	1	3	19
AUDIT COURSE					
201ACLSOAN	Office Automation	-	-	-	2

Course Code	Course Title	L	T	P	C
THEORY					
20110AEC41/ 20111AEC41/ 20132AEC41/ 20135AEC41	Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV	4	0	0	2
20111AEC42	English-IV	4	0	0	2
20112SEC43 Operations Research		4	0	0	3
20112AEC44 Astronomy		4	0	0	3
201ENSTU45	Environmental Studies	2	0	0	2
20118AEC46	Mathematical Statistics-II	5	1	0	5
PRACTICAL					
20118AEC47L	Mathematical Statistics- II Lab	0	0	3	2
	Total	23	1	3	19
AUDIT COURSE					
201ACLSLMS	Leadership and Management Skills	-	-	-	2
201ACSSAQA	General Aptitude and Quantitative Ability				2

Course Code	Course Title	L	T	P	C
THEORY					
20112AEC51 Modern Algebra		5	0	0	4
20112AEC52	Real Analysis	5	1	0	4
20112SEC53	Statics	5	1	0	4
20112SEC54	Programming in C++	5	0	0	3
20112DSC55_	Discipline Specific Elective -I	5	0	0	3
RESEARCH SKILL BASED COURSE					
20112BRC56	Participation in Bounded Research	-	-	-	1
	Total	**25**	**2**	**0**	**19**
AUDIT COURSE					
201ACLSPSL	Professional Skills	-	-	-	**2**

SEMESTER – VI

Course Code	Course Title	L	T	P	C
	THEORY				
20112AEC61	Complex Analysis	5	0	0	4
20112SEC62	Dynamics	5	1	0	4
20112AEC63 Discrete Mathematics		5	0	0	4
20112DSC64_	Discipline Specific Elective –II	5	0	0	4
201_ _OEC(2 Digit Course Name)	Open Elective	4	0	0	2
	PRACTICAL				
20120SEC65L	Project Work	-	-	-	4
20120SEC66L	Program Exit Examination	-	-	-	1
	Total	**24**	**1**	**0**	**23**
	AUDIT COURSE				
201ACSSIST	Interview Skills Training and Mock Test	-	-	-	**2**
201ACLSCET	Community Engagement	-	-	-	**1**
Total Credits -Programme					**115**
Total Credits - Audit Courses					**19**

Discipline Specific Electives

Semester	Discipline Specific Elective Courses-I
V	a) 20112DSC55A – Fuzzy Analysis b) 20112DSC55B - Formal Languages and Automata Theory
	Discipline Specific Elective Courses-I
VI	a) 20112DSC64A - Graph Theory b) 20112DSC64B - Mathematical Modelling

Open Electives

Semester	Open Elective Courses
VI	a) 201TNOEC-Tamil Ilakkiya Varalaru b) 201ENOEC-Journalism c) 201PHOEC-Instrumentation d) 201CEOEC-Food and Adulteration e) 201MBOEC- Wildlife Conservation f) 201CSOEC – E-Learning g) 201CAOEC-Web Technology h) 201CMOEC-Banking service

Credit Distribution

Sem	AEC	SEC	DSC	OEC	Research	Others	Total
I	17	-	-	-	-	-	17
II	13	4	-	-	1	-	18
III	17	-	-	-	2	-	19
IV	14	3	-	-	-	2	19
V	8	7	3	-	1	-	19
VI	8	4	4	2	4	1	23
Total	77	18	7	2	8	3	115

Course Code	Course Title	L	T	P	C
20110AEC11	Tamil -I	4	0	0	2

பிரிஸ்ட் நிகர்நிலைப் பல்கலைக்கழகம்- வல்லம், தஞ்சாவூர்

பாட குறியாடு :

தமிழ் முதல் பருவம்

முதலாம் ஆண்டு

இக்கால இலக்கியம் - செய்யுள், சிறுகதை , நாடகம், இலக்கிய வரலாறு

அலகு : 1.செய்யுள்

1. தாயுமானவ சுவாமிகள் - ஆதார புவனம் - சிதம்பர ரகசியம் - 40 அடிகள்

2. இராமலிங்க அடிகள் - திருவருட்பா - கருணை விண்ணப்பம் - 40 அடிகள்

3. கவிமணி தேசிக விநாயகம் பிள்ளை - மலரும் மாலையும் - 52 அடிகள்

4. பாரதியார் - புதுமைப்பெண் - 40 அடிகள்

5. பாரதிதாசன் - பாரதிதாசன் கவிதைகள் ,தமிழ் இனிமை , தமிழ் உணவு

அலகு : 2. செய்யுள்:

6 . நாமக்கல் கவிஞர் - தமிழ் தேன் - தமிழ் வளர்க்க சபதம் செய்வோம் , 40 அடிகள்

7. ந.பிச்சமூர்த்தி - வழித்துணை - கவிதை கருடன் , 42 அடிகள்

8.சுரதா - தேன்மழை, கலப்பை , 22 அடிகள்

9. கண்ணதாசன் - இலக்கியம் , ஒரு பானையின் கதை , 54 அடிகள்

10. அப்துல் ரகுமான் - சொந்த சிறகுகள், குப்பையை கிளறும் சிறகுகள், 80 அடிகள்

அலகு : 3. சிறுகதை :

11. சு.சமுத்திரம் - வேரில் பழுத்த பலா

அலகு : 4. நாடகம் :

12. கு. வெ. பாலசுப்பிரமணியன் , கௌதம புத்தர் (உரைநடை நாடகம்)

அலகு : 5. இலக்கிய வரலாறு

13. சிறுகதை , புதினம், நாடகம் உரைநடை , கவிதை , புதுக்கவிதை

Course Code	Course Title	L	T	P	C
20111AEC11	Advanced English-I	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To familiarize 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:

- Develop vocabulary
- Learn to edit and do proof reading
- 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

Comparison and contrast

Cause and effect

UNIT – IV

Editing

Proof reading

UNIT – V

Speeches of famous people:

Mahatma Gandhi-Abraham Lincoln-Swami Vivekananda-John F. Kennedy

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

Course Code	Course Title	L	T	P	C
20111AEC12	English-I	4	0	0	2

Aim:

- To acquaint with learning English through literature

Objective:

- To improve English delightfully through simple poems, essays
- To throw light on fiction
- To read and comprehend literature

Outcome:

- Read and comprehend literature
- Appreciate the different types of poetry and prose

UNIT –I

Because I could not Stop for Death   -Emily Dickinson

Stopping by Woods on a Snowy Evening   -Robert Frost

UNIT – II

Enterprise   -Nissim Ezekiel

Love poem for a wife   -A.KRamanujam

UNIT –III

The Art of Reading   - Lin Yutang

An Eco-Feminist Vision   -ArunaGnanadason

UNIT –IV

The Merchant of Death   -Nanda Kishore Mishra & John Kennet

She Spoke for all Nature   -Young world 'The Hindu'

UNIT –V

Oliver Twist   -Charles Dickens**Text book:**

Author	Title of the book	Edition / Year	Publisher
S.Murugesan/Dr.K.Chellappan	The Art of Reading/ Experiencing Poetry	Reprint 2004	Emerald Publishers

Course code	Course Title	L	T	P	C
20112AEC13	**Differential Calculus and Vector Calculus**	5	0	0	3

Course code	Course Title	L	T	P	C
20112AEC14	Trigonometry, Analytical Geometry 3 D and Calculus	5	0	0	3

Objectives:

This course is designed to give students a secure base in elementary calculus and vector calculus to allow them to tackle the mathematics needed in other sciences. Students wishing to do more mathematics will be given a good foundation from which they can proceed to other courses.

UNIT I:

Successive differentiation — Leibnitz theorem with proof — Problems, Partial derivative of a function.

UNIT II:

Maxima & Minima for functions of two variables — Lagrange multiplier method.

UNIT III:

Curvature (Cartesian, Polar and Pedal form) — evolutes.

UNIT – IV

Vector differentiation – velocity & acceleration vectors- Gradient of a vector directional derivative - Init normal vector- tangent plane, Divergence- Curl – Solenoidal & Irrotational vector- Double operators – Properties connecting grad, div & curl of a vector.

Unit –V

Vector integration –Line integrals – Conservative force field – Scalar field- Scalar potential- Work done by d Force- Surface integrals – Volume integrals.

Text Books:

1.Differential calculus — T.K.M. Pillai

2.Vector calculus — T.K.M. Pillai.

Reference:

T.K. Manickavasagam Pillai, Analytical Geometry (3D) & Vector calculus, Neq Gamma Publishing House, 1991

Learning outcomes

By the end of this course, you should:

✔ be able to manipulate, and solve problems using, successive differentiation & vector operators;

✔ be able to calculate Maxima & Minima for functions of two variables and Lagrange multiplier method

✔ be able to solve curvature, evolutes, asymptotes and envelopes in simple cases.

✔ be able to calculate gradient, divergence and curl vectors.

Objectives:

This course is designed here to get sufficient ideas about integral calculus, trigonometry and analytical geometry to tackle the mathematics needed in other sciences.

UNIT I:

Expansions of cos $n\theta$, sin $n\theta$, $\cos^n\theta$, $\sin^n\theta$ (for positive integral values of n) — series for cos θ, sin θ, tan θ.

UNIT II:

Hyperbolic functions — Principal and general values of logarithms of complex numbers. Separation of real and imaginary parts — factorization.

UNIT III:

Summation of trigonometrical series — method of difference - sum of series of n angles in A.P, C+ is form, Gregory's series.

UNIT IV:

Analytical Geometry (3-D)
Spheres (Simple Properties only) general second degree equations to cone cylinder.

UNIT V:

Integralcalculus.
Evaluation of double and Triple integral — Beta and gamma integrals.

Text Books:

1. Trigonometry — T.K.M. Pillai
2. Analytical Geometry (3D) And Integral Calculus — T.K.M. Pillai

Learning outcomes

By the end of this course, you should:

✔ be able to manipulate the expansions of basic trigonometric functions

✔ be able to calculate summation of trigonometric series and Gregory's series

✔ understand the concept of analytical geometry and be able to use properties of spheres, cone and cylinder in real cases.

✔ be able to manipulate, and solve problems using, integral calculus

Allied- I- Paper -I PROGRAMMING IN C

Course code	Course Title	L	T	P	C
20120AEC15	Allied- I- Paper -I Programming In C	6	0	0	5

Objectives:

- To learn the concept of programming
- To understand input and output functions
- To study about Structures
- To learn Pointers in C Language

UNIT I :

Evolution and Applications of C - Structure of a C Program -Data Types - Declaration - Operators - Expressions - Type conversions -Built-in functions.

UNIT II :

Data Input and Output - Control statements: IF, ELSE-IF, GOTO, SWITCH, WHILE- DO, DO-WHILE, FOR, BREAK and CONTINUE.

UNIT III :

Functions:

Defining and accessing functions-passing parameters of functions -Arguments - Recursive functions -Storage classes.

Arrays:

Defining and processing Arrays -Multi dimensional arrays - passing arrays to functions -Arrays and strings String functions - String Manipulations.

UNIT IV :

Pointers

Pointers Declarations - Operations on pointers -pointers to functions - Pointer and Strings -pointers and arrays - array of pointers - Structures and pointers -unions.

UNIT V :

Data files -Opening, Closing, and processing files - Files with structures and unions

Register variables - Bit wise Operations - Macros- Pre-processing

Reference:

"Programming in C" — E. Balagurusamy — Tata McGrawHill Publications

Reference:

1. " Programming with C" — ByronS.Gottfried — Schauni's outline

series — Tata McGrawHill publications.

2. "Let us C "— Yeswant kanetkar — BPB Publications.

Learning Outcomes:

At the end of the course, the student should be able to:

- Design C Programs for problems.
- Write and execute C programs for simple applications

Allied- I Practical -I PROGRAMMING IN C LAB

Course code	Course Title	L	T	P	C
20120AEC16 L	Allied -I -Paper -I Programming in C Lab	0	0	3	2

Objectives

Programming in C Lab 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 Quadratic Equation, Sum of Series (Sine, Cosine, e^x), Fibonacci Numbers using recursive functions, Sorting of given names in a1phabtical order, Matrix Operations (Addition, Subtraction, Multiplication — use functions) would be taught.

Students are able to the C program

1. Write a C program to find the roots of Quadratic Equation (all cases).

2. Write a C program to find the Sum of Series (Sine, Cosine, e^x)

3. Write a C program to reads an integer N and determine whether N is prime or not.

4. Write a C program to Finding factorials, generating Fibnoacci Numbers using recursive functions.

5. Write a C program to find the numbers in Ascending and Descending order

(use it to find largest and smallest numbers).

6. Write a C program to find the sum of natural numbers using WHILE statement,

7. Write a C program for Sorting of given names in a1phabtical order.

8. Write a C program for Matrix Operations (Addition, Subtraction, Multiplication — use functions).

9. Write a C program for String Manipulation without using String functions (String length, String Comparison, String Copy, Palindrome checking, counting words and lines in strings — use function pointers).

Learning Outcomes:

At the end of the course, the student should be able to:

- Students learned program techniques
- Understand the concept of various functions and pointers
- A knowledge of writing C program
- Design/development of solutions

INDIAN CONSTITUTION

Course Code	Course Title	L	T	P	C
201ACLSICN	Indian Constitution	-	-	-	2

Objectives:

1. To make the students understand about the democratic rule and parliamentarian administration

2. To appreciate the salient features of the Indian constitution

3. To know the fundamental rights and constitutional remedies

4. 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 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

UNIVERSAL HUMAN VALUES

Course Code	Course Title	L	T	P	C
201ACLSUHV	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:

1. Knowaboutuniversalhumanvaluesandunderstandtheimportanceofvaluesini ndividual, social circles, career path, and national life.

2. Learnfromcasestudiesoflivesofgreatandsuccessfulpeoplewhofollowedandp ractised human values and achieved self-actualization.

3. Become conscious practitioners of human values.

4. Realisetheirpotentialashumanbeingsandconductthemselvesproperlyinthew aysofthe world.

Unit I : Love & Compassion

- 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: Truth

- 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 :Non-Violence

- 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 organizations that are known for their commitment to non-violence

- Narrativesandanecdotesaboutnon-violencefromhistory,andliteratureincluding

  local folklore

- Practicing on-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: Righteousness

- 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 earners 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:Peace

- Introduction: What is peace? Its need, relation with harmony and balance
- Individuals and organizations 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: Service

- 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 earners 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: Renunciation(Sacrifice)

- 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

Course Code	Course Title	L	T	P	C
20110AEC12	Tamil -II	4	0	0	2

பிரிஸ்ட் நிகர்நிலைப் பல்கலைக்கழகம்- வல்லம், தஞ்சாவூர்

பாட குறியாடு :

தமிழ் இரண்டாம் பருவம்

முதலாம் ஆண்டு

செய்யுள் , பக்தி இலக்கியம், சிற்றிலக்கியம் , இலக்கிய வரலாறு

அலகு : 1. செய்யுள்:

1. திருஞானசம்பந்தர் தேவாரம் - கோளறு பதிகம்

2. திருநாவுக்கரசர் தேவாரம் - தனிக் குறுந்தொகை

3. சுந்தரர் தேவாரம் - திருநொடித் தான் மலை

4. மாணிக்கவாசகர் - திருவாசகம் - தருப்பொன் ஊசல்

அலகு : 2 . செய்யுள்:

5. குலசேகராழ்வார் - பெருமாள் திருமொழி

6. நம்மாழ்வார் திருவாய் மொழி - இரண்டாம் பத்து - உலகிற்கு உபதேசம்

7. ஆண்டாள் - நாச்சியார் திருமொழி - திருமணக்கனவை உரைத்தல்

8. திருமங்கை ஆழ்வார் - சிறிய திருமடல்

அலகு : 3 . செய்யுள்:

9 . திருமூலர் - மூன்றாம் திருமுறை

10 . குமரகுருபரர் - மானாட்சியம்மைப் பிள்ளை - தமிழ் வருகைப் பருவம்

11 . திரிகூடராசப்பக்கவிராயர் - குற்றாலக்குறவஞ்சி - குறத்தி நாட்டு வளங் கூறுதல்

12 . வீரமாமுனிவர் - திருக்காவலூர்க் கலம்பகம்

அலகு : 4 . புதினம்

13 . கு.வெ. பாலசுப்ரமணியன் - காளவாய்

அலகு : 5 . இலக்கிய வரலாறு

14 . **சைவ வைணவ இலக்கியங்கள்** , **சிற்றிலக்கியங்கள்** , (**பள்ளு -**
பிள்ளைத்தமிழ் ,- **பரணி**)

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

Course Code	Course Title	L	T	P	C
20111AEC22	English-II	4	0	0	2

Aim:

- To acquaint learners with different trends of writing

Objective:

- To acquire language skills through literature
- To enable the students to appreciate literature
- To develop the conversational skills through one act plays

Outcome:

- Appreciate different forms of literature
- Acquire language skills through literature
- Broaden the horizon of knowledge

UNIT – I

Ecology   -A.K. Ramanujan

Gift   -Alice Walker

The First Meeting   -Sujata Bhatt

UNIT –II

Fueled   -Marcie Hans

Asleep   -Ernst Jandl

Buying and selling   -Khalil Gibran

UNIT –III

The End of living and The Beginning of Survival   - Chief Seattle

My Wood   - E.M.Forster

The Meeting of Races   - Rabindranath Tagore

UNIT – IV

The Refugee   -K.A. Abbas

I Have a Dream   -Martin Luther king

Those People Next Door   -A.G. Gardiner

UNIT – V

Marriage is a private Affair   -Chinua Achebe

The Fortune Teller   -Karel Capek

Proposal   -Anton Chekov

Text book:

Author	Title of the book	Edition / Year	Publisher
Gowri Sivaraman	Gathered Wisdom	Reprint 2010	Emerald Publishers

Course code	Course Title	L	T	P	C
20112AEC23	Core -III Basic Mathematics III (Integrals and Differential Equations)	5	0	0	3

INTEGRALS AND DIFFERENTIAL EQUATIONS

UNIT I:

Properties of definite integrals and solve standard problems. Reduction formulae- $\int x^n e^{ax} dx$, $\int x^n \cos ax\, dx$, $\int \sin^n x\, dx$, $\int \cos^n x\, dx$, $\int \cos^m x \sin n x\, dx$ and problems based on above types working problems based on $\int \sin^m x \cos^n x\, dx$

UNIT II:

Second order differential equation with constant coefficients $- e^{\alpha x} g(x)$, x sin x , x cos x, , x²cos x types only and with Variable coefficients- Variation of parameters

UNIT III:

Partial differential equations. Formation of equation $-$ General, particular and complete integrals of PDE $-$ Lagrange's method four standard forms

UNIT IV:

Laplace Transforms: Laplace transform and its application for solving ordinary differential equations $-$ convolution theorem for Laplace transform $-$ problems.

UNIT V:

Fourier series: Periodic functions $-$ Dirichlet conditions (Without Proof) Odd and Even functions- change of interval $-$ Half range series.

Reference
Calculus - T.K.M.Pillai, Arumugam and S.Narayanan.
Differential equations -   S.Narayanan

SEQUENCE AND SERIES

Course code	Course Title	L	T	P	C

20112SEC2 4	Core -III Basic Mathematics III (Integrals and Differential Equations)	5	0	0	4

UNIT 1:

Sequence, Limits, Convergence-Cauchy's general principle of convergence-Cauchy's first theorem on Limits-Bounded sequences-Monotonic sequence always tends to a limit, finite or infinite - Limit superior and limit inferior.

UNIT 2:

Infinite series-Definition of convergence, Divergence and Oscillation-Necessary Condition for Convergence - Convergence of $\Sigma\ 1\ /\ n^{p}$ and Geometric series. Comparison test,D 1 Alembert's ratio test and Raabe's test –Simple problems.

UNIT 3:

Cauchy's condensation test, Cauchy's root test and their simple problems Alternative series with simple problems.

UNIT 4:

General summation of series including successive difference and recurring series.

UNIT 5:

Inequalities - Geometric and Arithmetic means Weistrass inequalities- Cauchy's inequality.

TEXT BOOK:

Alebra Volume I & Volume II T.K.M.Pillai (Relavant problems only)

Unit I : Chapter 2 (4.7)

Unit II : Chapter 2 (8-14,16,18,19)

Unit III : Chapter 2 (15,17,21-24)

Unit IV : Chapter 5

Unit V : Chapter 4 (second volume)

General Reference

Sequence and series: Arumugam and Isaac

Course code	Course Title	L	T	P	C
20120AEC25	Allied -I-Paper-II Web Programming	5	1	0	5

Objectives

- give you a general understanding of how a computer works
- introduce you to assembly-level programming
- prepare you for future courses. .

UNIT-I:

Introduction to HTML- Head and body sections- Hyper text and Link in HTML documents.

UNIT-II:

Designing the body section- Managing images in HTML.

UNIT-III:

Ordered and Unordered Lists –Table Handling.

UNIT-IV:

DHTML and Style Sheet – Frames.

UNIT-V:

A Webpage design project – Forms.

REFERENCE BOOKS:

1. World Wide Web Design with HTML – c.Xavier –Tata McGraw-Hill-2000.
2. Principles of web design –Joel Sklar –Vikas Publishing House 2001.

Learning outcomes

By the end of this course, you should be able to:

- describe the fetch-execute cycle of a computer
- understand the different types of information which may be stored within a computer memory
- write a simple assembly language program

Allied- I Practical—II   WEB PROGRAMMING LAB

Course code	Course Title	L	T	P	C
20120AEC26L	Allied-I Practical-II Web Programming Lab	0	0	3	2

Objectives
1. To create a fully functional website with mvc architecture
2. To develop an online book store
3. To provide an understanding of the language translation peculiarities by designing a complete translator for a mini language

1. Create a Web page for ABC INFOTECH LTD., with necessary images and marquee.

2. Create Web pages which displays the menu card of a hotel. The first page should contain the list of items available. After selection of one item, the corresponding details should be displayed on the next page.

3. Create a Web page which displays the balance sheets for the given list of companies (same as above problem).

4. Create a Web page for XYZ INFOTECH LTD., to display the company profile employee details balance sheet, receive resume, customer service using links.

5. Using frames create web pages *for* a travel agency

6. Create a Web page using forms for our college students admission process. (Use list box, push button, radio button, command button, rich text box, text box, etc where ever applicable)

7. Create a Web page which receives suggestions from customers for a software development & consultancy agency using necessary.

Learning outcomes
    By the end of this course, you should be able to:
● Will create a fully functional website(online book store) using mvc architecture
● Will create a complete translator for a mini language
● Understand the basic terminology used in computer programming
● Use different data types in a computer program.
● Design programs involving decision structures, loops and functions.

Course code	Course Title	L	T	P	C

201ACLSCOS	Communication Skills	-	-	-	2

Course Objectives :

This course has been developed with the following objectives:

1. Identify common communication problems that may be holding learnersback
2. Identify what their non-verbal messages are communicating toothers
3. Understand role of communication in teaching-learningprocess
4. Learning to communicate through the digitalmedia
5. Understand the importance of empatheticlistening
6. Explore communication beyondlanguage.

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 :Listening

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

Unit II: Speaking

- Pronunciation
- Enunciation
- Vocabulary
- Fluency
- Common Errors

Unit III :Reading

- 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: Writing and different modes of writing

- 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:Digital Literacy

- 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: Effective use of Social Media

- 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 : Non-verbal communication

- 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

Reference Books

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

Course Code	Course Title	L	T	P	C
20110AEC13	Tamil -III	4	0	0	2

பிரிஸ்ட் நிகர்நிலைப் பல்கலைக்கழகம்- வல்லம், தஞ்சாவூர்

பாட குறியாடு :

தமிழ் மூன்றாம் பருவம்

இரண்டாம் ஆண்டு

செய்யுள், காப்பியங்கள் இலக்கிய வரலாறு

செய்யுள்

அலகு : 1

1. சிலப்பதிகாரம் - மனையறம் படுத்த காதை

2. மணிமேகலை - ஆதிரை பிச்சையிட்ட காதை

3. சீவக சிந்தாமணி - விமலையார் இலம்பகம்

அலகு :2

4. பெரியபுராணம் - இளையான் குடிமாற நாயனார் புராணம்

5. கம்பராமாயணம் - கைகேயி சூழ்வினைப் படலம்

அலகு :3

6. சீறாப்புராணம் - நபி அவதாரப் படலம் - 24 வரிகள்

7. தேம்பாவணி - வாமன் ஆட்சி படலம் - முதல் 5 பாடல்கள்

அலகு :4

8. நளவெண்பா - சுயம்வர காண்டம் (20 - 51)

அலகு . 5 : இலக்கிய வரலாறு

9. காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள், புராணங்கள், இதிகாசங்கள்

Course Code	Course Title	L	T	P	C
20111AEC31	**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 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
20111AEC32	English-III	4	0	0	2

Aim:

- To acquaint with learning English through literature

Objective:

- To sensitize language use through prescribed text
- To develop the conversational skills through one act plays

Outcome:

- Appreciate different types of prose
- Develop the conversational skills through one act plays
- Enhance the skill of making grammatically correct sentences.

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

Text book:

Author	Title of the book	Edition / Year	Publisher
SteuartH.King	Nine Short Stories	Reprint 2001	Blackie Books
T.Prabhakar	One – Act Play		Emerald

Author	Title of the book	Edition / Year	Publisher
SteuartH.King	Nine Short Stories	Reprint 2001	Blackie Books
T.Prabhakar	One – Act Play		Emerald

Core V - NUMBER THEORY

Course code	Course Title	L	T	P	C
20112AEC33	Core – V Number Theory	4	0	0	3

Objectives:

The objective is for the students to obtain a foundational knowledge of elements of Number Theory through step-by-step proofs of classical theorems, as well as to sharpen their skills through problem-solving.

UNIT 1:

THE FUNDAMENTAL THEOREM OF AR1THMETIC:- Introduction - Divisibility — Greatest Common divisor — Prime numbers — The fundamental theorem of arithmetic — The series of reciprocals of the primes — The Euclidean algorithm — The greatest Common divisor of more than two numbers.

UNIT 2:

ARITHMETICAL FUNCTIONS AND D1RICHLET MULTIPLICATION:- The motions function $\mu(n)$ — The Euler totient function — A relation connecting φ and μ - A product formula for $\mu(n)$ — The Dirichlet product of arithmetical functions — Dirichlct inverses and the Mobius inversion formula — the Mangoldt function $\Lambda(n)$ — Multiplicative functions — Multiplicative function and Dirichlet multiplication.

UNIT 3:

AVERAGES OF ARITHMETICAL FUNCTIONS: - The big oh notation Asymptotic equality of functions — Euler's summation formula — some elementary asymptotic formulas- the average order of d(n) — the average order of the divisor fraction $\partial\alpha(n)$ - the average order of $\varphi(n)$.

UNIT 4:

SOME ELEMENTARY THEOREMS ON THE DISTRIBUTION OF

PRIME NUMBERS:- Chebyschev's function $\psi(x)$ and $\vartheta(x)$ - Relations

connection $\vartheta(x)$ and $\pi(x)$ - some equivalent forms of the prime number theorem — Inequalities of $\pi(n)$ and P_n — Shapiro's Tauberian theorem — Application of Shapiro's theorem — An asymptotic formula for the partial sums $\sum p_n \leq \left(\frac{1}{p}\right)$ - the partial sums of the mobius function.

UNIT 5:

CONGRUENCES:- Definition and basic properties of congruence's — Residue classes complete residue systems — Linear congruence's — Reduced revised systems — Ruler Fernat's Theorem — Polynomial congruence's module Lagranges theorem — Applications of Lagrange's Theorem — Chinese Remainder theorem.

Reference:
 Introduction to Analytic Number Theory by Tom. M.Apostal
For Unit 1 - Chapter 1
For Unit 1 - Chapter 2

For Unit 1 - Chapter 3
For Unit 1 - Chapter 4 Section 4,1 to 4.9 only
For Unit 1 - Chapter 5

General Reference:
      1. Number theory : George E.Andrews
      2. Introduction to theory of Number : G.H.I-lardy and E.M.Wright.
      3. Basic Number Theory : S.B.Malilk.
      4. Elements of Number Theory : S.Kumaravelu and Susheela Kumaravelu.

Learning Outcomes:

On satisfying the requirements of this course, students will have the knowledge and skills to:

- ✔ Solve problems in elementary number theory

- ✔ Apply elementary number theory to cryptography

- ✔ Develop a deeper conceptual understanding of the theoretical basis of number theory and cryptography

- ✔ Define and interpret the concepts of divisibility, congruence, greatest common divisor, prime, and prime-factorization,

Core VI - NUMERICAL ANALYSIS

Course code	Course Title	L	T	P	C
20112AEC34	Core – VI Numerical Analysis	4	0	0	3

Objectives:

The roll of numerical analysis is to develop and analyze the numerical techniques. 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.

UNIT 1:

Solutions of Algebraic and transcendental equation iterative method, Bisection method-Aitken's process Method of False Position-Newton-Raphson methods.

UNIT 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.

UNIT III: Numerical differentiation and integration

Numerical differentiation — integration — Trapezoidal rule and Simpson's rule.

UNIT IV: Solution of Linear systems

Gaussian Elimination method — Iterative methods Jacobi and Gauss seidal Methods.

UNIT V:

Numerical solution of Ordinary -Differential Equations. Solution by

Taylor's series - Picard's method of successive approximations -Euler method

Modifies Euler's method -Runge Kutta methods -Predictor Corrector nethods   -   Adams method and Mines method.

Text Book

Numerical Methods in Science And Engineering by M.K.Venkatraman

Reference:

Introductory methods of Numerical Analysis

By

S.S. Sastry- Prentice Hall of India Pvt. Ltd.

Chapters:2. 2.1 to 2.5

3. 3.1,3.3,3.6,3.9, 3.9.1,3.10,3.10.1

4. 4.2, 4.4, 4.4.1, 4.4.2

5. 5,4

6. 6.1 to 6.5 and 6.6.1 and 6.6.2

Learning Outcomes:
- Solving problems in algebraic and transcended equations
- Understand about finite differences
- Students develop and analyze numerical techniques
- Applying Various numerical methods to solve the ordinary differential equations
- Students gets the Research inquiry and analytical thinking abilities

Course code	Course Title	L	T	P	C
20118AEC35	Mathematical Statistics I	5	1	0	5

Objectives:

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 Basic Statistics, Probability, Baye's Theorem,random variables, discrete distributions, continuous functions, Bivariate Distributions, Correlation and Regression would be taught.

UNIT I:

Statistical data — Primary and Secondary data. Formation of frequency distribution Various measures of Central tendency and their merits and demerits various measures of dispersion and their merits and demerits Concept of Skewness and Kurtosis.

UNIT II:

Axiomatic Probability and classical, probability addition, multiplication and Bayc's theorems, Simple problems.

UNIT III:

Concept of random variable—discrete and continuous distribution function, probability mass function, probability density function — their properties — mathematical expectation — moment generating function — Simple problems.

UNIT IV :

Bivariate distribution - discrete and continuous, marginal and conditional distribution Statistical independence, Conditional expectation.

UNIT V:

Correlation — Rank Correlation, Karl Pearson's Correlation coefficient and its properties Linear Regression and its properties — Concept of multiple and partial correlation for three variables only.

Text Book:

1. Fundamentals of Mathematical Statistics — S.C.Gupta and V.K.Kapoor, Sultan Chand & Sons, New Delhi.

Reference:

1. Fundamentals of Applied Statistics — S.C.Gupta and V.K.Kapoor. Sultan Chand & Sons.
2. Elementry Statistical Methods – S.P.Gupta, Sultan Chand & Sons, New Delhi.

Learning outcomes

By the end of this course, you should:

- Students gets the methodology for the planning and execution for any scientific enquiry
- Students learning statistical techniques and statistical data
- Understand the concept of random variables
- Understand the concept of Bivariate Distribution..
- A knowledge of constructions and uses correlation and regression.

Course code	Course Title	L	T	P	C
20118AEC36L	Mathematical Statistics – I lab	0	0	3	2

Objectives:

Statistics provides the methodology for the planning and execution for any scientificenquiry,which has been accepted as a valid tool in this content. In this course random variables, discrete distributions, continuous distributions would be taught.

List of Practical's

1. Measures of Central tendencies and measures of dispersion.
2. Moments.
3. Skewness and Kurtosis.
4. Fitting of binomial distribution.
5. Fitting of Poisson distribution.
6. Fitting of Normal distribution.
7. Correlation for Discrete Variables.
8. Correlation for Continuous Variables.
9. Rank Correlation.
10. Regression for Discrete Variables.
11. Regression for Continuous Variables.
12. Index Numbers.

Learning outcomes

By the end of this course, you should:

- Students learned statistical techniques and statistical data.
- Understand the concept of various distributions.
- Understand the concept of Correlation and Regression.
- Study of Index Numbers.

RESEARCH METHODOLOGY

Course code	Course Title	L	T	P	C
20112RMC37	Research Methodology	2	0	0	2

UNIT 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.

UNIT 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.

UNIT 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.

UNIT 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).

UNIT 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

REFERENCE:

1. C.R. Kothari, Research Methodology-Methods & Techniques, 2nd 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.

4. R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 1999.

5. Ajai.S.Gaur, Sanjaya S.Gaur, Statistical Methods for Practice and Research, Response, 2009

OFFICE AUTOMATION

Course Code	Course Title	L	T	P	C
201ACLSOAN	OFFICE AUTOMATION	-	-	-	2

Course Objective:

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 Books:

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.

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

Course Code	Course Title	L	T	P	C
20110AEC41	Tamil -IV	4	0	0	2

பிரிஸ்ட் நிகர்நிலைப் பல்கலைக்கழகம்- வல்லம், தஞ்சாவூர்

பாட குறியாடு :

தமிழ்.

நான்காம் பருவம்

இரண்டாம் ஆண்டு

செய்யுள் , சங்க இலக்கியம், அற இலக்கியம் , செம்மொழி , இலக்கிய வரலாறு

அலகு . 1 : பண்டைய இலக்கியம் - நற்றிணை;

1. நெய்தல் - தோழி கூற்று - பாடல் எண் . 11

2. குறிஞ்சி - தலைவி கூற்று - பாடல் எண். 64

3. முல்லை - தலைவன் கூற்று - பாடல் எண்.142

4. பாலை - நற்றாய் கூற்று - பாடல் எண். 29

5. மருதம் - தலைவி கூற்று - பாடல் எண். 70

பண்டைய இலக்கியம் குறுந்தொகை

1 . குறிஞ்சி - தோழி கூற்று - பாடல் எண்.1

2. முல்லை - செவிலித்தாய் கூற்று - பாடல் எண்.167

3. மருதம் - தலைவி கூற்று - பாடல் எண். 181

4. நெய்தல் - தலைவி கூற்று - பாடல் எண் . 290

5. பாலை - தலைவன் கூற்று - பாடல் எண் . 347

பண்டைய இலக்கியம் ஐங்குறுநூறு

1. மருதம் - கள்வன் பத்து - முதல் இரண்டு பாடல்கள்

2. நெய்தல் - தோழிக்குரைத்த பத்து - முதல் இரண்டு பாடல்கள்

3. குறிஞ்சி - குன்றக் குறவன் பத்து - முதல் இரண்டு பாடல்கள்

4. பாலை - இளவேனிற் பத்து - முதல் இரண்டு பாடல்கள்

5. முல்லை - பாசறைப் பத்து - முதல் இரண்டு பாடல்கள்

அலகு . 2 : கலிந்தொகை

1 . பாலை - பாடல் எண். 2

2. குறிஞ்சி - பாடல் எண். 37

அகநானூறு

1 . பாலை - பாடல் எண். 5

2. மருதம் - பாடல் எண். 6

புறநானூறு

பாடல் எண் : 6 ,121, 41, 153 ,172 191, 223, 246, 284, 358.

பதிற்றுப்பத்து

இரண்டாம் பத்து பாடல் எண். 4 (நிலம் நீர் வளி விசும்பு)

அலகு.**3;**

1 . பட்டினப்பாலை - முதல் 105 வரிகள்

2. திருக்குறள் - 1.மருந்து 2.ஊக்கமுடைமை 3.உழவு

அலகு . 4 : செம்மொழி வரனறு ;

(மொழி - விளக்கம் , மொழிக்குடும்பங்கள், உலகச் செம்மொழிகள், இந்தியச் செம்மொழிகள் , செம்மொழித் தகுதிகள் , வரையறைகள், வாழும் தமிழ் செம்மொழி, தொன்மை , தமிழின் சிறப்புகள், தமிழ் செம்மொழி நூல்கள்)

அலகு . 5 : இலக்கிய வரலாறு

சங்க இலக்கியங்கள் , பதினெண்கீழ்க்கணக்கு நூல்கள்.

Course Code	Course Title	L	T	P	C
20111AEC41	**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

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 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

Course Code	Course Title	L	T	P	C
20111AEC42	English-IV	4	0	0	2

Aim:

- To learn English through literature

Objective:

- To explore learners to the standard literary texts
- To impart wisdom through morally sound poems and essays
- To introduce Shakespeare to non-literature students

Outcome:

- Improve their ability to read and understand them
- Know the genius of Shakespeare
- Express one's views in writing

UNIT –I

My Last Duchess   -Robert Browning

The Toys   -Coventry Patmore

I, too   -Langston Hughes

UNIT –II

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 –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

Text book:

Author	Title of the book	Edition / Year	Publisher
Devaraj	English for Enrichment	2012	Emerald Publishers
Board of Editors	Selected Scenes from Shakespeare Book I & II	2012	Emerald Publishers

Core VIII- OPERATIONS RESEARCH

Course code	Course Title	L	T	P	C
20112SEC43	Core –VIII Operations Research	4	0	0	3

Objectives:

Optimization is an important tool of modern applied mathematics. This course gives an idea to the student to recognize potential linear programming problems, to humiliate such problems as linear programming models, to employ the proper computational techniques to solve these problems, and to understand the mathematical aspects that tie together these elements of linear programming. The objective of this paper is to highlight the theoretical, computational and applied aspects of linear programming problems.

UNIT 1:

Introduction to operations Research — Elementary treatment of linear

programming simplex Method <,=,>,= constraints.

UNIT 2:

Application to Transportation problem - Transportation Algorithm - Degeneracy in Transportation problem, unbalanced transportation problem, Assignment problem - The assignment algorithm - unbalanced assignment problem.

UNIT 3:

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)

UNIT 4:

Sequencing problem: Processing of n jobs through 2 machines -   processing n jobs through 3 machines - processing 2 jobs through m machine

Games Theory: Characteristics of games —Maximin, Minmax, criteria of optimality — Dominance property - Algebraic and graphical method of solution of solving 2 x 2 games.

UNIT 5:

Inventory Theory--Variables in an Inventory problem Techniques of Inventory Control with known demand.

1. Purchasing model with no shortage. 2.. Purchasing model with shortages.
3. Manufacturing model with no shortages, 4. Manufacturing model with shortage.

5. Technique of Inventory Control with uncertain demand. 6.Buffer stock of safety stock model

[In all the units Application of the concept only. No book work]

Reference :

1.   Operations Research by Kantiswarup, P.K. Gupta and Manmohan.
2. Resource Management Techniques (Operations Research) V.Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan.
3. Operations Research Methods and Applications, P.Mariappan

Learning outcomes

By the end of this course,

- Students using OR techniques in business tools for decision making
- Students develop PERT and CPM networks and finding the shortest path
- Understand the concept of sequencing problems and game theory
- Students gets the knowledge about inventory theory

Course code	Course Title	L	T	P	C
20112AEC44	Core – **IX** Astronomy	4	0	0	3

Objectives

Knowledge and understanding about celestial objects . Apply scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations..Discuss the astronomical refraction zones of Earth, phases of Moon, seasonal

Variations, Kepler's law of motion, anomalies, eclipses.

UNIT-I:

Relevant properties of a sphere & relevant formulae for spherical trigonometry (all without proof) -Celestial sphere -Diurnal motion

UNIT-II:

Earth- Dip of the horizon-Twilight- Astronomical refraction- Tangent& Cosines   Formula-Properties & simple problems applying them

UNIT-III:

Keplar's laws of planetary motion (statement only) -Newton's deductions from them -Three anomalies of the Earth and relation between them .

UNIT-IV:

Time: Equation of time – Seasons - Years and calendar – Conversion of time - Geocentric parallax - Heliocentric parallax- Aberration of light -simple problems in the   above

UNIT-V:

Moon(except Moon's liberations)-Motions of planet(assume that orbits are circular- Eclipses

Reference

(1) S. Kumaravelu and Prof. Susheela Kumaravelu, Astronomy, SKV

Publications,2004

UNIT-I — Chapterl&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—Chapter 12,13 & 14

Reference(s)

[1] J V.Thiruvenkatacharya, A Text Book of Astronomy, S. Chand and Co., Pvt   Ltd., 1972

Learning outcomes

By the end of this course, you should:

- **Understand about celestial objects**
- Knowledge about Eclipses
- Different zones of Earth
- Astronomical refraction
- Different phases of Moon

Course code	Course Title	L	T	P	C
20118AEC46	Mathematical Statistics II	5	1	0	5

Objectives:

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.

UNIT I:

Tchebychev's inequality and weak law of large numbers — Simple form of central limit theorem for i.i.d random variables.

UNIT II:

Binomial, Poisson, Negative binomial, geometric distribution — Constants, moment generating function, Cumulant generating function.

UNIT III:

Continuous distribution — rectangular, exponential, beta, gamma distributions, Normal Distributions.

UNIT 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.

UNIT 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.

Text Book:

1. Fundamentals of Mathematical Statistics — S.C.Gupta and V.K.Kapoor, Sultan Chand & Sons, New Delhi.

Reference:

1. Fundamentals of Applied Statistics — S.C.Gupta and V.K.Kapoor. Sultan Chand & Sons.
2. Elementry Statistical Methods – S.P.Gupta, Sultan Chand & Sons, New Delhi.

Learning outcomes

By the end of this course, you should:

● Understand the concept of Tchebychev's inequality and Applications of Central Limit Theorem.
● Understand the concept of Bivariate Distribution.
● A knowledge of test of significance based on parametric and non – parametric test.
● Understood the concept of sampling theory.
● Learned the concept of chi square, F-Test and ANOVA.

Course code	Course Title	L	T	P	C
20118AEC47L	Mathematical Statistics – II lab	0	0	3	2

Objectives:

Statistics provides the methodology for the planning and execution for any scientificenquiry,which has been accepted as a valid tool in this content. In this course, chi-square distribution ,sampling distributions and analysis of variance would be taught.

List of Practical's

1.Goodness of fit. (Chi-square Test).
2. Attributes, Contingency table.
3. Large sample tests. Type I.
4. Large sample tests. Type II.
5.Large sample tests. Type III.
6.Large sample tests. Type IV.
7. t — tests.
8. Variance tests. (F-Test)
9. ANOVA.
10. Design of Experiments.

Learning outcomes

By the end of this course, you should:

- A knowledge of test of significance based on parametric and non – parametric test.
- Knowledge of Small and Large Sampling Tests.
- Design/development of solutions.

ENVIRONMENTAL STUDIES
(for under graduate students)

Course code	Course Title	L	T	P	C
201ENSTU45	Environmental Studies	2	0	0	2

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.

2. Nature of Environmental Studies

Definition, scope and importance.
Multidisciplinary nature of environmental studies
Need for public awareness.

3.   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.

4. 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 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.

<div align="center">or</div>

Visit to a local polluted site — Urban / Rural *I* lad Listrial / Agricultural.

<div align="center">or</div>

Study of common plants, insects, birds.

<div align="center">or</div>

Study of simple ecosystems -— ponds, river, hill slopes, etc.

References:

1) Agarwal, K.C,200l, Environmental Biology, Nidi Pub. Ltd., Bikaner.

2) Bharucha Erach, The l3iodiversity of India, Mapin Publishing Pvt, Ltd., Ahmedabad 380013, India, Email: rn4pin@icenet.net (R)

3) Brunner R.C., 1989, 1-lazardous Waste Incineration, McGraw Hill Inc. 480p

4) Clank R.S., Marine Pollution, Clanderson Press Oxford (TB)

5) Cunningham, W.P. Cooper, T.H. Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, Il96p

6) De A.K., Environmental Chemistry, Wiley Wastern 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 Dcv., 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 PubI. 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

(M) Magazine

(R) Reference

(TB) Textbook

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
5. describe the realities that managers face when dealing with complex issues; and
6. Understand how politics and management have ecological consequences.

Course code	Course Title	L	T	P	C
201ACLSLMS	Leadership and Management Skills	-	-	-	2

Course Objectives :

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. Learnanddemonstrateasetofpracticalskillssuchastimemanagement,selfmanagement,

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.

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

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 Books:

- Ashokan, M. S. (2015). *Karmayogi: A B 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 BooksIndia
- Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential WithinUs All.*WilliamCollins
- KurienV., & Salve G. (2012). *I Too Had a Dream*. Roli Books PrivateLimited
- Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success*. New York: American ManagementAssociation
- McCormackM.H.(1986).*WhatTheyDon'tTeachYouatHarvardBusinessSchool:NotesFro mA 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
- SinekS. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*.Penguin
- Sternberg R. J., Sternberg R. J., &BaltesP. B. (Eds.). (2004). *International Handbook of Intelligence*. Cambridge UniversityPress.

Core X. MODERN ALGEBRA

Course code	Course Title	L	T	P	C
20112AEC51	Core-X- Modern Algebra	5	0	0	4

Objectives:

Algebraic structures like Groups, Rings, Vector spaces are studied. The existence of subgroups of given order and the number of such subgroups are studied. The properties of Euclidean rings are discussed. Vector spaces and its properties which will be useful in the study of Field Theory are exposed. Finally, Lattices and their types and finite Boolean algebras are introduced.

UNIT 1:

Permutation Groups - Sub Groups — Cosets and Lagrange's theorem

UNIT II:

Normal subgroups - Quotient groups. -Homeomorphisms –Isomorphism

UNIT III:

RING THEORY:

Definition and Examples of Rings — Some special Classes of Rings — Homomorphisms - Ideals and Quotient Rings — More ideals and Quotient Rings — Euclidean Rings.

UNIT IV:

VECTOR SPACE:

Elementary Basic concepts — Linear independence and Bases and spaces - Inner product spaces

UNIT V:

VECTOR SPACE:

Rank and Nullity-Matrix of a linear transformation

INNER PRODUCT SPACES:

Introduction-Definitions and examples-Orthogonality-Orthogonal Complement

Text Books:

"TOPIC IN ALGEBRA" by Arumugam . S and Isaac. A.T (Second edition)

For UNIT 1 - .Chapter 3: Section 3.4 to 3.8

For UNIT 2 - Chapter 3: Section 3.9 to 3.11

For UNIT 3 - Chapter 4: Section 4.1 to 4.14

For UNIT 4 - Chapter 5: Section 5.0 to 5.6

For UNIT 5 - Chapter 5: Section 5.7 to 5.8 , Chapter 6 section 6.0 to 6.3

General References

1. Modern Algebra : A.R.Vasistha

2. Modern Algebra : Dr. S. Arumugam.

Learning outcomes

By the end of this course, you should:

- Knowledge and understand about Algebraic structures like Groups, Rings, Vector spaces
- Understood about Morphisms
- Skillness in Linear dep. , in- dep. and bases problems

Core XI - REAL ANALYSIS

Course code	Course Title	L	T	P	C
20112AEC52	Core –XI- Real Analysis	5	1	0	4

Objectives:

This paper is intended to cover all elementary topics in Real analysis such as sequence of real numbers, series of real numbers, continuous functions, connectedness, completeness and compactness. This paper is essential for studying Riemann integrals, fundamental theorem of calculus and improper integrals. This enhances the mathematical maturity of the students.

UNIT I: BASIC TOPOLOGY:-

Finite, countable and uncountable sets - Metric spaces - Compact spaces -Perfect sets - Connected sets.

UNIT II: NUMERICAL SEQUENCES AND SERIES:-

Convergent sequences - Subsequence's -Cauchy Sequences -Upper and Lower limits - some special sequences - Series -Series of Non negative Terms -The Number E   - The Root and Ratio Tests-Power series -Summation by parts - Absolute convergence   - Addition and Multiplication of series.

UNIT III: CONTINUITY:-

Limits of functions -continuous functions -Continuity and compactness - Continuity and connectedness-Discontinuity -Monotonic functions - Infinite   limits and limits at infinity.

UNIT IV: DIFFERENTIATION:-

The derivative of a Real function - Mean value theorems - The continuity of Derivatives -L'Hospital's Rule -Derivatives of Higher order -Taylor's theorem.

UNIT V:

THE RIEMANN- INTEGRALS:- Definition and Existence of the Integral — Properties of the Integral — Integration and Differentiation.

Reference:

Principles of Mathematical Analysis by Walter Rudin, MC Graw Hill.

For UNIT I - Chapter-2

For UNIT II - Chapter-3 (section 3.1 to 3.50)

For UNIT III - Chapter-4

For UNIT IV - Chapter-5

For UNIT V - Chapter-6

General References:

1.Real Analysis : Bartle and Schuhest.

2. Real Analysis : Albert smith E.H.

Learning outcomes

By the end of this course, you should

- Knowledge about Connectedness, completeness and compactness
- Understanding the Riemann integrals, fundamental theorem of calculus
- Analyses the problem and finding the solution

Core XII - STATICS

Course code	Course Title	L	T	P	C
20112SEC53	Core – XII – Statics	5	1	0	4

Course Objectives:

Develop an understanding of the principles of statics, and the ability to analyze problems in a systematic and logical manner, including the ability to draw free-body diagrams.

UNIT-1

Forces and equilibrium –Forces-Resultant of two forces-Three forces related to a triangle –Equilibrium of a particle under three or more forces.

UNIT-II

Forces on a rigid body –Moment –Equivalent systems of forces-Parallel forces varigopn's theorem –Forces along a triangle-Couples –Equilibrium of a rigid body under three coplanar forces –Reduction of coplanar forces into a force and a couple.

UNIT –III

Friction –Laws of friction-Coefficient of fiction, angle and cone of Friction-Limiting equilibrium of a particle on a rough inclined plane, Tilting of a body Simple problems.

UNIT-IV

Virtual work-principle of virtual work-applied to a body or a system of bodies in equilibrium-Equation of virtual work-Simple problems.

UNIT-V

String –Equilibrium of string under gravity –common catenary-suspension bridge.

Reference:

(1)P.DURAIPANDIAN, Mechanics(vector treatment),S.chand &co.june 1997

UNIT-I chapter 2& chap 3 section 3.1

UNIT-II chapter 4 sec 4.1,4.3 to 4.9 & chap 5 sec 5.1

UNIT –III chap 2 sec 2.1,chap 3 sec 3.2,chap 5 sec 5.2

UNIT-IV chapter 8 ,UNIT-V chapter 9

Reference:

(1) M.K.Venkataraman, Statics, Agasthir publication ,2002

(2)A.V.Dharmapadham, Statics, S.Viswanathan publishers Pvt Ltd.,1979

(3)S.L.Lony ,Elements of Statics and Dynamics, part-1,A.I.T.Publishers,1991

Course Outcomes:

Students who successfully complete the course will demonstrate the following outcomes by tests, homework, and written reports:

1. An ability to construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium.
2. An understanding of the analysis of couples and friction.

Core-XIII- PROGRAMMING in C++

Course code	Course Title	L	T	P	C
20112SEC54	Core-XIII- Programming in C++	5	0	0	3

Objectives

- Utilize Object Oriented techniques to design C++ programs.
- Use the standard C++ library.
- Exploit advanced C++ techniques

UNIT 1: Principles of OOP — Software evolution — OOP paradigm — basic

Concepts of OOP's — Object oriented languages — applications of 00 P.

(Chapter 1)

UNIT 2: Introduction of C++ - tokens, keywords, identifiers, variables, operators,

manipulators, expression and control structures in C++ - main function in

function prototyping — call by reference — return by reference — function overloading

and virtual functions (Chapter 2,3 &4)

UNIT 3: Classes and objects - Constructors and destructors — operator overloading

and type conversions, (Chapter 5, 6 &7)

UNIT 4: Inheritance — single inheritance — multilevel inheritance —multiple

inheritances — hybrid inheritance. (Chapter 8)

UNIT 5: Pointer — virtual functions and polymorphism — managing console I/O

operations (Chapter 9 & 10)

Reference

Object oriented programming with C++ by E. Balagurusamy, 2e, Tarn. McGraw

Hill publishing Co. Ltd., New Delhi.

Reference

1. C++ The Complete Reference by Herbeit Schildt.
2. OOP's with C++ from the foundation by N.R. Parsa, Dream Tech Press India Pvt.

Ltd., New Delhi.

Learning Outcomes:

At the end of the course, the students should be able to:

- Able to understand and design the solution to a problem using object-oriented programming concepts.

- Able to reuse the code with extensible Class types, User-defined operators and function Overloading
- Understand functions and parameter passing.
- Understand object-oriented design and programming
- Understand dynamic memory allocation and pointers

Elective 1- FUZZY ANALYSIS

Course code	Course Title	L	T	P	C
20112DSC55A	Elective Paper – I Fuzzy Analysis	5	0	0	3

Objectives

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. The principal objective of **fuzzy logic** is formalization/mechanization of this capability.

UNIT I:

Fuzzy sets-basic types-basic concepts- α cuts-additional properties of α cuts-extension principle for fuzzy sets,

UNIT II:

Operation on fuzzy sets-types of operations- fuzzy complements-
t-norms- fuzzy unions-combinations of operations.

UNIT III:

Fuzzy Arithmetic - Fuzzy numbers-Arithmetic operations on intervals
Arithmetic operations on fuzzy numbers.

UNIT IV:

Fuzzy relations-Binary fuzzy relation-fuzzy equivalence relation-fuzzy compatibility relation-fuzzy ordering relations-fuzzy morphism.

UNIT 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.

Reference

FUZZY SETS AND FUZZY LOGIC
J.KLIR AND BOYUAN.
PNI,NEWDELHI,2004.

Learning outcomes

By the end of this course, you should,

- Be able to get the knowledge and understand Classical Sets vs Fuzzy Sets (FS) – Types of FS – Operations on FS

- Be able to get the knowledge and understand Zadeh's Extension Principle

- Be able to get the knowledge and understand Fuzzy Relations – Fuzzy Relational Equations – Possibility Theory :

- Be able to get the knowledge and understand Fuzzy Measures. Fuzzy relation equations based on sup-i compositions-fuzzy relation equations based on w_i compositions.

ELECTIVE - I - FORMAL LANGUAGES AND AUTOMATA THEORY

Course code	Course Title	L	T	P	C
20112DSC55B	Elective Paper-I-Formal Languages and Automata Theory	5	0	0	3

Objectives

1. The course aims to develop an appreciation of the theoretical foundations of computer science through study of mathematical and abstract models of computers and the theory of formal languages.

2. Theory of formal languages and use of various abstract machines as 'recognizers' and parsing will be studied for identifying the synthetic characteristics of programming languages.

3. To understand the fundamental models of computation that underlies modern computer hardware, software, and programming languages.

 4. Explain computational thinking

Learn the foundations of automata theory, computability theory.

5. Discuss the applications of theory to other areas of computer science such as algorithms, programming languages, compilers, natural language translation, operating systems, and software verification.

UNIT I : The Theory of Automata — definition of an Automaton — Description of a finite Automaton — Transition system — properties of transition function — Acceptability of a string by a finite Automaton — Non deterministic finite state machine — the equivalence of DFA and NDFA — Mealy and Moore models — minimization of finite Automata.

UNIT II: Formal language — basic definition and examples — Chomsky

classification of languages — language and their relation — recursive and recursively enumerable sets — operations on languages — languages and Automata.

UNIT III: Regular sets and regular grammars — regular expressions — finite

Automaton and regular expressions — Pumping lemma for regular sets — application of pumping lemma.

UNIT IV: Context — free languages — context — free languages and derivation Trees — Ambiguity in context — free grammars — Simplification of context — free grammars — normal forms for context — free grammars.

UNIT V : Push Down Automata — basic definitions — Acceptance by PDA — Push Down Automata and context — free languages — parsing and Push down Automata.

Reference

        K.L.P. Mishra and N. Chandrasekaran, "**Theory of Computer Science**",

(Automata, languages and computation) — Prentice Hall of India private 2: limited — New Delhi, 3.

UNIT I   : CHAPTER 2: (2.1 to2.9)

UNIT II : CHAPTER 3: (section 3.1 to 3.6)

UNIT III : CHAPTER 4 : (section 4.1 to 4.4)

UNIT IV : CHAPTER 5: (section 5.1 to 3.4)

UNIT V : CHAPTER 6 : (section 6.1 to 6.4)

Learning outcomes

By the end of this course you should be able ,

- Design deterministic and non-deterministic machines.
- Design the pushdown automata.
- Comprehend the hierarchy of problems arising in the computer sciences.
- The Student will get an idea for designing Compiler Design.
- The students will get knowledge about regular expressions and computability theory
- Acquire a fundamental understanding of the core concepts in automata theory and formal languages.
- An ability to design grammars and automata (recognizers) for different language classes.
- An ability to identify formal language classes and prove language membership properties.
- An ability to prove and disprove theorems establishing key properties of formal languages and automata.

PROFESSIONAL SKILLS

Course Code	Course Title	L	T	P	C
201ACLSPSL	Professional Skills	-	-	-	2

The Course Professional Skills is divided into two parts:

a) CareerSkills
b) Team Skills

A. Career Skills

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. Preparetheirresumeinanappropriatetemplatewithoutgrammaticalandothererrorsand 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. Usethenecessarycomponentsrequiredtoprepareforacareerinanidentifiedoccupation (as a case study).

Unit I: Resume Skills

    i. 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

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   5Hours

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

Reference

Please check IT-ITeS Sector Skills Council readiness programs namely

- Foundation Skills In IT (FSIT) -Refer the websites like https://www.sscnasscom.com/ Ssc-projects/capacity-building-and-development/training/fsit/and
- GlobalBusinessFoundationSkills (GBFS)–Referwebsiteslikehttps://www.sscnasscom. Com/ssc-projects/capacity-building-and-development/training

B. *Team Skills*

The objectives of the course are to make learners:

1. Understand the significance of Team Skills and help them in acquiring them
2. To help them design, develop and adapt to situations as an individual and as a team.

Course Outcomes:

By the end of this course the learners/candidates will be able to:

1. Use common technology messaging tools that are used in enterprises for flow of informationandtransitionfromcommandandcontroltoinformalcommunicationduring an online/offline team session

2. Activelyuseandoperateonlineteamcommunicationtools:Webinar,Skype,Zoom,Google hangout etc

3. Appreciate and demonstrate Team Skills

4. Participate in a digital lifestyle conversant with computers, applications, Internet and nuances of cyber security

5. Explore (online) and identify career opportunities in consideration of their own potential and aspirations.

6. Discuss and articulate the key requirements of an entrepreneurial exercise

7. Empathies and trust colleagues for improving interpersonal relations

8. Engage in effective communication by respecting diversity and embracing good listening skills

9. Distinguish the guiding principles for communication in a diverse, smaller internal world

10. Practiceinterpersonalskillsforbetterrelationswithseniors,juniors,peersand stakeholders

11. Projectagoodpersonalimageandsocialetiquettesoastohaveapositiveimpacton building of one's chosen career

12. Generate, share and maximise new ideas with the concept of brainstorming and the documentation of key critical ideas/thoughts articulated and action points to be implemented with timelines in a team discussion (as MOM) in identified applicable templates.

Core XIV - COMPLEX ANALYSIS

Course code	Course Title	L	T	P	C
20112AEC61	Core – XIV-Complex Analysis	5	0	0	3

Objectives:

This paper is an introduction to the theory of analytic functions of one complex variable. Properties of analytic functions, results on linear transformations, problems on complex integration are discussed. Calculus of residues are also studied.

UNIT — I: Analytic Functions:

Functions of complex variables-Limits theorems on limits-continuous functions functions-Diffetentiability-C.R. Equations-Analytic Functions Harmonic functions (section 2. 1 to 2.8)

UNIT — 2: Bilinear Transformations:

Elementary transformations-Bilinear Transformations-cross ratio-fixed points of bilinear transformations-Some special bilinear transformations. (Section 3. 1 to 3.5)

UNIT —3: Complex Integration:

Definite Integral-Cauchy's Theorem-Cauchy's integral formula-Higlier derivations (Section 6.1 to 6.4)

UNIT — 4: Series Expansions:

Taylor's series-Laurent series-Zeros of analytic functions-Singularities (Section 7.1 to 7.4)

UNIT— 5: Calculus of residues:

Residues- Cauchy's Residue theorem — Evaluation of definite integrals (Section 8. 1 to 8.3)

Reference:

1. Complex Analysis by T.K. Manikavasakam Pillai & Others Ananda Book Depot. Madras.
2. Functions of Complex Variable by E.G. Philips.
3. Complex Varuable by Dr. P.P. Gupta Kedar Nath Ram Nath Meerut — Delhi.
4. Functions of Complex Variable by J.N. Sharma Krishna Prakashan Mandir Meerut.

Learning outcomes

By the end of this course you should be able

- Represent complex numbers algebraically and geometrically,
- Define and analyze limits and continuity for complex functions as well as consequences   of continuity,
- Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions including the fundamental theorem of algebra,
- Analyze sequences and series of analytic functions and types of convergence,
- Evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula, and

- Represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.

Core XV - DYNAMICS

Course code	Course Title	L	T	P	C
20112SEC62	Core –XV Dynamics	5	1	0	3

Course Objectives:

Develop an understanding of the principles of dynamics, and the ability to analyze problems in a systematic and logical manner. Ability to analyze the dynamics of particles, systems of particles and rigid bodies.

UNIT-I:

     Kinematics velocity-Relative velocity-Acceleration –coplanar motion components of velocity & acceleration-Newton's laws of motion.

UNIT-II:

     Simple harmonic motion-Simple pendulum-Load suspended by an elastic string-projectile-Maximum height reached, range, time of flight-projectile.

UNIT-III:

     Impulsive force-conversion of linear momentum-impact of a sphere & a plane-Direct & oblique impact of two smooth sphere –kinetic energy and impulsive.

UNIT-IV:

     Central orbit –central force-Differential EQUATION TO A CENTRAL ORBIT IN polar & pedal coordinates-Given the central orbit, to find the law of force-Kepler's laws of planetary motion's.

UNIT-V:

     Motion of a rigid body-Moment of inertia of simple bodies-Theorem of parallel & perpendicular axes-motion in two dimension-motion of a rigid body about a fixed axis.

TEXT BOOKS:

1. P.DURAIPANDIAN, VECTOR TREATMENT AS IN MECHANICS,

Unit-I-Chapter 1 & cha 2 sec 2.1, 2.1.1

Unit-II-Cha 12 sec 12.1 to 12.3 & cha 13

Unit-III-Cha 14

Unit –IV-cha 16

Unit-V-Cha 4 sec 4.2 cha 17 & cha 18

General References:

Dynamics – Dr. K.Viswanath Naik and Dr. M.S. Kasi.

Course Outcomes:

Students who successfully complete the course will demonstrate the following outcomes by tests, homework, and written reports:

1. A knowledge of internal forces and moments in members.
2. An ability to calculate centroids and moments of inertia.
3. A knowledge of kinematic and kinetic analyses and energy and momentum methods for particles and systems of particles.
4. A knowledge of kinematic and kinetic analyses and energy and momentum methods for rigid bodies.

<div align="center">**Core** XVI **– DISCRETE MATHEMATICS**</div>

Course code	Course Title	L	T	P	C
20112AEC63	Core-XVI **Discrete Mathematics**	5	0	0	3

Objectives:

Discrete Mathematics is a bridge connecting various branches of Computer Science and Mathematics. In Discrete Mathematics, we essentially study various finite (discrete) structures of Mathematics which are essential to develop the various concepts of computer science.

UNIT 1 :

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

UNIT 2:

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

UNIT 3:

LATTICES AND BOOLEAN ALGEBRA

Lattices – Some Properties of Lattices – New Lattices – Modular and Distributive Lattices- Boolean Algebra

UNIT 4:

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

UNIT 5:

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

Text Books: Dr.M.K. Venkataraman and N. Sridharan.N.Chandrasekaran

For UNIT 1 - .Chapter 2: Section 2.1 to 2.21& Chapter 3 Section 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

Learning outcomes

Students who successfully complete the course will demonstrate the following outcomes by tests, homework, and written reports:

1. A knowledge of Relations and functions
2. 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..
3. An ability to find the solutions of Recurrence relations.
4. A knowledge of to study on ordering relations.

Elective II - GRAPH THEORY

Course code	Course Title	L	T	P	C
20112DSC64A	Elective Paper –II Graph Theory	5	0	0	3

Objectives:

Graph Theory is an integral part of Discrete Mathematics. It has applications to many fields, including computer science, physics, chemistry, psychology and sociology. 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

UNIT 1: 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.

UNIT 2: 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.

UNIT 3: Cut-sets — Properties of cut-set- All cut-sets in a graph — Fundamental circuits and cut-sets — connectivity and reparability.

UNIT 4: Planar graphs — Knratowski's two graphs — Representation of a planar graph — Detection of planarity — Geometrical dual — Combinational dual.

UNIT 5: 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 Narsing Deo, Prentice Hall of India, New Delhi.

References:

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.
3. Graph Theory — S.A. Choudum, Macmillan India Limited —New Delhi — Madras.

Learning outcomes

By the end of this course, you should be able

- Knowledge in Graph Theory
- Understanding the properties of Graph Theory
- Understanding the concept of Kuratowski's graph
- Understanding Matrix representation of graphs

Elective II - MATHEMATICAL MODELLING

Course code	Course Title	L	T	P	C
20112DSC64B	Elective Paper –II Mathematical Modelling	5	0	0	3

Objectives:

Mathematical modelling can be used for a number of different reasons. How well any particular objective is achieved depends on both the state of knowledge about a system and how well the modelling is done.

1. Developing scientific understanding - through quantitative expression of current knowledge of a system.
2. Test the effect of changes in a system;
3. Aid decision making, including (i) tactical decisions by managers; (ii) strategic decisions by planners.

UNIT-I

Mathematical modeling through ordinary differential equations of first order: linear growth and decay models-nonlinear growth and decay models compartment models-dynamics problems-geometrical problems.

UNIT-II

Mathematical modeling through systems of ordinary differential equations of first order: population dynamics-epidemics-compartment models-economics-medicine. arms race, battles and international trade-dynamics.

UNIT-III

Mathematical modeling through ordinary differential equations of second order: planetary motions-circular motion and motion of satellites- Mathematical modeling through linear differential equations of second order-miscellaneous mathematical models.

UNIT-IV

Mathematical modeling through difference equations: simple models-basic theory of linear difference equations with constant coefficients-economics and finance population dynamics and genetics-probability theory.

UNIT-V

Mathematical modeling through Graphs: solutions that can be modeled through graphs-mathematical modeling in terms of directed graphs, signed graphs, weighted graphs and unoriented graphs.

Reference:

MATHEMATICAL MODELLING, J.N.KAPUR ,WILEYEASTERN LIMITED, NEWDELHI,1988.

Learning Outcomes:

Having successfully completed this module, you will be able to demonstrate knowledge and understanding of:

1) The concept of mathematical modelling.

2) The mathematical descriptions of some real systems.

3) Correct methodology when developing mathematical models.

4) Skill in applications

5) Designing and developing the solutions

Course Code	Course Title	L	T	P	C
201ACSSIST	Interview Skills Training and Mock Test	-	-	-	2

Unit I:Presentation Skills

- Types of presentations
- Internal and external presentation
- Knowing the purpose
- Knowing the audience
- Opening and closing a presentation
- Using presentation tools
- Handling questions
- Presentation to heterogenic group
- Ways to improve presentation skills overtime

Unit II: Trust and Collaboration

- Explain the importance of trust in creating a collaborative team
- Agree to Disagree and Disagree to Agree–Spirit of Teamwork
- Understanding fear of being judged and strategies to overcome fear

Unit III: Listening as a Team Skill

- Advantages of Effective Listening

Listening as a team member and team leader. Use of active listening strategies to encourage sharing of ideas (full and undivided attention, no interruptions, no pre- think, us **Credit Distribution**

- e empathy, listen to tone and voice modulation, recapitulate points, etc.).

Unit IV: Brainstorming

- Use of group and individual brainstorming techniques to promote idea generation.

- Learning and showcasing the principles of documentation of team session outcomes

Unit V: Social and Cultural Etiquette

- Need for etiquette (impression, image, earn respect, appreciation, etc)

- Aspects of social and cultural/corporate etiquette in promoting team work

- Importance of time, place, propriety and adaptability to diverse cultures

Unit VI: Internal Communication

- Use of various channels of transmitting information including digital and physical,
  to team members.

Reference:

PleasecheckIT-ITeSSectorSkillsCouncilreadinessprogramnamelyGlobalBusinessFoundation Skills (GBFS) in website (https://www.sscnasscom.com/ssc-projects/capacity-building-and-development/training/gbfs/),and Generic and the entrepreneurial

COMMUNITY ENGAGEMENT

Course Code	Course Title	L	T	P	C
201ACLSCET	**Community Engagement**	-	-	-	2

Course Objectives:

- To develop an appreciation of rural culture, life-style and wisdom amongst students
- To learn about the status of various agricultural and rural development programmes
- To understand causes for rural distress and poverty and explore solutions for the same
- To apply classroom knowledge of courses to field realities and there by improve quality of learning

Course Outcomes:

After completing this course, student will be able to

- Gain an understanding of rural life, culture and social realities
- Develop a sense of empathy and bonds of mutuality with local community
- Appreciate significant contributions of local communities to Indian society and economy
- Learn to value the local knowledge and wisdom of the community
- Identify opportunities for contributing to community's socio-economic improvements

Unit I : Appreciation of Rural Society

Rural lifestyle, rural society, caste and gender relations, rural values with respect to community, nature and resources, elaboration of "soul of India lies in villages' (Gandhi), rural infrastructure

Unit II : Understanding rural economy & livelihood

Agriculture, farming, landownership, water management, animal husbandry, non-farm livelihoods and artisans, rural entrepreneurs, rural markets

Unit III : Rural Institutions

Traditional rural organizations, Self-help Groups, Panchayati raj institutions (Gram Sabha, Gram Panchayat, Standing Committees), local civil society, local administration

Unit IV : Rural Development Programmes

History of rural development in India, current national programmes: Sarva Shiksha Abhiyan, BetiBachao, BetiPadhao, Ayushman Bharat, Swatchh Bharat, PM Awaas Yojana, Skill India, Gram Panchayat Decentralised Planning, NRLM, MNREGA, etc.

Open Elective

Course Code	Course Title	L	T	P	C
201ENOEC	**Journalism**	4	0	0	2

Aim :

- To acquaint with the basic knowledge of journalism

Objective:

- To instil in the minds of students the different aspects of journalism
- To understand the different kinds of news
- To learn the qualities and duties of a reporter, editor and sub-editor
- To familiarize with the style and features of the different sections in a newspaper

Outcome:

- Become a journalist
- Explore the different kinds of news

UNIT- I

Journalism – Definition, Qualities of a journalist, Forms of journalism, Role and elements

UNIT- II

News – Definition, Kinds, Elements, Sources

UNIT- III

Reporters

UNIT- IV

The Editor and the Sub-editor

UNIT –V

Language of Journalism, Style

Qualities of a Writer

Writing a News story, Opinion Pieces, Reviews, Headlines, Editorials

Reference Book:-

Author	Title of the book	Edition / Year	Publisher
Susan	Journalism		
John Hogenberg	Professional Journalism	2012	

| M.James Neal | News Writing and Reporting | | Surjeet Publication |
| M.V Komath | The Journalist's Handbook | | |

Course code	Course Title	L	T	P	C
201MAOEC	Development of Mathematics Skills	4	0	0	2

Aim:

● To understand the concepts from the five branches of mathematics

Objectives

● Knowledge and understanding are fundamental to study mathematics and form the base from which to explore concepts and develop problem-solving skills. Through knowledge and understanding students develop mathematical reasoning to make deductions and solve problems.

● To develop student's ability to apply both conventional and creative techniques to the solution of mathematical problems

Outcomes

● Know and demonstrate understanding of the concepts from the five branches of mathematics (Operations Research, Set Theory, Statistics, Matrices and Business mathematics)

● Use appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts

● Select and apply general rules correctly to solve problems including those in real-life contexts.

Unit I

Simple interest and compound interest

Unit II

Sinking fund – discounting – trade discount – quantity discount – cash discount

Unit III

Set theory – Series

Unit IV

Matrices – Determinants

Unit V

Assignment problems

References

P.A.Navanitham, Business Mathematics & Statistics

Kanti Swarup, P.K.Gupta and Manmohan, "Operations Research"

Course Code	Course Title	L	T	P	C
201PHGEC	Instrumentation	4	0	0	2

Aim:

Making and analyzing measurements is the primary task of the experimental physicist. This includes designing experiments. Most experimental work, whether in bench-top situations, or using complex instruments. To many physicists this can be as interesting and involving as the basic physics one is trying to do.

Objectives:

To build the strong foundation in physics of students needed for the field of Instrumentation.

To prepare student to apply reasoning informed by the contextual knowledge to practice.

To provide opportunity for students to work as part of teams on multi-disciplinary projects.

UNIT – I: INTRODUCTION

Potentiometer - calibration of volt meter and ammeter, measurement of resistance, Principles of network theorems – Thevenin's and Norton's theorem – Bridges :
AC bridges – Maxwell, Owen, Schering and deSauty's bridges – Wien bridges.

UNIT – II: ELECTRONIC INSTRUMENTS – I

Basic characteristics of instruments – resolution – sensitivity - Audio frequency oscillator, Conversion of galvanometer into voltmeter and ammeter – resistance meter - Amplified D.C. meter – Chopper stabilized amplifier – A.C. Voltmeter using
rectifiers – Electronic multimeter – Differential voltmeter – Digital voltmeters – Component measuring instruments (quantitative studies)

UNIT – III: ELECTRONIC INSTRUMENTS – II

Signal conditioning systems – DC and AC carrier systems – Instrumentation amplifiers – Vibrating capacitor amplifier – Analog to digital data and sampling – A/D and D/A convertor (successive approximation, ladder and dual slope converseons).

Unit IV – Recording Devices

Recorders necessity – Recording requirements – Analog recorders – Graphic recorders – strip chart recorders – Galvanometer types recorders – Null type recorders.

Unit V – CRO

CRO – Construction and action – Beam transit time and frequency limitations – Measurement of potential, current, resistance, phase and frequency – Special purpose oscilloscopes – Sampling storage oscilloscope.

Books for Study
1. Electronic Instrumentation and Measurement techniques – W.D. Cooper and A.D. Helfrick – PHI – Third edn. – 1989

Learning Outcomes:
- Appreciate important practical aspects of theoretical knowledge: how important components work, when to impedance match, non-ideal behaviour of op-amps etc.
- Acquire a sound understanding of the role of noise in measurement systems and know how to apply noise reduction techniques.

Books for Reference:

1. A course in electrical and electronic measurements and Instrumentation – A.K. Sawhmey – DhanpatRai and Sons – 1990.

2. Electronic measurements and instrumentation – Oliver Cage – McGraw Hill – 1975.

Course Code	Course Title	L	T	P	C
201CEOEC	Food and Adulteration	4	0	0	2

Aim:

- To introduce students to food safety and standardization act and quality control of foods.

Objectives:

- To educate about common food adulterants and their detection.
- To impart knowledge in the legislatory aspects of adulteration.
- To educate about standards and composition of foods and role of consumer.

Outcomes:

- The students will have knowledge about different processing and preservation methods and principles involved.

Unit-I   Introduction to Food Chemistry

Introduction to Food Chemistry- Water (Structure of water and ice, Physical constants of water, Types of water, Water activity) Composition of Food- Carbohydrates, Proteins, Lipids, Vitamins & Minerals.

Unit- II Food Pigments

Introduction- classification, types of food pigments- chlorophyll, carotenoids, anthocyanins, flavanoids.

Unit – III Food Preservation

Introduction - Importance, principle and Types.

High and low temperatures preservation - Pasteurization - Sterilization- Canning- Freezing- Refrigeration.

Unit – IV Food Additives

Introduction- antioxidants, sequestrants, preservatives, nutrient supplement, emulsifiers, stabilizers and thickening agents, bleaching and maturing agent, sweeteners, humectants and anti -caking agents, coloring and flavoring substance.

Unit-V Food Adulteration

　　　Types of adulterants- intentional and incidental adulterants, methods of detection. Detection of common food adulterants in Spices , Grains, Coffee , Tea, Oil fats , Food colours and Milk. Health hazards and risks.

References:

1. The Food Safety and Standard ACT, 2006 – Seth & Capoor

2. Hand book of Food Adulteration and Safety Laws – Sumeet Malik

3. Food Science – B.Srilakshmi

Course Code	Course Title	L	T	P	C
201CSOEC	E Learning	4	0	0	2

COURSE OBJECTIVES
- Learn the basics of E-Learning concepts.
- Learn the content development techniques.

COURSE OUTCOMES
- Develop e – learning application on their own.
- Ability to develop contents for e-learning.
- To perform course management using tools.

UNIT I INTRODUCTION
Introduction – Training and Learning, Understanding elearning, components and models of e-learning, Advocacy of e-learning – benefits, learning styles, criteria for choosing, - Applications of E-learning.

UNIT II CONCEPTS and DESIGN
E-Learning Strategy, the essential elements of elearning strategy, Quality assuring e-learning, suppliers and resources, virtual learning environments, authoring tools, e-assessment, Learning Design Issues – purpose, general principles, designing live e-learning, designing self managed learning.

UNIT III APPLICATIONS
Moodle 2.0 E-Learning Course Development – Features, Architecture, Installation and Configuring Site.

UNIT IV COURSE MANAGEMENT
Creating – Categories, Courses, Adding Static Course Material – Links, Pages, Moodle HTML Editor, Media Files, Interacting with Lessons and Assignments – Evaluating Students – Quizzes and Feedback.

UNIT V ENHANCEMENT
Adding Social Activities - Chat, Forum, Ratings, Blocks – Types, Activities, Courses, HTML, Online Users – Features for Teachers.

REFERENCE BOOKS:
1. Delivering E-Learning: A complete Strategy for Design, Application and Assessment, Kenneth Fee, Kogan page, 2009.
2. Designing Successful e-Learning, Michael Allen, Pfeiffer Publication, 2007.
3. Moodle 2.0 E-learning Course Development, William Rice, PACKT, 2011.
4. Moodle 2.0 First Look, Mary Cooch, 2010.

Course Code	Course Title	L	T	P	C
201CAOEC	Web Technology	4	0	0	2

AIM

To equip the students with basic programming skill in Web Technology.

OBJECTIVE

- To understand the concepts and architecture of the Worldwide Web.
- To understand and practice mark up languages
- To learn Style Sheet and Frames

OUTCOMES:

- Acquire knowledge about functionalities of world wide web
- Explore markup languages features and create interactive web pages using them
- Learn and design Client side validation using scripting languages
- Acquire knowledge about Open source JavaScript libraries
- Able to design front end web page and connect to the back end databases.

UNIT I

Introduction to the Internet: networking- internet – email – Internet Technologies: modem internet addressing .

UNIT II

Internet browsers: Internet Explorer – Netscape navigator- Introduction to HTML: Html document – anchor tag – hyperlink.

UNIT III

Head and body sections: Header section – titles – links- colorful web page – sample html document – Designing the body section: paragraph – tab setting.

UNIT IV

Ordered and unordered lists: list – unordered list – heading in a list- order list- nested list.

UNIT V

Table handling: tables – table creation in html cell spanning multiple rows and columns- coloring cells- sample tables- frames frame set definition- nested frames set.

REFERENCE BOOKS

1.World Wide Web design with HTML – C. Xavier – Tata McGraw – Hill – 2000.

2. Principles of web design – Joel Sklar – Vikas publishing house 2001.

Course Code	Course Title	L	T	P	C
201CMOEC	Open Elective – Banking Service	4	0	0	2

AIM:

To Provide the Bank is financial institution which is involved in borrowing and lending money.

OBJECTIVE:

- To provide a lending money to firms, customers and home buyers.
- To provide keep money for customers
- To provide offering financial advice and related financial services, such as insurance.

UNIT – I

Commercial Banking – An Overview: Banking-Classification- Banking system- Universal Banking- Commercial Banking- functions – Role of Banks in Economic Development

UNIT – II

E-banking –An Overview: Meaning-Service-E-banking and Financial Services –Benefits-Internet Banking –Internet Banking Vs Traditional Banking –Mechanics of Internet Banking-Services

UNIT – III

Mobile Banking and Telephone Banking –An Overview: Meaning-Features-Registration-Services –Security Issues –Banking Facilities- Telephone Banking System –Drawbacks- Call Centers

Unit – IV

ATM and Electronic Money: Concept of ATM-Features-Functions-Strategic importance of ATM- Electronic Money – Categories –Merits – E-Money and Monetary Policy-Policy Issues for the RBI

Unit-V

EFT System and INFINET: Meaning- Steps in EFT- RBI Guidelines-EFT Systems Vs Traditional System - ECS-Features-Factors- Benefits –Handicaps -Applications

OUTCOME:

To help to gather knowledge on banking and financial system in India
To provide knowledge about commercial banks and its products
To create awareness about modern banking services like e-banking-banking and internet banking, ATM System
To introduce recent trends in banking system

To make the student understand the basic concept of banking and financial institutions and expose various types of risk based by banks

REFERENCES:

1. Banking theory law and Practice

2. Banking Theory law and practice -Santhanam

3. Banking Awareness   - N.K.Gupta

4. Management of Banking and financial Services-Padmalathasuresh,Justin paul .

COURSE STRUCTURE

Course Code	Course Title	L	T	P	C
	SEMESTER I				
20212AEC11	Algebra	6	0	0	4
20212AEC12	Real Analysis	7	0	0	4
20212AEC13	Ordinary Differential Equations	6	0	0	4
20220SEC14	C++ Programming	6	0	0	4
20212DSC15_ Discipline Specific Elective – I		5	0	0	4
20212RLC16	Research Led seminar	-	-	-	1
	Total	**30**	**0**	**0**	**21**
	SEMESTER II				
20212AEC21	Complex Analysis	5	1	0	4
20212AEC22	Measure Theory and Integration	5	0	0	4
20212SEC23	Mathematical Methods	6	0	0	4
20212AEC24	Graph Theory	5	0	0	4
20212DSC25_ Discipline Specific Elective – II		5	0	0	4
20212RMC26	Research Methodology	3	0	0	2
20212BRC27	Participation in Bounded Research	-	-	-	2
	Total	**29**	**1**	**0**	**24**
	SEMESTER III				
20212AEC31	Topology	6	0	0	5
20212SEC32	Stochastic Process	6	1	0	5
20212AEC33	Advanced Numerical Analysis	6	1	0	5
20212DSC34_ Discipline Specific Elective – III		5	0	0	4
202__OEC	Open Elective	4	0	0	3
20212SRC36	Participation in Scaffold Research (Societal Project)	-	-	-	2
	Total	**27**	**2**	**0**	**24**
	SEMESTER IV				
20212AEC41	Functional Analysis	5	1	0	5
20212SEC42	Visual Programming	6	1	0	5
20212AEC43	Number Theory	6	0	0	5
20212DSC44_ Discipline Specific Elective – IV		5	0	0	4
20212PRW45	Project Work	0	0	0	6
20212PEE	Programme for Exit Examination	0	0	0	2
	Total	**22**	**2**	**0**	**27**

	Total Credits for the Programme				96

Discipline Specific Electives

Semester	Discipline Specific Elective Courses
I	a) 20212DSC15A- Classical Dynamics b) 20212DSC15B- Fluid Dynamics
II	a) 20212DSC25A- Mathematical Probability b) 20212DSC25B- Mathematical Modelling
III	a) 20212DSC34A- Cryptography b) 20212DSC34B- Algebraic Coding Theory
IV	a) 20212DSC44A- Combinatorial Mathematics b) 20212DSC44B- Design And Analysis of Algorithm

Open Electives

Semester	Open Elective Courses
III	a) 20211OEC-Writing For the Media b) 20213OEC-Bio-medical Instrumentation c) 20214OEC-Green Chemistry d) 20215OEC-Herbal Medicines e) 20220OEC-M-Marketing f) 20261OEC- Financial Service g) 20280OEC-Counselling and Psychology

Credit Distribution:

Sem	AEC	SEC	DSC	OEC	Research	Others	Total
I	12	04	04	-	01	-	21
II	09	03	04	-	05	-	21
III	10	05	04	02	02	-	23
IV	10	05	04	-	06	02	29
Total	41	17	16	02	14	02	92

H.O.D.

M.Sc., MATHEMATICS
SYLLABUS

SEMESTER – I
Core I: ALGEBRA

Course Title
20212AEC11 Core –I - Algebra

Objectives:
1. Group Theory is the fundamental building blocks for the Abstract Algebra.
2. To study the algebraic aspects of Real and Complex numbers.
3. Module is a third algebraic Model - Applicable to geometry and physics.

UNIT I:

    Group theory: Sylow's theorem — direct products — finite abelian groups.

UNIT II:

    Ring theory: Polynomial rings — polynomials over the rational field polynomial ring over commutative rings — modules.

UNIT III:

    Field: Extension fields — roots of polynomials — more about roots

UNIT IV:

    Field: the elements of Galois theory — Finite fields

UNIT V:

    Linear transformations — the algebra of linear transformations, Hermition, Unitary and   normal transformations.

Reference

1. Topics in Algebra — 1.N. Herstein

Learning Outcomes:

1. Understand the concept of Group Theory, Ring Theory.
2. A knowledge of Linear Transformations.
3. An understanding of the analysis of Fields.
4. Research inquiry and analytical thinking abilities

Course Title
20212AEC12
Core –II Real Analysis

Objectives:
1. To introduce the motion of Reimann – stieltjes integral.
2. To study the infinite series and infinite sequences of functions.
3. To study the multivariate differential calculus.

UNIT I:
   Riemann — Stielties — integral

UNIT II:
   Infinite series and infinite products

UNIT III:
   Sequences of functions

UNIT IV:
   Multivariable Differential Calculus

UNIT V:
   Implicit functions and Extremum problems

Reference:
   Mathematical Analysis Tom. M.Apostol. 2nd Edition Narosa Publishing House— 1985

   Unit I   Chapter— 7(7.1—7.25)
   Unit II   Chapter — 8(8.1 — 8.18)
   Unit III Chapter — 9(9.1 — 9.6, 9.8-9.13)
   Unit IV Chapter— 12(12.1—12.5, 12.7— 12.14)
   Unit V   Chapter— 13(13.1 — 13.6)

Learning Outcomes:

Students will be able to

1. Know the motion of the Riemann-Stieltjes integral, prove elementary properties of the Riemann integral and the Fundamental Theorem of Calculus.
2. Describe the Infinite series and Infinite Products, Sequences of Functions.
3. An understanding of Multivariable Differential Calculus and Implict Functions and Extremum problem.

Course Title
20212AEC13 Ordinary Differential Equations

Objectives:

1. Teaching the theory and applications to students preparing for advanced training in applied sciences and social sciences.
2. Presenting in easy and lucid language the results of oscillations, boundry valued problems (BVP) and elements of control theory.
3. Justifying the inclusion of qualitative theory to students who that it is out of place.
4. Emphasing the importance of the study of Boundary problems, both in Mathematics and applied sciences.
5. Studying about the stability of stationary solutions.

UNIT I:
Systems of linear diffrential equations — Chapter 4

UNIT II:
Existence and uniqueness of solutions Chapter 5

UNIT III:
Boundary value problems — Chapter — 7

UNIT IV:
Oscillations of second order equations — Chapter 8

UNIT V:
Stability of linear and nonlinear system — Chapter 9

Reference
Ordinary differential Equations and Stability Theory — S.G.GEO. V.Ragavendra, V.Lakshmikanthan

Learning Outcomes :

Upon completing this course students should be able to:

1. Solve first order equations, systems of periodic coefficients and use these methods to solve applied problems.
2. A knowledge of Sturm-Liouville Problem.

3. Understanding about the stability of stationary solutions.

Course Title
20220SEC14 C++ Programming

Objectives
- Utilize Object Oriented techniques to design C++ programs.
- Use the standard C++ library.
- Exploit advanced C++ techniques

UNIT 1:

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

UNIT 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

UNIT 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.

UNIT 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.

UNIT V:

Inheritance: extending classes — introduction — defining derived classes — single in heritance — multiple inheritance — virtual base classes — abstract classes — nesting classes.

Reference:

Object Oriented Programming with C++ - E.Balagurusamy.

Learning Outcomes:

At the end of the course, the student should be able to:
- Able to understand and design the solution to a problem using object-oriented programming concepts.

- Able to reuse the code with extensible Class types, User-defined operators and function Overloading
- Understand functions and parameter passing.
- Understand object-oriented design and programming
- Understand dynamic memory allocation and pointers

Course Title
20212DSC15A
Elective Classical Dynamics

Objectives.

1. Classical mechanics afford the student an opportunity to master many of mathematics techniques.
2. It is certainly true that classical mechanics today is far from being a closed subject.
3. Alternative means exist in the curriculum for acquiring the mathematics needed in other branches.

UNIT I:
  Introductory Concepts—Chapter 1(1.1 — 1.5)

UNIT II:
  Lagrange's equations — Chapter 2

UNIT III:
  Special applications of Lagrange's equations — Chapter 3

UNIT IV:
  Hamilton equations — Chapter 4

UNIT V:
  Hamilton Jacobi theory — Chapter 5

Reference

  CLASSICAL DYNAMICS — Donald T.Greenwood, PHI, India.

Learning Outcomes:

Students who successfully complete the course will demonstrate the following outcomes by tests, homework, and written reports:

1. A knowledge of mechanical systems , virtual work Energy and Momentum.

2. Understanding the concept and Applications Lagrange's Equation.
3. A knowledge of Hamilton's Principal function.

Course Title
20212DSC15B Elective- Fluid Dynamics

Objectives:
1. To introduce the behavior of fluid in motion.
2. To study the application of complex analysis in the analysis of flow of fluids.

UNIT I
Real fluids and ideals fluid — velocity of a fluids at a point-streamlines and path lines: steady and unsteady flows — the velocity potential — The velocity vector — local and particle rates of change — the Equations of continuity — Worked examples — Accelerations of a fluids — Pressure at a point in a fluid at rest — Pressure at a point in moving fluids — Conditions at a Boundary to two invisid immiscible fluids — Euler's equations of motions — Bernoulli's equation — worked examples.

UNIT II
Some flows involving axial symmetry — some special two — Dimensional flow — impulsive Motion. Some three — dimensional flows: Introductions — sources, skins and doublets — images in a rigid infinite plane — Axis-symmetric flows: stokes stream functions.

UNIT III
Some two — Dimensional Flows: meaning of a two — Dimensional flow — Use of cylindrical polar coordinates — The steam function — The complex potential for two Dimensional, irrotational, incompressible flow — complex velocity potentials for standard two — dimensional flows — some worked examples — The Milne — Thomson circle theorem and applications — The theorem of Blasius.

UNIT IV
The use of conformal transformation and Hydrodynamical Aspects — stress components in real fluids — relations between Cartesian components of stress — Translational motion of fluid element — The rate of strains Quadric and principal stresses — Some further properties of the rate of strains quadric — stress Analysis in fluid motion — Relations between stress and rate of strain — The coefficient of viscous fluids

UNIT V

Some solvable problems in viscous flow — steady viscous flow in tubes of uniform cross section — Diffusion of vorticity — Energy. Dissipation due to viscosity — steady flow past a fixed sphere — Dimensional Analysis; Reynolds Number — prandtl's Boundary layer.

Reference:

Fluids dynamics by F. Chorlton (CBS Publisher & Distributors, Delhi- 110032) 1985.

Unit I   : Chapter 2.Sec 2.1 to 2.9 and Chapter 3.Sec 3.1 to 3.6
Unit II   : Chapter 3.Sec 3.9 to 3.11 and Chapter 4.Sec 4.1,4.2, 4.3, 4.5
Unit III   : Chapter 5.Sec 5.1 to 5.9 except 5.7
Unit IV   : Chapter 5.Sec 5.10 and Chapter 8:Sec 8.1 to 8.9
Unit V   : Chapter 8.Sec 8.lO to 8.l6

General References

Fluids Dynams shanty swarup, Krishna prakasan mandir Meerut 1984.

Learning Outcomes:

Students who successfully complete the course will demonstrate the following outcomes by tests, homework, and written reports:

1. A knowledge of behaviour of fluid in motion.
2. A knowledge of Two Dimensional and conformal mappring.
3. A knowledge of solving problems in viscous flow-steady viscous flow

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SEMESTER – II

Course Title
20212AEC21
Complex Analysis

Objectives:

1. To introduce the students to the fascinating world of complex analysis which is different from analysis of real variable.

2. To introduce the concepts of harmonic functions , elliptic functions and periodic functions.

UNIT I:

Harmonic functions — power series expansions partial fraction and factorization — entire functions.

UNIT II:

The Riemann zeta function — normal families.

UNIT III:

The Riemann mapping theorem — conformal mapping of polygons — Chapter 6(6.1, 6.2)

UNIT IV:

A closer look at harmonic functions — the Dirichiet's problem Harmonic measures — Chapter 6 sec 3.4 and 5(5.1 only)

UNIT V:

Simple periodic functions — double periodic functions — the weierstrass theory Chapter 7 sec 1,2,3(3.1. 3.2, 3.3)

Reference

Complex Analysis L.V. Ahlfors 3rd edition McGraw Hill

Learning Outcomes:

On completion of this unit successful students will be able to:

1. Understand the significance of harmonic functions, Reimann zeta function.
   A knowledge of periodic functions, the weierstrass
2. Research inquiry and analytical thinking abilities
3. Abilities in conformal mapping

Course Title
20212AEC22
Measure Theory and Integration

Objectives:

To gain understanding of the abstract measure theory and definition and main properties of the integral. To construct Lebesgue's measure on the real line and measurability in product space. To explain the basic advanced directions of the theory.

UNIT I

  Measure on Real line — Lebesgue outer measure — Measurable sets — Regularity — Measurable function — Borel and Lebesgue measurability.

UNIT II

  Integration of non-negative functions — The General integral — Integration of series — Riemann and Lebesgue integrals.

UNIT III

  Abstract Measure spaces — Measures and outer measures — Completion of a measure — Measure spaces — Integration with respect to a measure.

UNIT IV

  Convergence in Measure — Almost uniform convergence — Signed Measures and Hahn Decomposition — The Jordan Decornpostion.

UNIT V

  Measurability in a Product space — The product Measure and Fubini's Theorem.

Reference:

[I] G.De Barra, Measure Theory and Integration, New age international (p) Limited.

UNIT — I   : Chapter II: Sections 2.1 to 2.5
UNIT—Il   : Chapter III: Sections 3.1 to 3.4
UNIT — Ill   : Chapter V: Sections 5.1 to 5.6
UNIT— IV   : Chapter VII: Sections 7.1 to 7.2, Chapter VIII: Sections 8.1 and 8.2
UNIT —VI   : Chapter X: Sections 10.1 to 10.2

Reference(s)

1. Measure and Integration. Second Edition by M.E.Munroe Addison — Wesley publishing company, 1971.
2. P.K.Jain, V.P.Gupta, Lebesgue Measure and integration, New Age International Pvt Limited Publishers, New Delhi, 1986. (Reprint 2000)
3. Richard L. Wheeden and Antoni Zygmund, Measure and Integral: An Introduction to Real Analysis, Marcel Dekker Inc. 1977.
4. Inder, K.Rana, An Introduction to Measure and Integration, Narosa Publishing House, New Delhi,1997.

Learning Outcomes:

To introduce the concepts of *measure* and *integral with respect to a measure,*

To show their basic properties,

To provide a basis for further studies in Analysis, Probability, and Dynamical Systems.

Knowledge in measure spaces

Course Title
20212AEC23 Mathematical Methods

Objectives:

To introduce the concept of Calculus of variations, Fourier Transforms, Hankel Transform, Linear Integral Equations, Method of successive approximations.

UNIT I

Calculus of variations — Maxima and Minima — the simplest case — Natural boundary and transition conditions variational notation — more general case — constraints and Lagrange's multipliers — variable end points — Sturm - Liouville problems.

UNIT II

Fourier transform — Fourier sine and cosine transform — Properties Convolution — Solving integral equations — Finite Fourier transform — Finite Fourier sine and cosine transforms — Fourier integral theorem Parseval's identity.

UNIT III

Hankel Transform: Definition - Inverse formula — Some important results for Bessel function — Linearity property — Hankel Transform of the derivatives of the function — Hankel Transform of differential operators — Parsavaj's Theorem.

UNIT IV

Linear Integral Equations — Definition, Regularity conditions — special kind of kernels — eigen values and eigen functions — convolution integral — the inner and scalar product of two functions — Notation — reduction to a system of' Algebraic equations — examples — Fredholm alternative — examples — an approximate method.

UNIT V

Method of successive approximations: Iterative scheme — examples — Volterra Integral equation examples — some results about the resolvent kernel. Classical Fredholm Theory: the method of solution of Fredholm — Fredholm's first theorem — second theorem — third theorem.

References

1. Ram.P.Kanwal — Linear Integral Equations Theory and Practise, Academic Press 1971.
2. F.B.Hildebrand. Methods of Applied Mathematics II ed. PHI, ND 1972.
3. A.R.Vasishtha. R.K.Gupta, Integral Transforms, Krishna Prakashan Media Pvt Ltd. India, 2002.

  UNIT — I   : Chapter 2:Sections 2.1 to 2.9 of [2]
  UNIT — II   : Chapter 7 of [3]
  UNIT — III   : Chapter 9 of [3]
  UNIT— IV   : Chapter 1 and 2 of [1]
  UNIT—V   : Chapter 3 and4 of [1]

Learning Outcomes:
On completion of this unit successful students will be able to:

1. Understand the significance of Caluculus of Variations, Fourier Transforms and Hankel Transform.
2. A knowledge of linear integral equations and Method of successive approximations.
3. Skillness in transformation form one function into another function
4. Applications

Course Title
20212AEC24 Graph Theory

Objectives
        1. To give a rigorous study of the basic concepts of Graph Theory.
        2. To study the applications of Graph Theory in other disciplines.

UNIT I
     Basic Results Basic Concepts - Subgraphs - Degrees of Vertices - Paths and Connectedness Operations on Graphs - Directed Graphs:

UNIT II
     Connectivity Vertex Cuts and Edge Cuts - Connectivity and Edge - Connectivity, **Trees**:Definitions, Characterization and Simple Properties - Counting the Number of Spanning Trees - Cayley's Formula.

UNIT III
     Independent Sets and Matchings Vertex Independent Sets and Vertex Coverings - Edge Independent Sets -Matchings and Factors - Eulerian Graphs - Hamiltonian Graphs.

UNIT IV
     Graph Colourings Vertex Colouring - Critical Graphs - Triangle - Free Graphs - Edge Colourings of Graphs - Chromatic Polynomials.

UNIT V
     Planarity Planar and Nonplanar Graphs - Euler Formula and its Consequences - K5 and K3,3 are Nonplanar Graphs - Dual of a Plane Graph - The Four-Colour Theorem and the Heawood Five-Colour Theorem-Kuratowski's Theorem.

Textbook
 1. R. Balakrishnan, K. Ranganathan, A Textbook of Graph Theory, Springer International Edition, New Delhi, 2008.
UNIT I Chapter I & II: 1.1 to 1.4, 1.7, 2.1, 2.2
UNIT II Chapter III & IV: 3.1, 3.2, 4.1, 4.3 to 4.4
UNIT III Chapter V & VI: 5.1 to 5.4, 6.1, 6.2
UNIT IV Chapter VII: 7.1 to 7.4, 7.7
UNIT V Chapter VIII: 8.1 to 8.6

References 1. J.A. Bondy, U.S.R. Murty, Graph Theory with Applications, Mac Milan Press Ltd., 1976.
2. Gary Chartrand, Linda Lesniak, Ping Zhang, Graphs and Digraph,CRC press,2010.
3. F.Harary, Graph Theory, Addison - Wesley, Reading, Mass., 1969.

Course Title
20212DSC25A
Elective -Mathematical Probability

Objectives:

The goal of the subject is to extend and master students' knowledge of probability and statistical and to provide theoretical background for studying and applying advanced statistical methods. Students are introduced to probability theory and mathematical statistics. They learn to understand important distributions, present statistical data, and fundamental statistical concepts. Emphasis is placed on evaluation the processes encountered in the real reality and on formulation of problems that are investigated by sampling.

UNIT I

Measure theory — Classes of sets. Singular distributions Probability measures and their distribution functions.

UNIT II

Random Variables — Expectation — Independence — General Definitions — Properties of mathematical expectation — Independence.

UNIT III

Convergence concept — Various modes of convergence — Almost sure convergence — Borel — Cantelli lemma — Vague convergence — continuation — Uniform integrability — convergence of moments.

UNIT IV

Law of large numbers and random series — simple limits theorem's — weak law of large numbers — convergence of series — strong law of large numbers.

UNIT V

Characteristic function — General properties — convolutions — Uniqueness and inversion — convergence theorems.

Reference

A course in Probability Theory — Second Edition — by Kai Lai Chung, Academic Press, New York

Unit I   :   Chapter 2
Unit II   :   Chapter 3
Unit III   :   Chapter 4
Unit IV   :   Chapter 5 (Sec.5.l to 5.4 Only)
Unit V   :   Chapter 6 (Sec.6.l to 6.3 Only)

GENERAL REGERENCE

Modern Probability theory — BR.Bhat, Willy Eastern Limited 0989).

Learning Outcomes:

Knowledge and understanding understand the place of probability theory knowledge in cognitive process, describe the basic probability theory and mathematical statistics concepts; Special abilities and skills.

1. Calculate the probabilities of events with an appropriate choice of the method of calculation;

2. Be familiar with the types of random variables, be able write them, calculate their numerical characteristics;

3. Evaluate numerical characteristics of the sample and interpret the meanings of the parameters of population.

4. Formulate and test hypotheses, draw the appropriate conclusions.

5. Understand impotent distribution

Course Title
20212DSC25B Elective- Mathematical Modelling

Objectives:
Mathematical modelling can be used for a number of different reasons. How well any particular objective is achieved depends on both the state of knowledge about a system and how well the modelling is done.
1. Developing scientific understanding - through quantitative expression of current knowledge of a system.
2. Test the effect of changes in a system;
3. Aid decision making, including (i) tactical decisions by managers; (ii) strategic decisions by planners.

UNIT I
Microbial population models, single-species, non — age — structured population models.
UNIT II
Age — structured population models.
UNIT III
Epidemic models.
UNIT IV
Models in genetics.

UNIT V
Mathematical models in Pharmacokinetics.

Reference:
Mathematical models in Biology and Medicine By J.N.Kapur, Affiliated East — West Press Pvt. Ltd., New Delhi

Unit I   : Chapter 2,3
Unit II   : Chapoter 4
Unit III   : Chapter 8
Unit IV   : Chapter 9
Unit V   : Chapter 10

General References
1. Mathematical Modelling J N Kapur Wiley Eastern Ltd New Delhi.

2. Theory of Ordinary Differential Equations with Equations with applications in biology and Engineering Ahmad & Mohana Rao Affiliated East — West Pvt Ltd New Delhi, (1999).

Learning Outcomes:
Having successfully completed this module, you will be able to demonstrate knowledge and understanding of:
1) The concept of mathematical modelling.
2) The mathematical descriptions of some real systems.
3) Correct methodology when developing mathematical models.
4) Skill in applications
5) Designing and developing the solutions.

20212RMC26   **Research Methodology**

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 manuscripts.

PREREQUISITES:

Research Methodology course in UG level or equivalent knowledge.

UNIT I: Introduction to Research Methodology

Objectives of research – Types of research – Significance of research. Research methods versus methodology – Research and scientific method – Criteria of good research – Problems encountered by researchers in India.

UNIT II: Database 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 – References – Appendices.

UNIT V: Application of MATLAB:

Numerical Integration - Numerical integration, ordinary differential equations, partial differential equations, boundary value problems

Fourier Analysis - Fourier transforms, convolution.

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, 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 by William J. Palm III

SEMESTER – III

Course Title
20212AEC31
Core IX- Topology

Objectives:
1) The subject of topology is of interest in its our right and it also serves to lay the foundations for future study in analysis, in Geometry and in Algebraic Topology.
2) To develop the students' abilities through hard thinking.
3) To train the students to develop analytical thinking.

UNIT I
   TOPOLOGICAL SPACES: Topological spaces' — Basis for a topology- The order topology — The product topology on X x Y — The subspace topology — Closed sets and limit points.

UNIT II
   CONTINUOUS FUNCTIONS: Continuous functions — the product topology — The metric topology.

UNIT III
   CONNECTEDNESS: Connected spaces — connected subspaces of the Real line — Components and local connectedness.

UNIT IV
   COMPACTNESS: Compact spaces — compact subspaces of the Real line — Limit Point Compactness — Local Compactness.

UNIT V:
   COUNTABILITY AND SEPERATION AXIOMS : The Countability Axioms — The separation Axioms — Normal spaces — The Urysohn Lemma — The Urysohn metrization Theorem — The Tietz extension theorem.'

Reference:
James R.Munkres, Topology(2nd Edition) Pearson Education Pvt. Ltd., New Delhi — 2002 (Third Indian Reprint)
UNIT — I   Chapter 2: Sections 12 to 17
UNIT — II   Chapter 2: Sections 1 8to 2l(Ornit Section 22)
UNIT — III   Chapter 3: Sections 23 to 25
UNIT — IV   Chapter 3: Sections 26 to 29
UNIT — V   Chapter 4: Sections 30 to 35.

Reference(s)

1. J.Dugundji, Topology, Prentice Hall of India, New Delhi, 1975.
2. George F.Sinmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Co., 1963.
3. .J.L.Kelly, General Topology, Van Nostrand, Reinhold Co., New York.
4. L.Steen and J.Seeback, Counter examples in Topology, HoIt, Rinehart and Winston, New York, 1970
5. S.Willard, General Topology, Addison — Wesley, Mass., 1970.

Learning Outcomes:

Upon successful completion of this course, the student will be able to: (Knowledge based) distinguish among open and closed sets on different topological spaces;

1) know the two fundamental topologies: discrete and indiscrete topologies.
2) Identify precisely when a collection of subsets of a given set equipped with a topology forms a topological space;
3) Understand when two topological spaces are homeomorphic;
4) Identify the concepts of distance between two sets; connectedness, denseness, compactness and separation axiom.

Course Title
20212AEC32 Core X – Stochastic Process

Objectives

The objective of this course is to provide the fundamentals and advanced concepts of random process to support graduate coursework and research in engineering. The required mathematical foundations will be studied at fairly rigorous level and the applications of the probability theory and random processes to engineering problems will be emphasized. The simulation techniques will also be studied and MATLAB will be used as a software tool for bridging the probability theory and engineering applications.

UNIT I

Elements of Stochastic Processes — Two simple examples of Stochastic processes — Classification of general Stochastic processes — Defining a Stochastic Processes — Markov chains — Definitions — Examples of Markov Chain — Transition probability matrices of a Markov chain — classification of states of a Markov chain — Recurrence — more on Recurrence.

UNIT II

The basic limit theorem of Markov chains and applications — Discrete renewal equation — proof of theorem — Absortion probabilities — criteria for recurrence — Random walk.

UNIT III

      Classical Examples of continuous time Markov chains — General pure birth processes and Poisson processes — more about Poisson processes — A counter model — birth and death processes — Differential equations of birth and death processes — Examples of birth and death processes.

UNIT IV

      Renewal processes — Definition of Renewal process and related concepts — Some examples of Renewal Processes — More on some special Renewal processes — Renewal equations and elementary Renewal theorem — The Renewal Theorem — Applications of Renewal theorem.

UNIT V

      Martingales — Preliminary definitions and examples — Super martingales and Sub martingales — The optional sampling theorem.

Reference

      A First course in Stochastic Processes — second Edition by Samuel Karlin and M . Taylor, Academic Press New York.

       Unit I   : Chapterl(l.2,l.3,l.4Only) , Chapter 2 (2.1 to 2.5 and 2.7 Only)
       Unit II   : Chapter 3 (3.1 to 3.4 and 3.7 Only)
       Unit III   : Chapter 4 (4.1 to 4.6 Only)
       Unit IV   : Chapter 5 (5.1 to 5.6)
       Unit V   : Chapter6(6.1,6.2,6.3 Only)

General references

  1. "Stochastic Processes" S.K Srinivasan and K.M. Mehata, Tata Mcgraw — Hill Publishing Company Ltd., New Delhi.
  2. "Stochastic Processes" JMedhi, Second Edition Wiley Eastern Ltd., New Del/it

Learning Outcomes

1.On successful completion of the course, students should be able to:
2. Explain fundamentals of probability theory, random variables and random processes.
3. Understand the mathematical concepts related to probability theory and random processes
4, Understand the characterization of random processes and their properties.
5. Formulate and solve the engineering problems involving random processes.
6. Analyze the given probabilistic model of the problem.
7. Make precise statements about random processes.

8. Use computational techniques to generate simulation results.

Course Title
20212AEC33 Advanced Numerical Analysis

  Objectives:

1) Derive appropriate numerical methods to solve algebraic and transcendental equations.
2) Develop appropriate numerical methods to solve a differential equation.
3) Derive appropriate numerical methods to evaluate a derivative at a value.
4) Derive appropriate numerical methods to solve a linear system of equations.

5) Derive appropriate numerical methods to calculate a definite integral.

Unit – I

Transcendental polynomials equation: Introduction, Methods based on first and second degree equation: secant method - Newton Raphson method - Muller method - Chebyshev method - Rate of convergence. Polynomials Equations: Birge-Vieta method - Bairstow method -Graeffe's root squaring method.

Unit – II

System of linear algebraic equation and Eigen values problems: Jacobi iteration method, Gauss-Seidal iteration method successive over relaxation method. Eigen values and vectors.

Unit – III

Interpolation and approximation – Hermite Interpolation – Bivariate interpolation – Lagrange bivariate interpolation- Newton's bivariate Interpolation for equispaced points – approximations – Gram-Schemidt orthoganalizing process – Chebyshev polynomials.

Unit – IV

Numerical Integration: Methods based on interpolation-Newton-Cotes methods-trapezoidal rule-Simpson's rule-Methods based on undetermined coefficients-Gauss-Legendre integration methods-Labotto integration method-Radau Integration Method and Gauss-Chebystew Integration methods.

Unit – V

Ordinary Differential Equations: Numerical methods – Euler method – Backward Euler method – Mid point method – Taylor series method – Runge Kutta methods – Implicit Runge – Kutta method.

TEXT BOOK:

Numerical methods for scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain III – Edition.

Unit: I   – Chapter-2 Sec 2.3, 2.4, 2.5, 2.8
Unit: II   – Chapter-3 Sec 3.4, 3.5, 3.6
Unit: III   – Chapter-4 Sec 4.5, 4.7, 4.8
Unit: IV   – Chapter-5 Sec 5.6, 5.7, 5.8
Unit: V   – Chapter-6 Sec 6.2, 6.3, 6.4.

Learning Outcomes

Students will be able to
1) Solve an algebraic or transcendental equation using an appropriate numerical method.
2) Solve a differential equation using an appropriate numerical method.
3) Evaluate a derivative at a value using an appropriate numerical method.
4) Solve a linear system of equations using an appropriate numerical method.
5) Calculate a definite integral using an appropriate numerical method.
6) Skill in finding the roots of the given equation

Course Title

Objectives:
1) Understand the basic concept of Cryptography and Network Security their mathematical models.
2) Understand mathematical foundation required for various cryuptographic Algorithms.

UNIT I:
Simple cryptosystem — enciphering matrices.

UNIT II:
Idea of public key cryptography — RSA — discrete log.

UNIT III:
Knap sack pseudo primes — Rho method

UNIT IV:
Fermat factorization and factor bases — continued fraction method.

UNIT V:
Basic facts — elliptic curve cryptosystems — elliptic curve factorization.

Reference:
A course in Number Theory and Cryptography — N.Koblitz, Springer — verlog, New York 1987.

Learning Outcomes

1) Analyze key agreement algorithms to identify their weaknesses.
2) Describe the ethical issues related to the misuse of computer security.
3) Develop code to implement a cryptographic algorithm or write an analysis report on any existing security product.

Course Title
20212DSC34B Elective- Algebraic Coding Theory

Objective:

- To equip students with the basic understanding of the fundamental concept of Coding Theory as they are used in communications.
- To enhance knowledge of codes. Error, Tree Codes,cyclic codes.
- To guide the student through the implications and consequences of fundamental theories and laws of coding theory with reference to the application in modern communication and computer systems

UNIT I

The communication channel. The coding problem. Types of codes.
Block codes. Error — detecting and Error — Correcting codes. Linear codes. The hamming metric. Description of linear block codes by matrices. Dual codes. Standard Array. Syndrome. Step — by — step decoding modular representation.

UNIT II:

Error — Correction capabilities of linear codes. Bounds on minimum Distance for block codes. Plotkin bound. Hamming sphere packing bound. Varshamov — Gilbert — Sacks bound. Bounds for Burst — Error detecting and correcting codes. Important linear block codes. Hamming codes. Golay codes. Perfect codes. Quasi — perfect codes. Reed — Muller codes. Codes derived from Hadmard matrices. Product codes. Concatenated codes.

UNIT III:

Tree codes. Convolutional codes. Description of linear tree and convolutional codes by matrices. Standard Array. Bounds on minimum distance for convolutional codes. V. G. S bound. Bounds for Burst — error detecting and correcting convolutional codes. The Lee metric, packing bound for Hamming code w.r.t. Lee metric. The Algebra of polynomial residue classes. Galois fields. Multiplicative group of a Galois field. Cyclic codes. Cyclic codes as ideals.

UNIT IV:

Matrix description of cyclic codes. Hamming and Golay codes as cyclic
codes. Error detection with cyclic codes. Error — connection procedure for short — ended cyclic codes. Pseudo cyclic codes. Code symmetry. Invariance of codes under transitive group of permutations. Bose — Chaudhary — Hocquenghem (BCH) codes. Reed — Soloman (RS) codes.

UNIT V:

Majority — Logic decodable codes. Majority — Logic Decoding. Singleton
bound. The Griesmer bound, Maximum — distance separable (MDS) codes. Generator and Parity — check matrices of MDS codes. Weight distribution of MDS code. Necessary and sufficient conditions for a linear code to be an MDS code. MDS codes from RS codes. Abramson codes. Closed — loop burst — error correcting codes (fire codes). Error locating codes.

References

1. Raymond Hill,' A First Course in Coding Theory "Oxford University Press. 1986.
2. Man Young Rhee, Error Correcting Coding Theory " MacGraw Hill Inc., 1989.
3. W.W. Peterson and E.J. Weldon, Jr., Error — Correcting Codes. M.I.T. Press. Combridge,

Massachusetts, 1972.

4. E.R. Beriekamp. Algebraic Coding Theory, MacGraw Hill Inc., 1968.
5. F.J. Macwilliams and N.J.A. Sloane, Theory of Error Correcting Codes" North — Roland
   Publishing Company, 1977.

Learning Outcomes

Upon completion of this course, students should be able to:

1) Define channel capacities and properties using Shannon's Theorems.

2) Construct efficient codes for data on imperfect communication channels.

3) Generalize the discrete concepts to continuous signals on continuous channels.

SEMESTER – IV

Course Title
20212AEC41 Core XII-Functional Analysis

Objectives:

1) To study about Converges, Hilbert spaces and Bessels's inequality.

2) To study about Spectral Theory.

3) To study about convergences in L(X,Y) – Uniform boundedness and The Gelfand
   Neumark theorem and Banach Algebra.

UNIT I

Algebraic Systems: Groups — Rings — The structure of rings — Linear spaces - The dimension of a linear space — Linear transformations — Algebras — Banach Spaces : The definition and some examples — Continuous linear transformations — The Hahn — Banach theorem — The natural imbedding of N in N** - The open mapping theorem — The conjugate of a operator.

UNIT II

Hilbert Spaces: The definition and some simple properties — Orthogonal complements — Orthonormal sets — The conjugate space H* - The adjoint of an operator — Self-adjoint operators — Normal and unitary operators — Projections.

UNIT III

Finite-Dimensional Spectral Theory: Matrices — Determinants and the spectrum of an operator — The spectral theorem — A survey of the situation.

UNIT IV

General Preliminaries on Banach Algebras: The definition and some examples
— Regular and singular elements — Topological divisors of zero — The spectrum — The formula for the spectral radius — The radical and semi- simplicity.

UNIT V

The Structure of Commutative Banach Algebras: The Gelfand mapping — Applications of the formula $r(x) =\lim ||x^n ||^{1/n}$ - Involutions in Banach Algebras
— The Gelfand-Neumark theorem.

Reference:

Introduction to Topology and Modern Analysis, G.F.Simmons, McGraw-Hill International Ed. 1963.

UNIT-I: Chapters 8 and 9
UNIT-lI   :   Chapter 10
UNIT-III   :   Chapter II

UNIT-IV   :   Chapter 12
UNIT-V   :   Chapter 13

Reference(s)

1. Walter Rudin, Functional Analysis, TMH Edition, 1974.
2. B.V.Limaye, Functional Analysis, Wiley Eastern Limited, Print, 1985.
3. K.Yosida, Functional Analysis, Springer-Verlag, 1974.
4. Laurent Schwartz, Functional Analysis, Courant Institute of mathematical Sciences, New York University, 1964.

Learning Outcomes

Upon successful completion of this course, the student will be able to: (Knowledge   based) distinguish among open and closed sets on different topological spaces;

1) know the two fundamental topologies: discrete and indiscrete topologies.
2) Identify precisely when a collection of subsets of a given set equipped with a topology forms a topological space;
3) Understand when two topological spaces are homeomorphic;
4) Identify the concepts of distance between two sets; connectedness, denseness, compactness and separation axioms.
5) Research inquiry and analytical thinking abilities

Course Title
20212AEC42 Core XIII – Visual Programming

Objectives

Learn to design and develop Windows-based business applications using Visual Basic.NET programs that meet commercial programming standards.

- To learn the basic principles of visual programming
- To study the necessary skills to create software solutions using visual programming
- Understood the Open Data Base Connectivity using Visual programming.
- To inculcate knowledge on Programming and Project Development using Visual Basic.

UNIT I

Introduction to Visual Basic — Integrated Development Environment (IDE) features — VB Editor — Customizing the IDE — Anatomy of a form — Working with form properties — setting form's properties — Introducing form events and form methods.

UNIT II

Variables in Visual Basic: Declaring variables — Data types — Null value. Error value — Empty value - The scope of a variable Module level variables — Constants — Creating your own constants — Scope of a constant — Converting data types — Arrays — Declaring arrays — Fixed size arrays — Dynamic arrays — Preserve Keyword - ReDim — Writing code in Visual Basic — The anatomy of a procedure —

Subroutine and functions — Language constructs — For .... Next, The While loop,
Select case - End select, Exit statement. With structure.

UNIT III

Selecting and Using controls — Introduction to standard controls -- Command buttons - Text boxes — labels — Option buttons — Check boxes — Frame controls — List boxes — Combo boxes — Image objects — Picture boxes — Timer — Scroll bars - File system Controls (Drive, DirList, File List boxes)

UNIT IV

Introduction to Built — in ActiveX Control — Tool bar — The Tree view control — The List view control — The Image list control — Common Dialog Control — Status bar control Rich textbox control — Menu editor.

UNIT V

DDE Properties — DDE Methods — OLE properties — Active Control Creation and Usage and ActiveX DLL creation and usage - Database access — Data Control — field control — Data grid record set using SQL to manipulate data — Open Data Base Connectivity.

Reference:

1. Mohammed Azam, Programming with Visual Basic 6.0 — Vikas Publishing House Pvt, Ltd — 2002
2. Content Development Group, Visual Basic 6.0 — Tata McGraw Hill Publishing Company Limited — 2002.

Learning Outcomes

Upon completion of this course, the student will be able to:

- Design, create, build, and debug Visual Basic applications.
- Explore Visual Basic's Integrated Development Environment (IDE).
- Implement syntax rules in Visual Basic programs.
- Write Windows applications using forms, controls, and events
- Write and apply decision structures for determining different operations.
- Write and apply loop structures to perform repetitive tasks.
- Students are able to design a IDE enabled software solution to representative problems.
- Students can use DDE data I/O components to read and write raster and vector data files.
- Students can use OLE map components to develop a custom Windows Forms based application with a map and legend.

Course Title
20212AEC43   Number Theory

Objectives:

The objective is for the students to obtain a foundational knowledge of elements of Number Theory through step-by-step proofs of classical theorems, as well as to sharpen their skills through problem-solving.

UNIT I :

Fundamentals of Congruence's : Basic properties of Congruence's – Residue-Riffling. Solving Congruence's: Linear Congruence's-the theorems of Fermat and Wilson Revisited-the Chinese remainder Theorem-polynomial congruence's.

UNIT II :

Arithmetic functions: Combinatorial study of $\varphi\,\varphi$ (n) – Formulae for d(n) and $\sigma(n)$ $\sigma(n)$-Multiplicative arithmetic functions. The Mobius inversion formula. Primitive roots: properties of reduced systems-primitive roots modulo P.

UNIT III :

Quadratic Residues: Euler's Criterion-the Legendre symbol-the quadratic Reciprocity law-Applications of the Quadratic reciprocity law, Distribution of quadratic residues: Consecutive residues and non residues-consecutive triples and Quadratic residues.

UNIT IV:

Sum of squares: Sums of two squares-Sums of four squares. Elementary partition theory; Introduction-graphical representation-Euler's partition theorem-searching for partition identities.

UNIT V :

Partition generating functions: Infinite products as generating functions-Identities between infinite series and products-partition identities: History and introduction-Euler's pentagonal number theorem-The Roger's Ramanujan identities-Series and Product identities.

TEXT BOOK: Scope and treatment as in "Number Theory" by George E.Anderews, Hindustan Publishing Corporation (India) Delhi-110 007 (1989).

Unit I :   Chapters IV and V
Unit II :   Chapters VI and VII
Unit III :   Chapters IX and X
Unit IV :   Chapters XI and XII
Unit V :   Chapters XIII and XIV

Learning Outcomes:

On satisfying the requirements of this course, students will have the knowledge and skills to:
1. Solve problems in elementary number theory
2. Apply elementary number theory to cryptography
3. Develop a deeper conceptual understanding of the theoretical basis of number theory and cryptography
4. Research inquiry and analytical thinking abilities

Course Title
20212DSC44A Elective –Combinatorial Mathematics

Objectives:

The main objective is to learn how rigorous mathematical tools can be made for the purpose of doing mathematics with help of computers.

UNIT I

Basic combinational numbers.

UNIT II

Generating functions and Recurrence relations symmetric functions.

UNIT III
Multinomials — Inclusion and exclusion principles — permutations with forbidden positions.

UNIT IV
Necklace problem and Burnsides' Lemma — Cycle Index of a permutations group.

UNIT V
Polya's theorems and their immediate applications — Binary operations on permutations groups.

Reference
Combinatorics theory and applications by V. Krishnamurthy.

Unit I	:	Chapter I (Pages 1 — 15)
Unit II	:	Chapter I (Pages 26— 61)
Unit III	:	Chapter I (Pages 66 — 98)
Unit IV	:	Chapter 11 (Pages 99— 121)
Unit V	:	Chapter II (Pages 122 — 159)

General Reference
Introductory Combinatorics — Kenneth P.Bogart — Pitman Publishing mc, MashJIeld, Mass achusetts.

Learning Outcomes

Upon successful completion of Math 315 - Combinatorics, a student will be able to:
- Apply diverse counting strategies to solve varied problems involving strings, combinations,   distributions, and partitions,
- Write and analyze combinatorial, algebraic, inductive, and formal proofs of combinatoric identities,
- Recognize properties of graphs such as distinctive circuits or trees.

- will become familiar with fundamental combinatorial structures that naturally appear in various other fields of mathematics and computer science.
- They will learn how to use these structures to represent mathematical and applied questions, and they will become comfortable with the combinatorial tools commonly used to analyze such structures.

Course Title
20212DSC44B Elective- Design And Analysis of algorithms

Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

UNIT I   INTRODUCTION

What is an algorithm? — Algorithm specification — Performance analysis — Randomized algorithms.

UNIT II   ELEMENTARY DATA STRUCTURES

Stacks and Queues — Trees — Dictionaries — Priority Queues — Graph representations.

UNIT III   DESIGN OF ALGORITHM METHODS

Divided — And — Conquer — General method — Binary search — finding the maximum and minimum in a set of items — Merge sort — Quick sort.

UN1T IV   DESIGN OF ALGORITHM METHODS CONTINUATION

The Greedy method — The general method — Tree vertex Splitting Problem — Tree traversal and search techniques — Techniques for Binary trees — Techniques for Graphs — Breadth first search and depth first search traversal — Connected components and spanning trees — Backtracking — General method — the 8 — Queens Problem — Branch and Bound method — Travelling sales person algorithm.

UNIT V   ALGEBRAIC PROBLEMS

Algebraic problems — The general method — Evaluation and Interpolation — The Fast Fourier transform — Modular arithmetic — Even faster evaluation and interpolation.

Reference

1. Eills Horowitz,. Sartaj Shani and Sanguthevar Rajasekaran — Fundamentals of Computer Algorithm — Galgotia Publications Pvt Ltd 2000.

   Unit I   Chapter 1 (sections; 1.1,1.2,1.3.1 to 1.3.4, 1.4.1 to 1.4.3)
   Unit II   Chapter 2 (section ; 2.1 to 2.4,2.6)
   Unit III   Chapter 3 (sections 3.1 to 3.5)
   Unit IV   Chapter 4 (sections 4.1, 4.3) Chapter 6 (sections 6.1 to 6.3)
                   Chapter 7 (sections 7.1, 7.2) Chapter 8 (sections 8.1, 8.3)
   Unit V   Chapter 9 (sections 9.1 to 9.5)

References

1. Aho A. V, Hopcroft, J.E. and Ullman, J.D.. The Design and Analysis of Computer Algorithms. Additor Wesley Reading Mass (1974)
2. Goodman, S. E and Hedetniemi, S.T Introduction to the design and analysis of algorithms (McGraw Hill international Edition 1987).

Learning Outcomes

Students who complete the course will have demonstrated the ability to do the following:

1) Argue the correctness of algorithms using inductive proofs and invariants.

2) Analyze worst-case running times of algorithms using asymptotic analysis.
3) Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms and analyze them. Compare between different data structures. Pick an appropriate data structure for a design situation

Course Title
20211OEC **Open Elective -Writing for the Media**

Aim:
- To equip students to enter into the realm of mass media.

Objective:
- To comprehend the intricacies of mass media
- To know about the barriers to mass communication
- To understand the function of mass media
- To learn the different kinds of news
- To enhance the different kinds of writing for media

Outcome:
- Understand the intricacies of mass media
- Learn to write for the media

UNIT-I
Mass communication- Barriers to mass communication and mass culture- Function of mass media - Media effects, Qualities of media men.

UNIT-II
News- Hard and soft news- Expected and unexpected news- Box news- Follow up news-Scoop-Filters- Human interest stories- Recognizing and evaluation news.

UNIT-III
News and views- News analysis, Editorial, Columns, Article, Middle reviews, Letters-Features.

UNIT-IV
Reporting- Crime, Court, Election, Legislature, Sports, Development Investigative, Interpretative depth.

UNIT-V
Writing for Media-Inverted pyramid style-Feature style-TV/Broadcast, New style writing TV/Radio Documentaries- Writing Advertisements-Practical

ReferenceBook:-

Author	Title of the book	Edition / Year	Publisher
Susan	Journalism		
John Hogenberg	Professional Journalism	2012	
M.James Neal	News Writing and Reporting		Surjeet Publication
M.V Komath	The Journalist's Handbook		
D.S Mehta	Mass Communication &Journalism		

Course Title

Objectives:
        1) Understand the basic concept of Interpolation.
        2) To enhance the knowledge about Assignment Problems, Replacement Problems,
        Decision Analysis and Game Theory.

UNIT I
Interpolation with unequal intervals: Newton's, Lagrange's, and inverse interpolation

UNIT II
Assignment Problems

UNIT III
Replacement Problems

UNIT IV
Decision Analysis

UNIT V
Game Theory

References
1. For unit I, "Numerical Methods in Science and Engineering" M.K.Venkatraman
2. For units II to V, "Operations Research",Kantiswarup, P.K. Gupta and Manmohan

Learning outcomes
By the end of this course,
- Students using OR techniques in business tools for decision making
- Students develop Assignment problem and Replacement problems
- Understand the concept of decision analysis and game theory
- Students gets the knowledge about interpolation

20213OEC OPEN ELECTIVE PAPER
BIOMEDICAL INSTRUMENTATION

Aim:
● To understand the concepts and application of electronic Instrumentation in the Medical field.

Objective:
● Understanding basic principles and phenomena in the area of medical diagnostic instrumentation,
● Theoretical and practical preparation enabling students to maintain medical instrumentation

UNIT – I: BIO ELECTRIC SINGNALS AND ELECTRODES
Fundamentals of medical instrumentation – Sources of biomedical signals – basic medical instrumentation – Intelligent medical instrumentation system – Origin of Bio electric signals – Recording Electrodes – Silver – Silver chloride electrodes – Electrodes for ECG – Electrodes for EEG – Electrodes for EMG.

UNIT – II: RECORDING SYSTEM AND RECORDERS
Basic recording system – General consideration for signal conditions – Preamplifiers – Biomedical signal analysis technique – main amplifier and driver stage – Writing systems – direct writing recorders – the ink jet recorders – Electrocardiograph, Electroencephalograph – Electromyography and other Biomedical recorders.

UNIT – III: MEASUREMENT AND ANALYSIS TECHNIQUES
Electro cardiography – measurements of Blood pressure - measurements of Blood flow and cardiac output, Respiratory therapy Equipment – Origin of EEG – Action Potentials of the brain – evoked potentials – Placement of electrodes – Recording set up – Analysis of EEG.

UNIT – IV: MAGNETIC RESONANCE AND ULTRASONIC IMAGILG SYSTEMS
Principles of NMR Imaging system – Image reconstruction Techniques – Basic NMR components – Biological efforts of NMR Imaging – Advantages of NMR Imaging System – Diagnostic ultra Sound – Physics of ultrasonic waves – metical ultra sound – basic pulse – echo apparatus, A – Scan – echocardiograph(M mode).

UNIT – V: ADVANCED BIO MEDICAL SYSTEMS
Pacemakers – Need for Cardiac pacemaker – External Pace makes – Implantable Pace makers – recent development in Implantable Pacemakers – Pacing system Analyzer – Defibrillator – Pacer – Cardioverter – Physiotherapy and electro therapy equipment – High frequency heat therapy – short wave diathermy – microwave and ultrasonic therapy – pain relief through electrical simulation.

OUTCOMES:
Define basic medical terms and physical values that can be handled by medical instrumentation,

Describe methods and implementation of electrical and nonelectrical medical parameters diagnostic,

demonstrate measuring of basic medical parameters,

Calculate basic parameters of the equipment for using in electro diagnostic and electro therapy,

Apply safety standards and select disposal method and procedures for electrical diagnostic equipment.

Books for Study
1. R.S Khandpur, Handbook of Biomedical instrumentation, Tata McGraw Hill publishing company Limited. New Delhi,(2003). (Unit I,II,IV & V)
2. Lestlie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, Bio medical instrumentation and measurements, PHI, New Delhi.(Unit-III)

Book for Reference
1. M.Arumugam, Biomedical Instrumentation, Anuradha Agencies, Kumbakonam (2000).

Course Title
20220OEC M-Marketing

OBJECTIVES
- Understand Mobile Business strategies.
- To understand Mobile marketing tools and techniques.
- To know Mobile technologies.

UNIT I Introduction
Mobile Marketing Campaign, Fortune 500 and Mobile Marketing, consumers engagement with mobile, Terminologies.

UNIT II Businesses Vs mobile marketing
classic mistakes in mobile marketing, laying foundation for successful mobile marketing campaign, understanding technology behind mobile marketing – Android, iOS, Windows Phone.

UNIT III
Strategic thinking about Mobile marketing campaign, Mobile Marketing Tools – setting up mobile website for different firms, using SMS, MMS and apps to drive customers to business and other ways to attract customers.

UNIT IV Location Based Marketing
LBS, NFC, Bluetooth and LBA, 2D codes, Tablet, Other Mobile Applications, Business Firms connecting to customers using Mobile – case study, Mobile Marketing for B2B companies, Mobile E-commerce to Drive Revenue.

UNIT V Mobile Payments
Present and Future Mobile Technology, Mobile Application Development.

OUTCOMES
- Upon Completion of the course, the students should be able to:
- Analyze various mobile marketing strategies.
- Market Mobile based Applications.
- Apply various tools in mobile marketing.

REFERENCE BOOKS:
1. Go Mobile: Location Based Marketing, Apps, Mobile Optimized Ad Campaigns, 2D codes and other Mobile Strategies to Grow your Business, Jeanne Hopkins, Jamie Turner, John Wiley&Sons Inc., 2012.
2. M- Commerce, Paul Skeldon, Crimson Publishing, 2012.
3. M-Commerce Technologies, Services and Business Models, Norman Sadeh , Wiley 2002.
4. Mobile Commerce, Opportunities, Applications and Technologies of Wireless Business, Paul Mary, Tom Jell, Cambridge University Press, 2001.

Course Title
20214OEC Open Elective-Green Chemistry

Aim:
● To reduce the soil and water pollution in environment.

Objectives:
● To learn about the environmental status, public awareness in evolution, principles involved in green chemistry, bio-catalytic reactions, global warming and its control measures, availability of green analytical methods.

Outcomes:
● To understand the environmental status and evolution.
- · To know about the Pollution and its prevention measures.
- · To familiarize the green chemistry.
- · To learn about the bio-catalytic reactions.
- · To understand about the vitamins and antiobiotics.

Unit I - Introduction
Introduction-Current status of chemistry and the Environment-Evolution of the Environmental movement: Public awareness - Dilution is the solution to pollution-Pollution prevention.

Unit II - Principles
Green Chemistry – Definition – Principles of Green Chemistry - Why is this new area of Chemistry getting to much attention - Why should chemist pursue the Goals of Green Chemistry - The roots of innovation – Limitations.

Unit III - Bio Catalytic Reactions
Green Chemistry Using Bio Catalytic Reactions – Introduction - Fermentation and Bio transformations - Production of Bulk and fine chemicals by microbial fermentation Antibiotics – Vitamins - Bio catalyses synthesis of industrial chemicals by bacterial constructs - Future Tends.

Unit IV - Green House Effect
Green house effect and Global Warming – Introduction - How the green house effect is produced - Major sources of green house gases - Emissions of CO_2 - Impact of green house effect on global climate - Control and remedial measures of green house effect - Global warming a serious threat - Important points.

Unit V - Green Analytical Methods
Future trends in Green Chemistry - Green analytical methods, Redox reagents, Green catalysts; Green nano-synthesis, Green polymer chemistry, Exploring nature, Biomimetic, Proliferation of solvent-less reactions; Non-covalent derivatization, Biomass conversion, emission control

References:
1. Introduction to Green Chemistry – M.Rayan and M.Tinnes
2. New Trends in Green Chemistry – V.K.Ahluwalia and M.Kidwai

Course Title
20215OEC **Open Elective -**Herbal Medicine

Aim:
● Be able to advise and educate effectively to create a comprehensive wellness plan incorporating herbal, dietary and lifestyle recommendations integrating self-awareness and lessons of nature

Objective

● Possess knowledge of traditional herbal systems as well as an understanding of the principles and practices of modern Western herbalism
● Demonstrate the ability to critically analyze herbal research and contribute to the current body of herbal literature
● Know how to integrate knowledge of raw materials, formulation, and herbal pharmacy for product development purposes
● Know how to effectively educate individuals and groups about herbs
● Be able to demonstrate basic skills in herb identification, harvesting, and preparation
● Be able to address potential safety concerns including herb-drug interactions

Outcomes
● Accurately gather information regarding past and current health status while differentiating between phenomena and the client's interpretation of phenomena
● Synthesize the above information to create a comprehensive assessment of health inputs and processes
● Work with clients to develop individualized goals and a plan for health and wellness

Unit I

Tribal medicine – methods of disease diagnosis and treatment – Plants in folk religion – Aegle marmelos, Ficus benghalensis, Curcuma domestica, Cyanodon dactylon and Sesamum indicum.

Unit II

Traditional knowledge and utility of some medicinal plants in Tamilnadu – Solanum trilobatum, Cardiospermum halicacabum, Vitex negundo, Adathoda vasica, Azadirachta indica, Gloriosa superba, Eclipta alba, Aristolochia indica and Phyllanthus fraternus.

Unit III

Plants in day today life – Ocimum sanctum, Centella asiatica, Cassia auriculata, Aloe vera. Nutritive and medicinal value of some fruits (Guava, Sapota, Orange, Mango, Banana, Lemon, Pomegranate) and vegetables - Greens (Moringa, Solanum nigrum Cabbage).

Unit IV

Allergens – types – sources – active principles – Chemical nature – Cell modifiers – Lectins – mutagens, teratogens – Allergic reactions with known examples.

Unit V

Cardiovascular diseases – blood pressure – cardiac drugs of plant origins – alkaloids, anticoagulants – basic mechanism of action. Pulmonary / respiratory disorders – asthma – bronchitis – common cold – allergy – Remedy from plants.

References

1. Tribal medicine – D.C. Pal & S.K. Jain Naya Prakash, 206, Bidhan Sarani, Calcutta , 1998

2. Contribution to Indian ethnobotany – S.K. Jain, 3rd edition, Scientific publishers, B.No. 91, Jodhpur, India. 2001

3. A Manual of Ethnobotany – S.K.Jain, 2nd edition, 1995.

4. Kumar, N.C., An Introduction to Medical botany and Pharmacognosy. Emkay Publications, New Delhi. 1993.

5. Rao, A.P. Herbs that heal. Diamond Pocket Books (P) Ltd., New Delhi, 1999

COURSE TITLE
20261OEC FINANCIAL SERVICES

AIM

To analyze the various financial institutions and their services.

OBJECTIVES

I.   To gain knowledge on financial services.

II. To understand importance of various services including banking, insurance, mutual funds.

UNIT – I

Financial system-An Overview: Indian Financial System-Global Financial System-Financial Services Environment- Credit Rating –Factoring and Forfeiting –Leasing

UNIT – II

Financial Markets –An Overview: Definition-Role-Functions-Constituents-Financial Instruments-Capital Market instruments-Indian money and Capital Market-Global Financial Markets.

UNIT – III

Money Market –An Overview: Definition-Characterstistics-Objectives-Imporatance-Functions-Segment-Financial Institutions-Indian Money Market-Global Money Market

Unit – IV

Capital Market: Money Market-Characteristics-Functions-New financial Instruments-measures of Investor Protection-Indian Capital Market-Major Issues

Unit-V

Stock Exchange: History of Stock Exchange-Functions-Indian Stock Exchanges-Organization structure-Regulations of Stock Exchange –Recent Developments

OUTCOME

To introduces meaning and functions of Financial Intermediaries

To understand the role of merchant bank and its services

To provide information regarding management of mutual funds and Regulations

To understand the role and functions of financial services Marketing

To know the structure and types of debt Instruments

To realize Foreign Exchange Market

REFERENCE BOOKS

1. Gordon ,Natarajan – Financial Market and Services.
2. Dr. S. Gurusamy – Financial services and Market.
3. Kucchol S.C. – Financial Management
4. Pandey I.M. – Financial Management.

Course Title
20280OEC **Open Elective - Counselling and Psychology**

Aim:
- To acquaint with counselling and its process

Objectives:
- To learn the fundamental concepts of counselling.
- To know the nature of different determinates.
- To familiarize with the approaches of counselling

Out Come:
- Learn counselling and its process

UNIT I
Definition of Counselling
Counselling as a Solution to Human Problems
Counselling-Expectations & Goals

UNIT II
Personality Determinates, Intellectual Determinates, Emotional Determinates
Social Determinates

UNIT III
Approaches to Counselling
Counselling Process

UNIT IV
Psychological Testing
Diagnosis

UNIT V
Educational Counselling
Family Counselling

References Book:
1. Hanson, J.C. Stevic, R.R., Warner, R.W., Jr. Counselling Theory & Process (2nd Edition) Boston
2. Hurlock Elizabeth B.(2oo7), Human Development, New York, Grawhill Book Company
3. John W, Santrock (1999), Life Span Development, 7th Edition, New Delhi; Mcgrowhill Company
4.blum And Bolimsky, B. Counselling & Psychology; Bomboy; Asia Publishing House, 1961
5. Bordin, E.S. Psychology Of Counselling New York; Application Century Crafts, 1968
6. Lewis E. C., The Psychology Of Counselling New York Holt, Rinchart And Winston Inc. 1970

DEPARTMENT OF MATHEMATICS

M.Phil

SYLLABUS

(REGULATION 2020)

COURSE STRUCTURE

SEMESTER - I					
COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**C**
203_ _ _ 11 (Common Paper)	Research Methodology	2	2	0	2
203MAC12	Algebra and Analysis	2	2	0	2
203MAC13	Advanced Numerical Analysis	2	2	0	2
(Common Paper) CPE_RPE	Research and Publication Ethics	2	2	0	2
	Total	**08**	**08**	**00**	**08**
SEMESTER - II					
203MAC31	Project Work				02

M Phil- SYLLABUS

(For the candidates admitted from the academic year 2020-2021 onwards)

<u>PAPER – I Research Methodology</u>

(Common for all Subjects except Languages)

Unit – I:

Methods and Technique. An introduction – Defining the research problem – What is a research problem?, Selecting the problem, Necessity of defining the problem, Technique involved in defining the problem, An illustration and conclusion. Research design – Meaning of research design, Need for research design, Features of good design, Important concepts of relating to research design, different research designs, Basic principles of experimental design and conclusion.

Unit – II:

Assignment and Thesis at the tertiary level: Writing at the tertiary level – assignments and term papers, thesis and dissertations, conventions of writing-the question of style. Planning the assignment – A time schedule, consulting source materials, preparing a work bibliography, taking notes, the outlines and the first draft. Planning the thesis – selecting a topic, reviewing the literature, designing the study and the chapter outline. Scholarly writing – a case study

Unit – III:

Writing the thesis or assignment: General format – preliminaries, the text, the reference material, the abstract and final product Page and Chapter format – chapter divisions and sub-divisions, spacing, pagination, margins, paragraph indentation and sample pages Tables and Figures – use of tables and figures, placement of tables and figures, Numbering of tables, numbering of pages, numbering of figures, table and figure captions, format of tables, format of figures, preparation of figures, foot notes to tables and figures, very large table and figures, pagination and margin, spacing and alignment, abbreviations and special symbols and numbers. Referencing – Reference systems, Essential informations, spacing capitalization and underline, alphabetical and chronological order, edited works and sum special cases.

Unit – IV:

Computer packages and Internet: Word Basics – Creating and working with documents – working with text and tables – Using Mail Merge. Using Excel: Working with worksheets – creating chart – working with Formula and Functions. Using Power Point:

Working with power point – User Interfaces – Using templates and wizard (slide Presentation) - - Creating chart and Tables. Internet and World Wide Web (WWW) – Electronic Main (E-mail) – Intranet and Extranet.

Unit – V:

Descriptive statistics – tabulation, graphical representation – bar diagram – and pie diagrams – various measures of variance, measures of central tendency and normal distribution. Differential statistics "t" test, Chi – square test, "F" test (ANOVA) co -variance (ANCOVA) correlation and multiple regression analysis - Introduction to SPSS.

References:

Thesis and Assignment writing by Janarthan Anderson and others – Wiley – Eastern Ltd, 1970. Part I Sections 1,2,3,4. Part II Sections 5,6,9,10.

Research Methodology by C.R. Kothari, Chapter 1,2,3.

Microsoft Office 2003 – Edward C. Willet. First Edition 2004, Wiley Publications, USA , (Chapters 2,3,4,5,6,12,14,15,26,28,29)

Department of Mathematics
M.Phil Mathematics
Paper – II
203MAC12-ALGEBRA AND ANALYSIS

Course Outcomes:
1. To empower scholars with knowledge of pure mathematics.
2. To introduce the algebraic structure through modules.
3. To acquaint with advance concepts in algebra
4. To understand Borel measures.
5. To enhance problem solving skills in algebra.
6. To understand the techniques in algebra.

Unit-I: Modules

Modules homomorphism and exact sequence–Projective and injective–
Modules homomorphism and duality. (Chapter 4.1, 4.3, 4.4, Text Book-1)

Unit-II: Commutative Rings and Modules

Chain conditions – Prime and primary ideals – Primary decomposition –
Noetherian Rings and modules (Chapter 8.1, 8.2, 8.3, 8.4, Text Book – 1)

Unit III: Positive Borel Measures

Vector spaces – Topological preliminaries – Urysohn's Lemma–The Riesz
representation theorem. (Chapter 2, Text Book -2, Sections 2.1-2.14).

Unit-IV: Problems in Algebra

Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayley's theorem, class equations, Sylow theorems. Rings, ideals, prime and maximal ideals, quotient rings, Field extensions, Galois theory. Algebra of matrices, rank and determinant of matrices, linear equations. Eigenvalues and eigenvectors, Cayley-Hamilton theorem. Matrix representation of linear transformations. Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms

Unit V: Banach Algebras

Banach algebras – Spectrum of an element in Banach algebra – Spectral radius formula – Quotient algebras–applications.
(Chapter 18, Text Book-2)

Books for Study:
1. Algebra by Thomas W Hungerford, Springer Verlog Indian reprint
2. Real and Complex Analysis byWalter Rudin, Tata McGraw Hill (II Edn) 1996.

Reference Books:
1. Abstract Algebra by David.S.Dummit and Richard.M.Foote, 3rd Edition,Wiley Student Edition
2. Linear Algebra by Stephen H. Freidberg, Arnold J. Insel, Lawrence E.Spence, Fourth Edition, Pearson

Paper –III

M.Phil Mathematics

203MAC13-ADVANCED NUMERICAL ANALYSIS
Course Outcomes
1. Basic Knowledge of numerical methods
2. Approximation methods.
3. Linear and nonlinear approximation
4. Understanding polynomial equations
5. Techniques in numerical analysis
6. Initial and boundary value problems.

Unit-I: Transcental and Polynomial Equations -Iteration method based on
second degree   equation – Rate of convergence –iterative methods –
Methods for   finding complex roots – iterative methods:-Birge-Vieta method,
Bairtow's   method, Gracffe's root squaring   method.

Unit-II:System of Algebraic Linear Equations-Direct methods –

Gauss Jotdan Elimination   Method – Triangularization-method –
Cholesky method – Partition method. Error Analysis – iteration
methods : Jacobi iteration method – Gauss - seidal iteration method – SOR-method,
Jacobi's method for symmetric matrices – power method – Inverse-power method.

Unit-III: Interpolation and Approximation-Hermite interpolation –
Piecewise and spline   interpolation –Approximation– Least square Approximation.

Unit-IV: Differentiation And Integration-Numerical differentiation – Numerical Integration –
Methods based   on   interpolation.

Unit-V: Ordinary Differential Equations-Multi – step method – predictor – Corrector method –
Boundary   value-problem – initial value methods – shooting method –
Finite Difference method.

Text Book
M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for scientific and Engineering
Computation, III Edn, Wiley Eastern Ltd., 1993.
Unit I - Chapter 2 – 2.4 to 2.8
Unit II - Chapter 3 – 3.2 to 3.5
Unit III - Chapter 4 – 4.4 – 4.6, 4.8 to 4.9
Unit IV - Chapter 2 – 2.4 to 2.8
Unit V - Chapter 6 – 6.4, 6.5, 6.8, 6.9, 6.10

References:

1. Kendall E. Atkinson, An introduction to Numerical Analysis, II Edn., John Wiley &
Sons, 1988.
2. M.K. Jain, Numerical Solution of Differential Equations, II Edn., New Age International Pvt.
Ltd., 1983.
3. Samuel. D. Conte, Carl, De boor, Elementary Numerical Analysis,Mc Graw-Hill International
Edn.,1983.

RESEARCH AND PUBLICATION ETHICS

Course Code	Course Title	L	T	P	C
CPE_RPE	**Research and publication ethics**				2

THEORY

Unit I: PHILOSOPHY AND ETHICS (3 hours)

1. Introduction to philosophy, definition, nature and scope, concept, braches.
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions.

Unit II: SCIENTIFIC CONDUCT (5 hours)

1. Ethics with respect to science and research.
2. Intellectual honesty and research integrity.
3. Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing.
5. Selective reporting and misrepresentation of data.

Unit III :   PUBLICATION ETHICS (7 hours)

1. Publication ethics: definition, introduction and importance.
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest.
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types.
5. Violation of publication ethics, authorship and contributorship.
6. Identification of publication misconduct, complaints and appeals.
7. Predatory publishers and journals.

PRACTICE

Unit IV: OPEN ACCESS PUBLISHING (4 hours.)

1. Open access publications and initiatives.

2. SHERPA/RoMEO online resourse to check publisher copyright & self-archiving policies.

3. Software tool to ideitify predatory publications developed by SPPU.

4. Journal finder / journal suggestion tools viz, JANE, Elsevier Journal Folder, Springer Journal Suggester, etc.

UNIT V : PUBLICATION MISCONDUCT (4 hours)

A. Group Discussions (2 hours)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest.
3. Complaints and appeals: examples and fraud from India and abroad.

B. Software tools (2 hours)

Use of plagiarism software like Turnitin, Urkund and other open source software tools.

UNIT VI: DATABASES AND RESEARCH METRICS (7 hours)

A. Databases (4 hours)

1. Indexing databases.
2. Citation database: Web of Science, Scopus etc.

B. Research Metrices (3 hours)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP,Cite Score.
   Metrices: h-index. g index, i10 index, altmetrics.