PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)
Declared as DEEMED-TO-BE-UNIVERSITY
U/s 3 of UGC Act, 1956
Vallam, Thanjavur-613403

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

COURSE STRUCTURE

Credit Distribution for UG Programme in Mathematics

B.Sc.,

MATHEMATICS

Syllabus

FROM THE ACADMIC YEAR

2023-2024

PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)
Declared as DEEMED-TO-BE-UNIVERSITY
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DEPARTMENT OF MATHEMATICS
B.Sc- MATHEMATICS- 2023-REGULATION

COURSE STRUCTURE

SEMESTER – I

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

SEMESTER – II

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

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

SEMESTER – III

Course Code	Course Title	L	T	P	C
THEORY					
23110AEC31/ 23132AEC31/ 23111AEC31/ 23135AEC31	Tamil – III/Hindi-III/Advanced English-III/ French – III	3	1	0	3
23111AEC32	English-III	3	1	0	3
23112AEC33	Vector Calculus and Applications	4	1	0	4
23112AEC34	Differential Equations and Applications	4	1	0	4
23112AEC36	Actuarial Mathematics	4	0	0	4
SKILL ENHANCEMENT COURSE					
23112SEC37	Entrepreneurial Based on Mathematics	3	0	0	1
23112SEC38	Statistics with R Programming	3	0	0	2
ABILITY ENHANCEMENT COMPULSORY COURSE					
23112RMC39	Research Methodology	2	0	0	2
AUDIT COURSE					
231ACLSOAN	Office Automation	0	0	0	1
	Total	**26**	**04**	**0**	**24**

SEMESTER – IV

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

ABILITY ENHANCEMENT COMPULSORY COURSE					
23112BRC48	Participation in Bounded Research	2	0	0	2
231AECCEVS	Environmental Studies	2	**0**		2
AUDIT COURSE					
231LSCLS	Leadership and Management Skills	0	**0**	**0**	1
	Total	**27**	**03**	**-**	**27**

SEMESTER – V

Course Code	Course Title	L	T	P	C
23112AEC51	Abstract Algebra	4	1	0	4
23112AEC52	Real Analysis	4	1	0	4
23112AEC53	Mathematical Modelling	4	1	0	4
23112AEC54	Mechanics	4	1	0	3
23112DSC55_	Discipline Specific Elective 1	4	0	0	3
23112DSC56_	Discipline Specific Elective 2	4	0	0	3
23112SEC57	Internship / Industrial Training	0	0	0	2
AUDIT COURSE					
231ACLSPSL	Professional Skills	0	**0**	**0**	1
231AECCVED	Value Education -1	2	0	0	2
	Total	**26**	**04**	**0**	**26**

SEMESTER – VI

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

DISCIPLINE SPECIFIC ELECTIVES (DSC)

SEMESTER	SUBJECT CODE	SUBJECT NAME
V	23112DSC55A	Fuzzy Sets and its applications
	23112DSC55B	Number Theory

	23112DSC56A 23112DSC56B	Stochastic Process Linear Algebra
VI	23112DSC63A 23112DSC63B	Astronomy Elements of Space

AUDIT COURSE CREDIT DISTRIBUTION

Sem	Audit
I	**1**
II	**1**
III	**1**
IV	**1**
V	**3**
VI	**2**
Total	**9**

7 7.1 Suggestive Topics in Core Component

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

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

Group I:

A. Allied Physics

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

Group II –Suggestive Elective Courses (Discipline-centric)

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

Q. Computational Geometry and more

7.3 Suggestive Topics in Skill Enhancement Courses (SEC)

Group III - Skill Enhancement Courses (SEC)

A. Statistics with R / Excel / SPSS

B. LaTeX

C. E- Commerce & Tally

D. Computing skills (Office Automation)

E. Android App development

F. Web Designing

G. Professional Competency Skill

H. Computational Mathematics

I. Data Analysis using latest package

(R / Matlab / Maxima/ Torus / GeoGebra /GIMP) and more

7.4 Suggestive Topic in Skill Enhancement Courses (SEC)

Group IV - Skill Enhancement Courses (SEC)

a. Indian knowledge System

b. Disaster Management

Credit Distribution

Credit Distribution

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

HOD **DEAN ACADEMIC AFFAIRS** **DEAN**

இக்கால இலக்கியம்

23110AEC 11

முதல் பருவம்

பாடநோக்கம் :

1.இக்கால தமிழ் இலக்கிய வகைகளின் மாதிரிகளைக் கற்பித்து அவற்றில் ஈடுபாட்டையும், கலைக்கும் திறனையும் ஏற்படுத்துதல்.

பயன்கள் :

- மொழி ஆளுமைத் திறன் பெறுதல்.
- சமூக சிந்தனையை வளர்த்துக் கொள்ளுதல்.
- படைப்பாளர்களாக உருவாகும் திறனைப் பெறுதல்.

அலகு - **1** மரபுக்கவிதை

1.பாரதியார்--விடுதலை, வந்தே மாதரம் ,சுதந்திர

2.பாரதிதாசன் - அழகின் சிரிப்பு ,தமிழுக்கு வீழ்ச்சி இல்லை

3.கவிமணி தேசியவிநாயகம் பிள்ளை -- தொழிலாளியின் முறையீடு

4.நாமக்கல் கவிஞர் -- தருணம் இதுவே ,

5.கண்ணதாசன்-- அனுபவம்

அலகு - **2** புதுக்கவிதைகள்

1.அப்துல் ரகுமான் -வெற்றி

2.அறிவுமதி-நட்புக் காலம்

3.வைரமுத்து- குரல், சிற்பி - ஒடு ஒடு சங்கிலி

4.மு.மேத்தா- வெளிச்சம் வெளியே இல்லை

அலகு - **3** நாட்டுப்புறவியல்

1.பழமொழிகள்

2. விடுகதைகள்

3. தொழில் பாடல்

அலகு- 4 சிறுகதை

1. தலைப்பு- மா. ஜெயிராஜன்

2. ஆசிரியர் - க. தமிழ்செல்வி

3.நீதி– பூமணி

அலகு- 5 இலக்கியவரலாறு

கவிதை, சிறுகதை நாட்டுப்புறப்பாடல்

பொதுக்கட்டுரை – மனித நேயம், வாழ்வியல் அறங்கள்

மனப்பாடப் பகுதி : பாரதியார் கவிதை- வேண்டும்,பாரதிதாசன் கவிதை-செந்தமிழ்

பார்வை நூல்கள் :

1. பாரதியார் கவிதைகள் - மணிவாசகர் பதிப்பகம் சென்னை

2.பாரதிதாசன் கவிதைகள் - பாரி நிலையம், சென்னை

3. தமிழ் இலக்கிய வரலாறு - மு வரதராசன் சாகித்திய அகாதெமி,சென்னை

4. நாட்டுப்புறவியல் - முனைவர். ஆ.கு. ராமசாமி ,மணிவாசகர் பதிப்பகம், சென்னை

5. தமிழ் சிறுகதையும் தோற்றம் வளர்ச்சி - தமிழ் புத்தக நிலையம், சென்னை

இணையதளம் -www.tamilvu.org

www.neelulagam.com

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

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC12	**Language**	3	1	-	-	3	4	25	75	100

Learning Objectives	
LO1	To enable learners to acquire the linguistic competence necessarily required in various life situations.
LO2	To help them understand the written text and able to use skimming, scanning skills
LO3	To assist them in creative thinking abilities
LO4	To enable them become better readers and writers
LO5	To assist them in developing correct reading habits, silently, extensively and intensively
UNIT	**DETAILS**
I	**Poetry** 1.1 A Patch of Land - SubramaniaBharati 1.3 A Nation's Strength – Ralph Waldo Emerson 1.4 Love Cycle - Chinua Achebe
II	**Prose** 2.1 JRD - Harish Bhat 2.2 Us and Them - David SedarisFrom Dress Your Family in Corduroy andDenim
III	**Short Stories** 3.1 The Faltering Pendulum- Bhabani Bhattacharya 3.2 How I Taught my Grandmother to Read- Sudha Murthy 3.3 The Gold Frame- R.K. Laxman
IV	**Language Competency** 4.1 Vocabulary : Synonyms, Antonyms, Word Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction
V	**English for Workplace** 5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions

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

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

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

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

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

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC13	Core	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Basic ideas on the Theory of Equations, Matrices and Number Theory.
LO2	Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems
LO3	To enable learners to find Eigen values and Eigen Vectors-Similar matrices and Finding powers of square matrix, Inverse of a square matrix
LO4	Able to find Expansions of sinnθ, cosnθ in powers of sinθ, cosθ - Expansion of tannθ in terms of tan θ
LO5	Relation between circular and hyperbolic functions Inverse hyperbolic functions
UNIT	**DETAILS**
I	Reciprocal Equations-Standard form–Increasing or decreasing the roots of a given equation- Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems.
II	Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems.
III	Characteristic equation – Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems.
IV	Expansions of sinnθ, cosnθ in powers of sinθ, cosθ - Expansion of tannθ in terms of tan θ, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta \sin^n\theta$ –Expansions of $\tan(\theta_1+\theta_2+,\ldots,+\theta_n)$-Expansions of sin θ, cos θ and tan θ in terms of θ - related problems.
V	Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems.

Course Outcomes		
CO1	Classify and Solve reciprocal equations	PO1
CO2	Find the sum of binomial, exponential and logarithmic series	PO1,PO2
CO3	Find Eigen values, Eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix	PO4,PO6
CO4	Expand the powers and multiples of trigonometric functions in terms of sine and cosine	PO4,PO5, PO6
CO5	Determine relationship between circular and hyperbolic functions and the summation of trigonometric series	PO3,PO8

Text Books (Latest Editions)	
1	MODERN ALGEBRA by S.Arumugam and S.T. Issac published on 2015
2	Algebra and Trigonometry, sixth edition by Michel Sullivan published on 2001
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Algebra and Trigonometry, seventh edition by Sullivan published on 2004
2	Algebra and Trignometry, fourth edition by James Stewart, LotharRedlin, Saleem Watson
Web Resources	
1	*https://assets.openstax.org/oscms-prodcms/media/documents/Algebra-and-Trigonometry-2e-WEB.pdf?_gl=1*tl8aq*_ga*MTcyNjE0NzAwMy4xNjg5ODQ3ODEz*_ga_T746F8B0QC*MTY4OTg0NzgxOS4xLjEuMTY4OTg0Nzg3NC41LjAuMA..*

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

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

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC14	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	The basic skills of differentiation, successive differentiation, and their applications.
LO2	Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems
LO3	To Understand and to Find Homogeneous functions, Partial derivatives of a function of two variables and Lagrange's method of undetermined multipliers.
LO4	To able to find Envelope of family of curves which are quadratic in the parameter.
LO5	To understand the Definition of Curvature, Circle, Radius and Centre of Curvature and The Radius of Curvature in Polar Co-ordinates

UNIT	DETAILS
I	**Successive Differentiation**: Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product – Feynman's method of differentiation
II	**Partial Differentiation**: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions.
III	**Partial Differentiation (Continued)**: Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers.
IV	**Envelope:** Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.
V	**Curvature:** Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutes – Radius of Curvature in Polar Co-ordinates

Course Outcomes		
CO1	Find the nth derivative, form equations involving derivatives and apply Leibnitz formula	PO1
CO2	Find the partial derivative and total derivative coefficient	PO1,PO2
CO3	Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers	PO4,PO6
CO4	Find the envelope of a given family of curves	PO4,PO5, PO6
CO5	Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates	PO3,PO8

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

Mapping with Programme Outcomes

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

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

FIRST YEAR -SEMESTER I
Part-III
Core Paper
Numerical Methods with Applications

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

Learning Objectives	
LO1	This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology
UNIT	**DETAILS**
I	Solution of Equations and Eigen value Problems: Solution of algebraic and transcendental equations, Fixed point iteration method, Newton Raphson method, Solution of linear system of equations.
II	Gauss elimination method, Pivoting, Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method.
III	Interpolation and Approximation: Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation .
IV	Interpolation with equal intervals - Newton's forward and backward difference formulae.
V	Numerical Differentiation and Integration: Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule

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

Text Books (Latest Editions)	
1	Grewal. B.S. and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 9th Edition, New Delhi
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi.
2	Chapra. S.C. and Canale. R. P., "Numerical Methods for Engineers, Tata McGraw

	Hill, New Delhi.
Web Resources	
	https://www.azdocuments.in/2021/11/numerical-methods-and-applications.html

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRST YEAR -SEMESTER I
Part-III
Core Paper
Bio Mathematics

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23113GEC16	CORE	-	1	0	-	2	3	25	75	100

Learning Objectives	
LO1	
Unit	**DETAILS**
Minimum of Eight Experiments from the list:	
1.	Population Dynamics: The Malthusian growth ; The Logistic equation; A model of species competition; The Lotka-Volterra predator-prey model; Age-structured Populations : Fibonacci's rabbits; The golden ratio Φ; The Fibonacci numbers in a sunflower; Rabbits are an age-structured population; Discrete age-structured populations; Continuous age-structured populations; The brood size of a hermaphroditic worm.
2.	Stochastic Population Growth : A stochastic model of population growth; Asymptotics of large initial populations; Derivation of the deterministic model; Derivation of the normal probability distribution; Simulation of population growth.
3.	Infectious Disease Modeling: The SI model; The SIS model; The SIR epidemic disease model; Vaccination ; The SIR endemic disease model ; Evolution of virulence.
4.	Population Genetics: Haploid genetics; Spread of a favored allele; Mutation-selection balance ; Diploid genetics; Sexual reproduction; Spread of a favored allele; Mutation-selection balance; Heterosis; Frequency-dependent selection; Linkage equilibrium; Random genetic drift.
5.	Biochemical Reactions: The law of mass action; Enzyme kinetics; Competitive inhibition; Allosteric inhibition; Cooperativity. Sequence Alignment: DNA ; Brute force alignment; Dynamic programming; Gaps; Local alignments; Software.

Course Outcomes		
CO1	Understand and define the laws involved in gravitation and elasticity.	PO1
CO2	Develop the knowledge about heat and thermodynamics, sound and spectroscopy.	PO1,PO2
CO3	Understand the concept of properties of matter and to recognize their applications in various real problems.	PO4,PO6
CO4	After studying this course, The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from Industry, management and other engineering fields.	PO4,PO5, PO6
CO5	Understand the magnetic properties	PO3,PO 8

Text Books (Latest Editions)	
1	Leah Edelstein-Keshet, “Mathematical Models in Biology,” SIAM Press, ISBN-13: 978-0-898715-54-5
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	https://new.kuk.ac.in/lms/syllabus?did=Mjc=&sid=MTQ4MA==&pn=TS5TYy4gKE1hdGhlbWF0aWNzKQ==
Web Resources	
	https://kuk.ac.in/wp-content/uploads/notes/Notes_5090_MMATH21-413-Unit%201.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRST YEAR -SEMESTER I
Part-IV
Skill Enhancement Course
BRIDGE MATHEMATICS
Foundation course FC

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC17	SEC	2	-	-	-	2	2	25	75	100

Learning Objectives	
L O1	To bridge the gap and facilitate transition from higher secondary to tertiary education
L O2	To Find confidence among stakeholders and inculcate interest for Mathematics

UNIT	DETAILS
I	Algebra: Binomial theorem, General term, middle term, problems based on these concepts
II	Sequences and series (Progressions). Fundamental principle of counting. Factorial n.
III	Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.
IV	Trigonometry: Introduction to trigonometric ratios, proof of sin(A+B), cos(A+B), tan(A+B) formulae, multiple and sub multiple angles, sin(2A), cos(2A), tan(2A) etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule
V	Calculus: Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method

Course Outcomes		
CO1	Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems	PO1
CO2	Find the various sequences and series and solve the problems related to them. Explain the principle of counting	PO1,PO2
CO3	Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations	PO4,PO6
CO4	Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.	PO4,PO5, PO6
CO5	Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function	PO3,PO 8

Text Books (Latest Editions)	
1	Tamil Nadu State Board 11th mathematics book
2	Tamil Nadu State Board 12th mathematics book

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

1	CBSE Board 11th Mathematics book
2	CBSE Board 12th Mathematics book
Web Resources	
	https://drive.google.com/file/d/1G4tb4PZTvCgruLhW93q5hNsEmwxTN4lh/view
	https://drive.google.com/file/d/1H75A2RThiInsh9M29BGamCqhgyqkduET/view

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRST YEAR -SEMESTER I
Part-IV
Ability Enhancement Compulsory Course
INDIAN CONSTITUTION

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCINC	AECC	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	To make the students understand about the democratic rule and parliamentarian administration
LO2	To appreciate the salient features of the Indian constitution
LO3	To know the fundamental rights and constitutional remedies
LO4	To make familiar with powers and positions of the union executive, union parliament and the Supreme Court
LO5	To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy

UNIT	DETAILS
I	**The making of Indian constitution:** The constitution assembly organization - character - work salient features of the constitution- written and detailed constitution -socialism -secularism- democracy and republic.
II	**Fundamental rights and fundamental duties of the citizens:** Right of equality -right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies - fundamental duties.
III	**Directive principles of state policy:** Socialistic principles-Gandhi an principles-liberal and general principles - differences between fundamental rights and directive principles
IV	**The union executive, union parliament and Supreme Court :** Powers and positions of the president -qualification - method of election of president and vice president -prime minister -Rajya Sabah -Lok Sabah .the supreme court -high court -functions and position of supreme court and high court
V	**State council -election system and parliamentary democracy in India:** State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.

Course Outcomes		
CO1	Students can know about constitution our fundamental rights and duties	PO1
CO2	Students can get knowledge of the Indian administrative systems.	PO1,PO2
CO3	Students will be able to understand the Nature of Indian Politics	PO4,PO6
CO4	Students will be able to understand the Indian constitution and Fundamental rights and Duties.	PO4,PO5, PO6
CO5	Integrate knowledge of the diversity of cultures and peoples.	PO3,PO8

Text Books (Latest Editions)	
1	India's Constitution by M.V.Pylee., 16thedt.,S.Chand& Company Ltd, Ram Nagar, New Delhi-110055.

2	Introduction to the Constitution of India by Durga Das Basu · 2015,.LexisNexis publication,SBN:9789351434467, 935143446X.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Palekar.s.a. Indian constitution government and politics, ABD publications, India
2	Aiyer, alladikrishnaswami, Constitution and fundamental rights 1955.
3	Markandan. K.c.directive Principles in the Indian constitution 1966.
Web Resources	
1	*https://www.google.co.in/books/edition/India_s_Constitution_16th_Edition/yjJlDwAAQBAJ?hl=en&gbpv=1&dq=indian+constitution+pdf&printsec=frontcover*
2.	

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRST YEAR -SEMESTER I
Part-IV
Audit Course
UNIVERSAL HUMAN VALUES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCUHV	AC	-	-	-	-	1	-	25	75	100

Learning Objectives	
LO1	The present course deals with meaning, purpose, and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realize one's potentials
UNIT	**DETAILS**
I	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
II	Introduction: What is truth? Universal truth, truth as value, truth as fact(veracity, Sincerity, honesty among others) Individuals who are remembered in history for practicing this value Narratives and anecdotes from history, literature including local

	folklore Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it? Learners' individual and/or group experience(s) Simulated situations Case studies
III	Introduction: What is non violence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non-violence Ahimsa as non-violence and non-killing Individuals and 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
IV	Introduction: What is righteousness? Righteousness and *dharma*, Righteousness and Propriety Individuals who are remembered in history for practicing righteousness Narratives and anecdotes from history, literature including local folklore

	Practicing righteousness: What will 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
V	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
VI	Introduction: What is service? Forms of service, for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster. Individuals who are remembered in history for practicing this value. Narratives and anecdotes dealing with instances of service from history, literature including local folklore Practicing service: What will 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 studie
VII	Introduction: What is renunciation? Renunciation and sacrifice. Self-restrain and Ways of overcoming greed. Renunciation with action as true renunciation Individuals who are remembered in history for practicing this value. Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation. Practicing renunciation and sacrifice: What will learners learn/gain if they practice Renunciation and sacrifice? What will learners lose if they don't practice it? Sharing learners' individual and/or group experience(s) Simulated situations Casestudies

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

பக்தி இலக்கியம்

23110AEC 21

இரண்டாம் பருவம்

நோக்கம் :

- காலந்தோறும் பக்தி இலக்கியம் வளர்ந்துள்ள தன்மையைக் கற்பித்தல்.
- நாயன்மார்கள், ஆழ்வார்களின் பக்தித் திறனை அறிய செய்தல்.

பயன்கள் :

- நாயன்மார்கள் பக்தித் திறனை அறிதல்.
- ஆழ்வார்களின் பக்தி நெறியை உணர்தல்.
- பக்தி இலக்கியம் காலம் தோறும் வளர்ந்ததை அறிதல்.
- பாடல்களில் இசை இன்பம், சுவை நயம் அறிதல்.

அலகு- 1 பன்னிரு திருமுறைகள்

1.திருஞானசம்பந்தர்– திருத்தில்லைப் பதிகம்

2.திருநாவுக்கரசர் - திருநீற்றுப் பதிகம்

3.சுந்தரர் - திருவெண்ணைநல்லூர்

4.திருமூலர்- திருமந்திரம்(இளமை நிலையாமை)

அலகு- 2 பன்னிரு ஆழ்வார்கள்

1.ஆண்டாள் - திருப்பாவை

2.பெரியாழ்வார்- மூன்றாம் திருமுறை(பத்து பாடல்கள்)

3.மதுரகவியாழ்வார் - கண்ணிநுண் சிறுதாம்பு

அலகு- 3 சிற்றிலக்கியங்கள்

1.மீனாட்சியம்மை முத்துக்குமாரசாமி பிள்ளைத்தமிழ் – செங்கீரை பருவம், அம்புலி பருவம்

நந்திக்கலம்பகம்

குற்றால குறவஞ்சி- குறத்தி நகர்வளம் கூறுதல்

கடைதிறப்புப் பாடல்கள்

அலகு- 4 புதினம்

1.நா. பார்த்தசாரதியின்- குறிஞ்சி மலர்

சீதை பதிப்பகம் சென்னை.

அலகு-5 தமிழ் இலக்கிய வரலாறு

1. பக்தி இலக்கியங்கள்

2. சைவமும் தமிழும்

3.வைணவ சமயம் போற்றி வளர்த்த தமிழ்

4. சிற்றிலக்கியங்கள்

5. நாவல் இலக்கியம்

பார்வை நூல்கள் :

1. தேவாரம் - மணிவாசகர் பதிப்பகம் சென்னை
2. நாலாயிர திவ்யபிரபந்தம் - வர்த்தமான பதிப்பகம் சென்னை
3. தமிழ் இலக்கிய வரலாறு - முனைவர் ச. சுபாஷ் சந்திர போஸ், இலக் வெளியீடு தஞ்சாவூர்
4. தமிழ் நாவல் இலக்கியம் -கா. கைலாசபதி- தமிழ் புத்தக நிலையம், சென்னை

இணையதளம் -www.tamilvu.org , www.noolulagam.com

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

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC22	LANGUAGE	3	1	-	-	3	4	25	75	100

Learning Objectives	
LO1	To introduce learners to the essential skills of communication in English
LO2	To enable them use these skills effectively in academic and non-academic contexts
LO3	To help them identify and eliminate common mistakes in writing and speaking
LO4	To enable them use various business communication strategies and to use advanced vocabulary
LO5	To familiarize them in writing descriptive essays and respond to arguments orally and in writing

UNIT	**DETAILS**
I	**Poetry** 1.1Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3On Killing a Tree -Gieve Patel
II	**Prose** 2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please - ShashiTharoor 2.3 The Spoon-fed Age- W.R. Inge
III	**Fiction** Alchemist - Paulo Coelho
IV	**Language Competency** 4.1 Homonyms, Homophones, HomographsPortmanteau words 4.2 Subject Verb Agreement
V	**English in the Workplace** 5.1 Reading for General and Specific information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes

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

Text Books (Latest Editions)	
1	The Alchemist - Paulo Coelho Harper - 2005
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2	Descriptive English. SP Bakshi, Richa Sharma · 2019, Arihant Publications (India) Ltd.
3	The Reading Book: A Complete Guide to Teaching Reading. Sheena Cameron, Louise Dempsey, S & L. Publishing, 2019.
4	Skimming and Scanning Techniques, Barbara Sherman, Liberty University Press, 2014
5	Brilliant Speed Reading: Whatever you need to read, however ...Phil Chambers, Pearson, 2013.
6	The Archer, Paulo Coelho. Penguin Viking, 2020.
Web Resources	
1	Very Indian poem by Nissim Ezekiel http://econtent.in/pacc.in/admin/contents/40_%20_2020103001102714.pdf
2	Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise
3	The Flower by Tennyson: https://www.poemhunter.com/poem/the-flower-2/
4	On Killing a tree by Gieve Patel: https://www.poemhunter.com/poem/on-killing-a-tree/
5	If you are wrong, admit it: https://www.tbr.fun/if-youre-wrong-admit-it/
6	Kindly Adjust please - ShashiTharoor https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3IhtdXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKgiNKKwdkeSg3qWp-U/
7	The Spoon Fed Age: https://www.nrkacademy.com/2016/04/spoon-feeding-by-wringe

	.html
8	The Alchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRST YEAR -SEMESTER II
Part-III
Core Paper
ANALYTICAL GEOMETRY (Two & Three Dimensions)

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC23	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes
LO2	To present mathematical arguments about geometric relationships.
LO3	To solve real world problems on geometry and its applications
LO4	Able to solve the Equation of a sphere, general equation, section of a sphere by a plane and equation of the circle
LO5	Understand Equation of a sphere-general equation-section of a sphere by a plane and the Equation of the circle and tangent plane
UNIT	**DETAILS**
I	Pole, Polar - conjugate points and conjugate lines – diameters – conjugate diameters of an ellipse - semi diameters- conjugate diameters of hyperbola
II	Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola
III	System of Planes-Length of the perpendicular–Orthogonal projection.
IV	Representation of line–angle between a line and a plane – co – planar lines– shortest distance between two skew lines –length of the perpendicular– intersection of three planes.
V	Equation of a sphere-general equation-section of a sphere by a plane-equation of the circle- tangent plane- angle of intersection of two spheres-condition for the orthogonality- radical plane

Course Outcomes		
CO1	In Analytical Geometry, An algebraic symbolism and methods are used to represent and solve problems in geometry.	PO1
CO2	Learn about The three common seven-coordinate geometries are pentagonal bipyramidal, monocapped octahedral, and monocappedtrigonal prismatic.	PO1,PO2
CO3	Understand The different types of coordinate systems in use are Number Line, Cartesian, Polar, Homogeneous, Curvilinear, Log-Polar, Verycentric, and Trilinear coordinate systems.	PO4,PO6
CO4	Learning about Coordinate Plane,Cartesian Coordinates, Polar Coordinates, Equation of a Straight Line and Conic Sections.	PO4,PO5, PO6
CO5	to learn the properties of these figures. Here we shall try to know about the coordinate plane and the coordinates of a point, to gain an initial understanding of Analytical geometry.	PO3,PO8

Text Books (Latest Editions)	
1	Analytical Geometry 2D and 3D by P.R.Vittal published by Dorling Kindersley (india) pvt.ltd,South Asia , 2013
2	The Analytical Geometry Of The Conic SectionsBy Edward Harrison Askwith ·2018
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.
2	Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961
3	Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010.
4	William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006
5	John F. Randelph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969
6	Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962.
Web Resources	
	https://archive.org/details/analygeomspace00snydrich/page/n9/mode/2up

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

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

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC24	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals
LO2	Knowledge about Beta and Gamma functions and their applications
LO3	Skills to Determine Fourier series expansions
LO4	Able to understand Beta and Gamma functionsproperties of Beta and Gamma functions, relation between Beta and Gamma functions and its Applications.
LO5	Knowledge about Geometric and Physical Applications of Integral calculus.
UNIT	**DETAILS**
I	Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula, Feyman's technique of integration
II	Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates - Change of order of integration
III	Triple integrals –applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces–change of variables – Jacobian
IV	Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions - Applications.
V	Geometric and Physical Applications of Integral calculus.

Course Outcomes		
CO1	Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae	PO1
CO2	Evaluate double and triple integrals and problems using change of order of integration	PO1,PO2
CO3	Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution	PO4,PO6
CO4	Explain beta and gamma functions and to use them in solving problems of integration	PO4,PO5, PO6
CO5	Explain Geometric and Physical applications of integral calculus	PO3,PO8

Text Books (Latest Editions)	
1	Integral Calculas by A.K.Sharma published by Discovery Publishing House, NE Delhi,2005
2	Differential And Integral Calculas by Richard Courant in 1937 published by Wiley Interscience
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Introduction to Integral Calculas by Ulrich L.Rohde, G.C. Jain, Ajay K. Paddar and A.K.Gosh in 2010
Web Resources	
	https://www.infobooks.org/pdfview/11236-clp-2-integral-calculus-joel-feldman-andrew-rechnitzer-elyse-yeager/

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRST YEAR -SEMESTER II
Part-III
Core Paper
Calculus of Finite Differences

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23114AEC25	CORE	3	1	-	-	4	4	25	75	100

Learning Objectives	
LO1	To enable the students to - Know and understand
LO2	Numerical Methods . - Distinguish between Numerical differences , integration and classical difference & Integration
LO3	Apply the knowledge Extensively in Engineering and Statistics.
UNIT	**DETAILS**
I	Finite Differences – Introduction , Forward and Backward Differences, Differences Formulae, Fundamental theorem of the differential calculus.
II	The Difference table. Effects of an error in a tabular value – To express any value of the function in terms of leading term and the leading differences of a difference table, The Operator E of finite differences and differential coefficient D of differential calculus, one or more mising terms, Factorial Notation.
III	Generalized factorial notations, Methods of representing any given polynomial in factorial notation. Differences of zero, Recurrence relation
IV	Newton-Gregory forward formula for Interpolation, Newton-Gregory formula for backward Interpolation.
V	Introduction, Illustration examples of Newton – Gregory forward (backward) formula, Central Difference Formulae, Newton's divided difference formula .

Course Outcomes		
CO1	To describe structure and functions of biologically important coordination compounds.	PO1
CO2	To apply eletromeric and resonance effect to predict reactivity and stability of organic compounds	PO1,PO2
CO3	To classify the drugs based on their mode of actions.	PO4,PO6
CO4	To predict conditions for spontaneous and non-spontaneous reactions.	PO4,PO5, PO6
CO5	To calculate Gibb's free energy, work function and entropy of a reaction	PO3,PO8

Text Books (Latest Editions)	
1	Calculus of Finite Differences And Numerical Analysis by Prof. P.P.Gupta and G.S. Malik – Krishna Prakashan Media (P) Ltd. Meerut (U.P) (2006)
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Numerical Methods – Dr. V.N.Vedamurthy & Dr. N.Ch.S.N.lyenger – Vikas

	Publishing House Pvt. Ltd. Jangpura, New Delhi (2005)
2	Numerical Analysis – G.Shankar Rao – New Age International Pvt. Ltd. New Delhi.(1997)
Web Resources	

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRST YEAR -SEMESTER II
Part-IV
Skill Enhancement Course
LaTeX

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC26	SEC	2	1	-	-	2	2	25	75	100

Learning Objectives	
LO1	To explain and use TeX and LaTeX. Describes the development process of TeX and LaTeX. Explains the difference between TeX and LaTeX. Tells the advantages of LaTeX over other more traditional softwares. install and use MikTeX. Lists LaTeX compatible operating systems. Explains how to obtain LaTeX.
UNIT	**DETAILS**
I	TeX Templates
II	Introduction to TeX
III	LaTex Symbols
IV	Introduction to Beamer
V	Finding Templates & Packages 5.1 LaTeX & Beamer Templates 5.2 TeX Packages 5.3 Beamer Themes

Course Outcomes		
CO1	To make conference proceedings and presentations. ❖ Use the preamble of LaTeX file to define document class and layout options. ❖ Use BibTeX to maintain bibliographic information and to generate a bibliography for a particular document.	PO1
Text Books (Latest Editions)		
References Books (Latest editions, and the style as given below must be strictly adhered to)		
1	https://mgo.syr.edu/resources/latex-resources/#TeX_Templates	

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRST YEAR -SEMESTER II
Part-IV
Skill Enhancement Course
COMPUTATIONAL MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC27	SEC	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	The roll of numerical analysis is to develop and analyze the numerical techniques
LO2	In this paper, different methods for finding the roots of algebraic and transcendental equations, solutions of simultaneous equations, solutions of ordinary differential equations Solution of Linear systems, Numerical differentiation and integration interpolation with equal & unequal intervals are concentrated.
LO3	Learn about Numerical differentiation, integration, Trapezoidal rule and Simpson's rule
LO4	Understand the solution of Linear systems, Gauss Elimination method
LO5	Able to solve Numerical solution of Ordinary and Differential Equations. Solution by Taylor's series

UNIT	DETAILS
I	Solutions of Algebraic and transcendental equation iterative method, Bisection method-Aitken's process Method of False Position-Newton-Raphson methods
II	Finite differences-Forward differences backward differences Central differences symbolic relations-Newton's formula for interpolation. Interpolation with unevenly spaced points Lagrange's interpolation formula-divided differences and their propertiesNewton's General interpolation formula
III	Numerical differentiation — integration — Trapezoidal rule and Simpson's rule
IV	Solution of Linear systems Gaussian Elimination method — Iterative methods Jacobi and Gauss seidal Methods.
V	Numerical solution of Ordinary -Differential Equations. Solution by Taylor's series - Picard's method of successive approximations -Euler method Modifies Euler's method –RungeKutta methods

Course Outcomes		
CO1	Solving problems in algebraic and transcended equations	PO1
CO2	Understand about finite differences	PO1,PO2
CO3	Students develop and analyze numerical techniques	PO4,PO6
CO4	Applying Various numerical methods to solve the ordinary differential equations	PO4,PO5, PO6
CO5	Students gets the Research inquiry and analytical thinking abilities	PO3,PO8

Text Books (Latest Editions)	
1	Numerical Methods in Science and Engineering by M.K.Venkatraman
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Introductory methods of Numerical Analysis by S.S. Sastry- Prentice Hall of India Pvt. Ltd. Chapters:2. 2.1 to 2.5 Chapters:3.3.1,3.3,3.6,3.9, 3.9.1,3.10,3.10.1 Chapters:4. 4.2, 4.4, 4.4.1, 4.4.2 Chapters:5. 5,4 Chapters:6. 6.1 to 6.5 and 6.6.1 and 6.6.2
Web Resources	
	https://perhuaman.files.wordpress.com/2014/07/metodos-numericos.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

FIRSTYEAR -SEMESTER II
Part-IV
Ability Enhancement Compulsory Course
SOFT SKILL -2-COMMUNICATION SKILL

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCCMS	AECC	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	Identify common communication problems that may be holding learnersback
LO2	Identify what their non-verbal messages are communicating toothers
LO3	Understand role of communication in teaching-learningprocess
LO4	Learning to communicate through the digitalmedia
LO5	Understand the importance of empatheticlistening
LO6	Explore communication beyondlanguage.

UNIT	DETAILS
I	:Listening • Techniques of effectivelistening • Listening and comprehension • Probing questions • Barriers to listening
II	Speaking • Pronunciation • Enunciation • Vocabulary • Fluency • Common Errors
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
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 modesofWriting - i. E-mails ii. Proposal writing for Higher Studies iii. Recording the proceedings of meetings iv. Any other mode of writing relevant for learners
V	Digital Literacy • Role of Digital literacy in professional life • Trends and opportunities in using digital technology in workplace • InternetBasics • Introduction to MS Office tools i. Paint ii. Office iii. Excel iv. PowerPoint
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
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

Course Outcomes		
CO1	By the end of this program participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.	PO1

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	SenMadhucchanda (2010), *An Introduction to Critical Thinking*, Pearson,Delhi
2	Silvia P. J. (2007), *How to Read a Lot*, American Psychological Association, Washington DC

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

காப்பிய இலக்கியம்
மூன்றாம் பருவம்
23110AEC31

பாடநோக்கம் :

- தமிழ்க் காப்பியங்களை அறிமுகப்படுத்துதல்.
- காப்பியங்கள் கூறும் வாழ்வியல் அறங்களை உணர்த்துதல்.
- காப்பிய இலக்கியங்களின் இலக்கியச் சுவையை பயிற்றுவித்தல்.
- நாடக இலக்கியத்தின் தனித்துவத்தைக் கற்பித்தல்.

பயன்கள் :

- இலக்கியங்களின் சிறப்புகளை அறிவர்.
- காப்பியக் கதைகள் வழி அறச் சிந்தனை பெறுவர்
- பல்வேறு காப்பிய வடிவங்களை பற்றிய அறிவு பெறுவர்.
- நாடக படைப்பாக்கத்திறனை தூண்டுதலைப் பெறுவர்.

அலகு-1 காப்பியங்கள்
1.சிலப்பதிகாரம் - மதுரை காண்டம் (வழக்குரை காதை)]
2.மணிமேகலை - சிறைவிடு காதை
3.சீவக சிந்தாமணி - குணமாலையார் இலம்பகம்

அலகு-2 காவியங்கள்
1.கம்பராமாயணம்- மந்தரை சூழ்ச்சி படலம்
2.மகாபாரதம்- ஆரண்ய பருவம்

அலகு-3 புராணங்கள்
1. பெரியபுராணம்- இளையான்குடி மாறநாயனார் புராணம்
2. சீறாப்புராணம் - ஈத்தங்குலை வரவழைத்தப் படலம்
3.தேம்பாவணி- பிறந்த மகனை கண்டபடலம்

அலகு-4 - நாடகம் - சாபம்? விமோசனம்
மு.இராமசாமி,
செண்பகம் இராமசாமி,
பாவை பதிப்பகம்,ஜானிஜான் கான் சாலை,
சென்னை - 14

அலகு-5 இலக்கிய வரலாறு
காப்பியங்கள், இரட்டைக் காப்பியங்கள்
நாடக இலக்கியம்

பார்வை நூல்கள் :
1. காப்பியத்திறன்- மணிவாசகர் நூலகம், சிதம்பரம்.
2. தமிழ் காப்பியங்கள் - கி. வா. ஜெகநாதன் , அமுத நிலையம் ,சென்னை .
3.தமிழ நாடக வரலாறுகள் - கோ.பழனி , தமிழ் பல்கலைக்கழகம், தஞ்சாவூர்.
4. இணையதளம் -www.tamilvu.org , www.noolulagam.com

Mapping with Programme Specific Outcomes

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

SECOND YEAR -SEMESTER III

Part-II

Language

ENGLISH - III

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC32	LANGUAGE	3	1	-	-	3	4	25	75	100

Learning Objectives	
LO1	To enhance the level of literary and aesthetic experience of students and to help them respond creatively.
LO2	To sensitize them to the major issues in the society and the world.
LO3	To provide them with an ability to build and enrich their communication skills
LO4	To equip them to utilize the digital knowledge resources effectively for their chosen fields of study
LO5	To help them think and write imaginatively and critically.
UNIT	**DETAILS**
I	**Poetry:** 1.1 The Voice of the Mountains -Mamang Dai 1.2 A Song of Hope -OodgerooNoonuccal 1.3In an Artist's Studio - Christina Rossetti
II	**Scenes From Shakespeare:** 2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene
III	**Speeches of Famous personalities** 3.1Yes, We Can-Barack Obama 3.2You've Got to Find What You Love-Steve Jobs
IV	**Language Competency** 4.1 Writing letters and emails 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram.facebook] 4.3 Learning netiquette, email etiquette
V	**English for Workplace** 5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used 5.4 Conducting and participating in a meeting

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

Text Books (Latest Editions)	
1	**Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011)**
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	The Shakespeare Book: Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
2	Famous Speeches by Mahatma Gandhi, Createspace Independent Publishing Platform, 2016
3	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish,Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
4	Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse, Michigan Teacher Training, 2016.
5	Role Play-Theory and Practice.Krysia M Yardley-Matwiejczuk, SAGE publications ltd, 1997
Web Resources	
1	The Voice of the Mountains by Mamang Dai: https://www.scribd.com/document/558838656/The-Voice-of-the-Mountain-By-Mamang-Dai-Adivasi-Resurgence
2	A song of Hope by Kath Walker: http://www.wordslikethis.com.au/a-song-of-hope/
3	In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio
4	Sita by Toru Dutt: https://www.poetrynook.com/poem/s%E2%94%9C%C2%ABta
5	Tryst with Destiny: https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html#:~:text=Jawaharlal%20Nehru%2C%20delivering%20his%20Tryst%20with%20Destiny%20speech.&text=%22Long%20years%20ago%20we%20made,awake%20to%20life%20and%20freedom.

6	Yes, We Can: https://www.englishspeecheschannel.com/english-speeches/barack-obama-speech/
7	You've got to find what you love: https://www.businessbusinessbusiness.com.au/steve-jobs-youve-got-to-find-what-you-love/#:~:text=Steve%20Jobs%2C%20in%20his%20commencement,emphasizes%20on%20believing%20in%20oneself.

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

SECOND YEAR -SEMESTER III

Part-III

Core Paper

VECTOR CALCULUS AND APPLICATIONS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC33	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Knowledge about differentiation of vectors and on differential operators. Knowledge about derivatives of vector functions
LO2	Skills in evaluating line, surface and volume integrals
LO3	The ability to analyze the physical applications of derivatives of vectors.
LO4	Ability to Understand Surface integral and Volume Integral
LO5	Understand the Gauss divergence Theorem, Stoke's Theorem, Green's Theorem in two dimensions and its Applications
UNIT	**DETAILS**
I	Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product
II	The vector operator 'del', The gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors – simple applications
III	Laplacian operator, Vector identities - Line integral - simple problems.
IV	Surface integral - Volume integral – Applications
V	Gauss divergence Theorem, Stoke's Theorem, Green's Theorem in two dimensions – Applications to real life situations

Course Outcomes		
CO1	Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products	PO1
CO2	Applications of the operator 'del' and to Explain soleonidal and ir-rotational vectors	PO1,PO2
CO3	Solve simple line integrals	PO4,PO6
CO4	Solve surface integrals and volume integrals	PO4,PO5, PO6
CO5	Verify the theorems of Gauss, Stoke's and Green's(Two Dimension)	PO3,PO8

Text Books (Latest Editions)	
1	Vector calculus by P.C.Matthews published by springer- verlag London Limitted in1998
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Vector Analysis Versus Calculas by Antonio Galbis and Manuel Maestre published by Springer New York DorDreeht Heidelberg,London,2012
Web Resources	
	https://www.google.co.in/books/edition/Advanced_Calculus_Revised_Edition/aDA8DQAAQBAJ?hl=en&gbpv=1&dq=vector+calculus+and+its+applications+book+free+download&printsec=frontcover

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

SECOND YEAR -SEMESTER III

Part-III

Core Paper

DIFFERENTIAL EQUATIONS AND APPLICATIONS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC34	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Knowledge about the methods of solving Ordinary and Partial Differential Equations
LO2	The understanding of how Differential Equations can be used as a powerful tool in solving problems in science.
LO3	Learn about Simultaneous linear differential equations, - Linear Equations of the Second Order and the Method of Variation of Parameters
LO4	Understand the Partial differential equation
LO5	Knowledge about the Special methods, Standard forms, Charpit's Methods and Simple Applications
UNIT	**DETAILS**
I	Ordinary Differential Equations: Variable separable - Homogeneous Equation-Non-Homogeneous Equations of first degree in two variables -Linear Equation - Bernoulli's Equation-Exact differential equations.
II	Equation of first order but not of higher degree: Equation solvable for dy/dx-Equation solvable for y-Equation solvable for x- Clairauts' form - Linear Equations with constant coefficients-Particular integrals of algebraic, exponential, trigonometric functions and their products.
III	Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals-Reduction to the Normal form-Change of the Independent Variable-Method of Variation of Parameters
IV	Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral-General integral-Lagrange's Linear Equations –Simple Applications.
V	Special methods – Standard forms-Charpit's Methods – Simple Applications

Course Outcomes		
CO1	Sundrapandian, V. Ordinary and Partial Differential Equations, Tata McGraw Hill Education Pvt.Ltd. New Delhi, 2013	PO1
CO2	Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products	PO1,PO2
CO3	Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters	PO4,PO6
CO4	Form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations	PO4,PO5, PO6
CO5	Explain standard forms and Solve Differential equations using Charpit's method	PO3,PO8

Text Books (Latest Editions)	
1	Boyce, W.E. and R.C.DiPrima. Elementary Differential Equations and Boundary Value Problems. (7th Edn.) John Wiley and Sons, Inc., New York. 2001.
2	Sundrapandian, V. Ordinary and Partial Differential Equations, Tata McGraw Hill Education Pvt.Ltd. New Delhi, 2013
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	D.A. Murray, Introductory course in Differential Equations, Orient and Longman
2	H.T. H. Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi,1985
3	Horst R. Beyer, Calculus and Analysis, Wiley, 2010.
4	Braun, M. Differential Equations and their Applications. (3rd Edn.), Springer-Verlag, New York. 1983.
5	TynMyint-U and LognathDebnath. Linear Partial Differential Equations for Scientists and Engineers. (4th Edn.) Birhauser, Berlin. 2007
Web Resources	
	http://dl.konkur.in/post/Book/Paye/Differential-Equations-and-Boundary-Value-Problems-Edwards-5th-Edition-%5Bkonkur.in%5D.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

SECOND YEAR -SEMESTER III

Part-III

Core Paper

ACTUARIAL MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112GEC35	CORE	4	-	-	-	4	3	25	75	100

Learning Objectives	
LO1	The basics of actuarial scienceValuing series of cash flows
LO2	Incorporating uncertainty into cash flows due to investment and mortality
LO3	Monte-Carlo simulation of uncertain cash flows in Excel (or an equivalent spreadsheet tool)
LO4	Applying actuarial techniques to life insurance and predicting human life expectancy
LO5	How actuarial science is used in finance, investments, banking and insurance

UNIT	DETAILS
I	Cash flows -An analogy with currencies-Discount functions -Calculating the discount function -Interest and discount rates -Constant interest-Values and actuarial equivalence -Vector notation -Regular pattern cash flows -Balances and reserves-Basic concepts -Relation between balances and reserves-Prospective versus retrospective methods -Recursion formulas
II	Basic definitions-Probabilities -Constructing the life table from the values of q_x -Life expectancy-Choice of life tables -Standard notation and terminology -A sample table
III	Introduction -Calculating annuity premiums -The interest and survivorship discount function-The basic definition-Relations between $y_x$for various values of x -Guaranteed payments -Deferred annuities with annual premiums -Some practical considerations -Gross premiums -Gender aspects-Standard notation and terminology-Spreadsheet calculations
IV	Introduction -Calculating life insurance premiums -Types of life insurance -Combined insurance–annuity benefits -Insurances viewed as annuities -Summary of formulas -A general insurance–annuity identity-The general identity -The endowment identity-Standard notation and terminology - Single-premium notation -Annual-premium notation-Identities -Spreadsheet applications
V	Introduction to reserves -The general pattern of reserves –Recursion-Detailed analysis of an insurance or annuity contract-Gains and losses -The risk–savings decomposition-Bases for reserves-Nonforfeiture values-Policies involving a return of the reserve -Premium difference and paid-up formulas-Premium difference formulas -Paid-up formulas -Level endowment reserves -Standard notation and terminology -Spreadsheet applications

Course Outcomes		
CO1	describe, interpret and discuss mathematical techniques used to model and	PO1
CO2	show a comprehensive understanding of the complex techniques applicable to solve problems in actuarial mathematics;	PO1,PO2
CO3	demonstrate a critical appreciation of recent developments in Actuarial Mathematics.	PO4,PO6
CO4	the links between the theory of Actuarial Mathematics and their practical application	PO4,PO5, PO6
CO5	Describe the value cashflows which are contingent on mortality and morbidity risks	PO3,PO8

Text Books (Latest Editions)	
1	Fundamentals of Actuarial Mathematics ., by S. David Promislow .,Third Edition., John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, United Kingdom ISBN 978-1-118-78246-0
2	**Unit-1 Chapter:2 Sec:2.1-2.10** **Unit-2 Chapter: 3 Sec: 3.1-3.7** **Unit-3 Chapter: 4 Sec: 4.1-4.8** **Unit-4 Chapter: 5 Sec: 5.1-5.9** **Unit-5 Chapter: 6 Sec: 6.1-6.10**
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Arrow, K.J. (1963). Uncertainty and the welfare of medical care. *American Economic Review* 53,941–973
2	Bowers, N., Gerber, H., Hickman, J., Jones, D. and Nesbitt, C. (1997). *Actuarial Mathematics*, 2nd edn
3	Brillinger, D.R. (1961). A justification of some common laws of mortality. *Transactions of the Societyof Actuaries* XIII, 116–119
4	Daniel, J.W. andVaaler, L.J.F. (2009). *Mathematical Interest Theory*, 2nd edn. Mathematical Association of America.
5	Frees, E., Carri`ere, J. and Valdez, E. (1996). Annuity valuation with dependent mortality. *Journal of Risk and Insurance* 63, 229–261.
6	Gerber, H. and Shiu, E.S. (1998). On the time value of ruin. *North American Actuarial Journal* 2, 48–78
Web Resources	
	https://www.actuariayfinanzas.net/images/sampledata/FundamentalsofActuarialMathematics_S.DavidPromislow2015.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

SECOND YEAR -SEMESTER III
Part-IV
Skill Enhancement Course
ENTREPRENEURIAL BASED ON MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC36	SEC	3	-	-	-	1	1	25	75	100

Learning Objectives	
LO1	Develop logical and problem-solving skills
LO2	Becoming familiar with some of the basic techniques used to construct mathematical proof
LO3	Develop writing skills
LO4	Learn to communicate mathematical concepts
LO5	Be able to construct independently basic mathematical proofs.
UNIT	**DETAILS**
I	**Arithmetic:** Ratios and Proportions Simple and Compound interest including application of Annuity Bill Discounting and Average Due Date Mathematical reasoning – basic application
II	**Algebra:** Set Theory and simple application of Venn Diagram Variation, Indices, Logarithms Permutation and Combinations – basic concepts
III	**Statistical Representation of Data:** Diagrammatic representation of data Frequency distribution Graphical representation of Frequency Distribution – Histogram, Frequency Polygon, Ogive, Pie-chart
IV	**Index Numbers**: Uses of Index Numbers Problems involved in construction of Index Numbers Methods of construction of Index Numbers
V	**Time Series Analysis**: Basic application including Moving Average Moving Average Method Method of Least Squares

Course Outcomes		
CO1	Apply the knowledge of Mathematics (Algebra, Matrices, Calculus, and Optimization) in solving business problems.	PO1
CO2	Demonstrate critical thinking, modelling, and problem-solving skills in a variety of contexts	PO1,PO2
CO3	Demonstrate mathematical skills required in mathematically intensive areas in Commerce such as Finance and Economics.	PO4,PO6
CO4	Understand the important role Mathematics plays in all facets of the business world.	PO4,PO5, PO6
CO5	Understand the use of equations, formulae, and mathematical expressions and relationships in a variety of contexts	PO3,PO8

Text Books (Latest Editions)	
1	Business statistics by S.C. Gupta, Himalaya Publication, 2nd edition.2013
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Business Statistics by Sunita Mall.
2	Introductory Business Statistics by Alexander Holmes, the university of Oklahoma Barbara Illowsky, De Anza college Susan dean, de Anza college.
3	
Web Resources	
	https://www.geektonight.com/business-mathematics-notes/
	https://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/Business-Statistics-by-Gupta.pdf
	https://www.ddegjust.ac.in/studymaterial/mcom/mc-106.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

SECOND YEAR -SEMESTER III

Part-IV

Skill Enhancement Course

STATISTICS WITH R PROGRAMMING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC37	SEC	3	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	Use R for statistical programming, computation, graphics, and modeling
LO2	Write functions and use R in an efficient way
LO3	Fit some basic types of statistical models
LO4	Use R in their own research,
LO5	Be able to expand their knowledge of R on their own
UNIT	**DETAILS**
I	Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.
II	R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree
III	Doing Math and Simulation in R, Math Function, Extended Example Calculating ProbabilityCumulative Sums and Products-Minima and Maxima-Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product-Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files.
IV	Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.
V	Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision-Random Forests,

Course Outcomes		
CO1	List motivation for learning a programming language	PO1
CO2	Access online resources for R and import new function packages into the R workspace	PO1,PO2
CO3	Import, review, manipulate and summarize data-sets in R	PO4,PO6
CO4	Explore data-sets to create testable hypotheses and identify appropriate statistical tests	PO4,PO5, PO6
CO5	Perform appropriate statistical tests using R Create and edit visualizations with	PO3,PO8

Text Books (Latest Editions)	
1	The Art of R Programming, A K Verma, Cengage Learning
2	R for Everyone, Lander, Pearson
3	The Art of R Programming, Norman Matloff, No starch Press
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	R Cookbook, Paul Teetor, Oreilly
2	R in Action, Rob Kabacoff, Manning
Web Resources	
	: https://www.jntuk396.com/2019/08/r-programming.html

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

SECOND YEAR -SEMESTER III
Part-IV
Ability Enhancement Compulsory Course
Soft Skill-3

RESEARCH METHODOLOGY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112RMC38	AECC	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	Able toUnderstandDefinition, Objectives, Motivation and purpose – types of research – Pure and applied, survey, case study experimental, exploratory – Concept of Research Design
LO2	Knowledge about the Definition & need of research problem, Types & selection of proper research question and suitable research design
LO3	Understand the Methods of data collection, Primary and secondary data and pre-testing, Survey vs Experiment, Practical Exercises
LO4	Able to editing, coding, transcription, tabulation, outline of statistical analysis, descriptive statistics and elements of processing through computer and packages for analysis
LO5	Review of literature, Report writing, target audience
UNIT	**DETAILS**
I	Research – Definition, Objectives, Motivation and purpose – types of research – Pure and applied, survey, case study experimental, exploratory – Concept of Research Design –Criteria of Good Research, Problems Encountered by Researchers in India. General guidelines for Good housekeeping & Lab-safety- Hygiene (Eye, foot, skin and hand protection) – Safety rules -Equipment protection – Respiratory protective equipment – safety equipment – Leaking, compressed gas cylinders – electrical safety. Fire – extinguishers
II	Research Problem: Definition & need of research problem, Types & selection of proper research question and suitable research design with Examples, Literature types- compendia and tables of information, Reviews, General treatises, Monographs
III	Methods of data collection – Primary and secondary data – observation – interview – Questionnaire – Tools for questionnaire; surveying & literature survey, spreadsheets, Technical writing, Construction of tools for data collection – testing validity – pilot study and pre-testing, Survey vs Experiment, Practical Exercises
IV	Processing and analysis of data – editing – coding – transcription – tabulation –outline of statistical analysis – descriptive statistics – elements of processing through computer- packages for analysis (Excel).
V	Review of literature, Report writing – target audience – types of reports – contents of reports – styles and Conventions in reporting – steps in drafting a report. Technical Presentation

Course Outcomes		
CO1	Demonstrate the ability to choose methods appropriate to research aims and objectives.	PO1
CO2	Understand the limitations of particular research methods.	PO1,PO2
CO3	Develop skills in qualitative and quantitative data analysis and presentation.	PO4,PO6
CO4	Develop advanced critical thinking skills.	PO4,PO5, PO6
CO5	Demonstrate enhanced writing skills	PO3,PO8

Text Books (Latest Editions)	
1	R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 1999.
2	Ajai.S.Gaur, SanjayaS.Gaur, Statistical Methods for Practice and Research, Response, 2009
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	C.R. Kothari, Research Methodology-Methods & Techniques, 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
Web Resources	
	https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

SECOND YEAR -SEMESTER III
Part-IV
Audit Course
OFFICE AUTOMATION

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCOAN	AC	-	-	-	-	1	-	25	75	100

Learning Objectives	
LO1	To provide an in-depth training in use of office automation, internet and internet tools.
LO2	The course also helps the candidates to get acquainted with IT.
LO3	learn about the various computer systems and software as well as the components of the operating system
LO4	Understand about word processing and other relevant software.
LO5	Knowledge about Data Management, Data Exchange, Accuracy.

UNIT	DETAILS
I	Knowing the basics of Computers
II	Word Processing (MS word)
III	Spread Sheet (MS XL)
IV	Presentation (MS Power Point)
V	Communicating with Internet

Course Outcomes		
CO1	After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with internet.	PO1
CO2	to develop relevant skills in candidates related to computer application, office management practices, and office automation techniques.	PO1,PO2
CO3	deals with the basic operations of an office automation system	PO4,PO6
CO4	The program teaches the important aspects of computer gear and software to digitally create, gather, store, and manage electronic business information.	PO4,PO 5, PO6
CO5	to improve efficiency, accuracy, and speed in business processes.	PO3,P O8

Text Books (Latest Editions)	
1	Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
2	Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
2	Microsoft Office 2007 Bible - John Walkenbach,HerbTyson,FaitheWempen,caryN.Prague,MichaelR.groh,PeterG.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
Web Resources	
	https://en.wikipedia.org
	https://wiki.openoffice.org/wiki/Documentation
	http://windows.microsoft.com/en-in/windows/windows-basics-all-topics

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

சங்க இலக்கியம்
நான்காம் பருவம்
23110AEC41

பாடநோக்கம் :

- பழந்தமிழ் இலக்கிய வளத்தை உணர்த்துதல்.
- சங்க அக, புற பாடல் மரபுகளைப் பயிற்றுவித்தல்.
- புற இலக்கியங்கள் காட்டும் வாழ்வியல் அறங்களை உணர்த்துதல்.

பயன்கள் :

- பழந்தமிழ் இலக்கிய மரபை அறிவர்.
- சங்க இலக்கியங்களில் உள்ள அறிவியல் கூறுகளை உணர்வர்.
- வாழ்வியல் அறங்கள் மற்றும் வரலாற்றுச் செய்திகளை அறிவர்.

அலகு-1

1. குறுந்தொகை - பாடல்கள் : 28, 38
2. நற்றிணை - பாடல்கள் : 1,27,28,167,168
3. ஐங்குறுநூறு - பாடல்கள் : இளவேனில் பத்து

அலகு-2

1. கலித்தொகை - பாடல்கள் : 3,7
2. அகநானூறு - பாடல்கள் :5,42,100
3. புறநானூறு - பாடல்கள் : 182,204,41,121

அலகு-3

திருமுருகாற்றுப்படை முழுவதும்

அலகு-4

திருக்குறள் - செய்ந்நன்றி அறிதல், கூடா நட்பு அதிகாரங்கள்

நாலடியார் - பாடல்கள் : 1,172,215,253

அலகு-5

இலக்கிய வரலாறு

1.சங்க இலக்கியம்

2.எட்டுத்தொகை, பத்துப்பாட்டு

3.பதினெண் கீழ்க்கணக்கு நூல்கள்

பார்வை நூல்கள்

1.குறுந்தொகை - கழக வெளியீடு ,சென்னை
2.நற்றிணை - கழக வெளியீடு ,சென்னை
3.ஐங்குறுநூறு - கழக வெளியீடு ,சென்னை
4.கலித்தொகை - கழக வெளியீடு ,சென்னை
5.அகநானூறு - கழக வெளியீடு ,சென்னை
6.புறநானூறு - கழக வெளியீடு ,சென்னை
7.திருக்குறள் - பரிமேலழகர் உரை ,கழக வெளியீடு ,சென்னை
8. இணையதளம் -www.tamilvu.org , www.noolulagam.com

SECOND YEAR -SEMESTER IV
Part-II
Language
ENGLISH - IV

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23111AEC42	LANGUAGE	3	1	-	-	3	4	25	75	100

Learning Objectives	
LO1	To help learners imbibe the rules of language unconsciously and tune to deduce language structure and usage.
LO2	To enable them use receptive skills through reading and listening to acquire good exposure to language and literature.
LO3	To help them develop style in speech and writing and manipulate the tools of language for effective communication.
LO4	To provide exposure to plays, autobiographies and expose them to value based ideas.
LO5	To enhance their language skills especially in the areas of grammar and pronunciation.
UNIT	**DETAILS**
I	**Life Writing** 1.1 I am Malala-MalalaYousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2
II	**One Act Plays** 2.1The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov
III	**Interviews** 3.1 Nelson Mandela's Interview with Larry King. 3.2 Rakesh Sharma's Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)
IV	**Language Competency** 4.1 Refuting, Arguing & Debating

	4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help4.3 Interviews (face to face, telephone and video conferencing)
V	**English for Workplace** 5.1 Job Applications: Covering letters, CV and Resume 5.2 Creating a digital profile - Linkedin 5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM,Credit/debit card 5.4 Body Language -Practical Skills for Interviews

Course Outcomes		
CO1	Learn to communicate effectively and appropriately in real life situation.	PO1
CO2	Use English effectively for study purpose across the curriculum	PO1,PO2
CO3	Develop interest in and appreciation of Literature	PO4,PO6
CO4	Develop and integrate the use of the four language skills	PO4,PO 5, PO6
CO5	Enhance their language skills especially in the areas of grammar and pronunciation.	PO3,P O8

Text Books (Latest Editions)	
1	I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by MalalaYousafzai, Christina Lamb , Little Brown, 2013.
2	My Inventions by Nikola Tesla Ingram Short title, 2011 Edition
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Writing Your Life: A Guide to Writing Autobiographies,Mary Borg, Taylor & Francis, 2021

2	One-act Plays for Acting Students: An Anthology of Short Norman A. Bert · 1987 ·
3	The One-Act Play Companion: A Guide to plays, playwrights ... Colin Dolley, Rex Walford · 2015
4	How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
5	Role Play-Theory and Practice.Krysia M Yardley-Matwiejczuk, SAGE publications ltd, 1997
Web Resources	
1	For Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s(the link to the performance; refer scripts by Aaron Sheperd)
2	http://BBC learn English.com
3	http://onestopenglish.com
4	http://hearn-english-today.com
5	http://talkenglish.com
6	The Zoo Story: http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pdf
7	The Proposal: https://www.one-act-plays.com/comedies/proposal.html
8	Nelson Mandela with Larry King Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lkl.00.html
9	Rakesh Sharma with Indira Gandhi Interview : https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-told-indira-gandhi-about-india-from-space-2204839
10	Lionel Messi with Sid Lowe Interview:https://www.worldsoccer.com/world-soccer-latest/lionel-

	messi-interview-part-one-338553

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

SECOND YEAR -SEMESTER IV
Part-III
Core Paper
INDUSTRY MODULE-INDUSTRIAL MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC43	CORE	3	1	-	-	3	4	25	75	100

Learning Objectives	
LO1	The course aims at building capabilities in the students for analysing different situations in the industrial/ business scenario involving limited resources and finding the optimal solution within constraints
LO2	The objective of this course is to enable the student to understand and analyse managerial and engineering problems to equip him to use the resources such as capitals, materials, productions, controlling, directing, staffing, and machines more effectively and Statistics provides the methodology for the planning and execution for any scientific enquiry, which has been accepted as a valid tool in this content
LO3	In this course Central Limit Theorem, Discrete and Continuous Distributions, Small and Large Sampling would be taught
LO4	Able to Solve Test of Hypothesis, Null and alternative hypothesis , One tail and two tail tests
LO5	Able to Solve Test of significance based on chi square and F-distributions for variance, test for goodness of fit and independence of attributes Analysis of variance
UNIT	**DETAILS**
I	Introduction to OR-Meaning and scope of O.R, Definition of O.R, LPP (Linear Programming Problem). Formulation of LPP, graphical solution of LPP- Problems
II	Transportation problem- Its definition, feasible solution by North-West corner rule, matrix minima VAM methods. Optimal solution through MODI & stepping stone method for balanced and unbalanced transportation problem
III	PERT and CPM network - critical and sub critical jobs -Determining the critical path. Network calculation PERT networks probability aspect of PERT- PERT time -PERT cist (omitting Crashing)
IV	Test of Hypothesis-Null and alternative hypothesis(Concept only) One tail and two tail tests, tests of significance based on normal and t-

	distribution for mean, simple correlation and properties
V	Test of significance based on chi square and F-distributions for variance, test for goodness of fit and independence of attributes Analysis of variance -One wayand two - way classifications with simple problems

Course Outcomes		
CO1	Students using OR techniques in business tools for decision making	PO1
CO2	Students develop PERT and CPM networks and finding the shortest path	PO1,PO2
CO3	Understand the concept of sequencing problems and game theory	PO4,PO6
CO4	Students gets the knowledge about inventory theory Understand the concept of Bivariate Distribution	PO4,PO 5, PO6
CO5	A knowledge of test of significance based on parametric and non – parametric test. Understood the concept of sampling theory	PO3,P O8

Text Books (Latest Editions)	
1	Operations Research by Kantiswarup, P.K. Gupta and Manmohan.
2	Fundamentals of Mathematical Statistics — S.C.Gupta and V.K.Kapoor, Sultan Chand & Sons, New Delhi
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Fundamentals of Applied Statistics — S.C.Gupta and V.K.Kapoor. Sultan Chand & Sons.
2	Resource Management Techniques (Operations Research) V.Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan
Web Resources	

	https://soaneemrana.com/onewebmedia/ADVANCED%20ENGINEERING%20MATHEMATICS%20BY%20ERWIN%20ERESZIG1.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

SECOND YEAR -SEMESTER IV

Part-III

CORE PAPER

ELEMENTS OF MATHEMATICAL ANALYSIS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC44	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Identify and characterize sets and functions and Understand,testan analyze the convergence and divergence of sequences, series**.**
LO2	Understand metric spaces with suitable examples
LO3	Able to Understand Operations on convergent sequences and operations on divergent sequences
LO4	Learn about Series of Real Numbers
LO5	Able to understand Limits and Metric Spaces, Limit of a function on a real line, Metric spaces and Limits in metric spaces
UNIT	**DETAILS**
I	Sets and Functions: Sets and elements- Operations on sets- functions- real valued functions- equivalence-countability- real numbers- least upper bounds
II	Sequences of Real Numbers: Definition of a sequence and subsequence-limit of a sequence – convergent sequences–divergent sequences- bounded sequences-monotone sequences
III	Operations on convergent sequences – operations on divergent sequences – limit superior and limit inferior-Cauchy sequences.
IV	Series of Real Numbers: Convergence and divergence – series with non – negative terms-alternating series-conditional convergence and absolute convergence- tests for absolute convergence.
V	Limits and Metric Spaces: Limit of a function on a real line - Metric spaces - Limits in metric spaces – Continuous Functions on Metric Spaces: Function continuous at a point on there a line-Function continuous on a metric space.

Course Outcomes		
CO1	Explain in detail about sets and functions, equivalence and countability and the LUB axiom	PO1
CO2	Explain Sequence and Subsequence of real numbers and to find the limit of sequence to test for convergent, divergent, bounded and monotone sequences	PO1,PO2
CO3	Explain the operations on convergent and divergent sequences and to Explain the concepts of limit superior and limit inferior and the notion of Cauchy sequences	PO4,PO6
CO4	Classify the series of real numbers and the alternating series and their convergence and divergence, the conditional convergence and absolute convergence and solve problems on convergence of the sequences	PO4,PO5, PO6
CO5	Explain about the metric spaces and functions continuous on a Metric space	PO3, PO8

Text Books (Latest Editions)	
1	E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983
2	K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2	R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
Web Resources	
	https://d3bxy9euw4e147.cloudfront.net/oscms-prod/media/documents/CalculusVolume1-OP.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

SECOND YEAR -SEMESTER IV
Part-III
CORE PAPER
FINANCIAL MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112GEC45	CORE	4	-	-	-	4	3	25	75	100

Learning Objectives	
LO1	To develop problem-solving skills.
LO2	To develop inductive and deductive skills in reasoning.
LO3	To understand the significance of central mathematical theorems and their applications.
LO4	To appreciate the precision and breadth presented in mathematical theories.
LO5	To solve the applying mathematical formulas and equations to financial problems, market modeling and data analysis.

UNIT	DETAILS
I	**The Arbitrage Theorem** 4.1 The Concept of Arbitrage 4.2 Duality Theorem of Linear Programming 4.2.1 Dual Problems 4.3 The Fundamental Theorem of Finance
II	**Random Walks and Brownian Motion** 5.1 Intuitive Idea of a Random Walk 5.2 First Step Analysis 5.3 Intuitive Idea of a Stochastic Process 5.4 Stock Market Example 5.5 More About Stochastic Processes 5.6 Ito's Lemma
III	**Derivatives of Black-Scholes Option Prices** 8.1 Theta 131 8.2 Delta 133 8.3 Gamma 8.4 Vega 8.5 Rho 8.6 Relationships Between $\Delta, \Theta and \Gamma$

IV	**Hedging** 9.1 General Principles 9.2 Delta Hedging 9.3 Delta Neutral Portfolios 9.4 Gamma Neutral Portfolios
V	**Optimizing Portfolios** 10.1 Covariance and Correlation 10.2 Optimal Portfolios 10.3 Utility Functions 10.4 Expected Utility 10.5 Portfolio Selection 10.6 Minimum Variance Analysis 10.7 Mean Variance Analysis

Course Outcomes		
CO1	Understand the mathematical foundations of quantitative finance understand the standard and advanced quantitative methodologies and techniques of importance to a range of careers in investment banks and other financial institutions	PO1
CO2	Appreciation of emerging theory and techniques in the area of financial mathematics. Create and evaluate potential models for the price of shares. Construct, evaluate and analyze models for investments and securities	PO1,PO2
CO3	Design, build, investigate and evaluate forward contract using arbitrage-free pricing methods. Develop connections within branches of Financial Mathematics and between Probability and other disciplines	PO4,PO6
CO4	Solve problems using a range of formats and approaches in basic science show the ability to work independently and within groups. Apply scientific models and tools effectively.	PO4,PO5, PO6
CO5	Use the internet to write reports about basic Financial Mathematics principles. Apply knowledge gained during the course using computer applications.	PO3,PO8

Text Books (Latest Editions)			
1	**An Undergraduate Introduction To Financial Mathematics by** J Robert Buchanan., World Scientific Publishing Co. Pte. Ltd.5 Toh Tuck Link, Singapore 596224.,ISBN 981-256-637-6		
2	**Unit-I** **Unit-II** **Unit-III** **Unit-IV** **Unit-V**	**Chapter:4** **Chapter:5** **Chapter:8** **Chapter:9** **Chapter:10**	**Sec:4.1- 4.3** **Sec:5.1- 5.6** **Sec:8.1- 8.6** **Sec:9.1- 9.4** **Sec:10.1- 10.7**
References Books (Latest editions, and the style as given below must be strictly adhered to)			
1	MarekCapinski and Tomasz Zastawniak, "Mathematics for Finance", Springer		
2	AmbadNazriWahidudin, "Financial Mathematics and its Applications", Ventus Publishing ApS		
Web Resources			
	https://pdfrock.com/compress-pdf-free.html		

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

SECOND YEAR -SEMESTER IV
Part-IV
SKILL ENHANCEMENT COURSE
INTRODUCTION TO DATA SCIENCE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC46	SEC	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	To offer highest professional and academic standards in terms of personal growth and satisfaction.
LO2	Make the society as the hub of emerging technologies and thereby captureϖ opportunities in new age technologies.
LO3	To create a benchmark in the areas of research, education and public outreach.
LO4	To provide students a platform where independent learning and scientific study areϖ encouraged with emphasis on latest engineering techniques
LO5	Compute probabilities of transition between states and return to the initial state after long time intervals in Markov chains.
UNIT	**DETAILS**
I	**Statistics:** Introduction-Defining the Problem- Collecting The Data- Summarizing The Data- Analyzing Data-Interpreting The Analyses And Communicating Results- Reasons to Study Statistics- Statistics And The Data Analysis Process- The Data Analysis Process- Observational Studies- Experimental Studies- Types of Data And Some Simple Graphical Displays- Frequency Distributions and Bar Charts For Categorical Data- Bar Charts-Pie Chart
II	**Probability:**Introduction- Properties of Probability- Combinatorial Principles- Conditional Probability- Independence of Events- Baye's Theorem- Bayes Theorem Applications With Simple Problems

III	**Sampling:** Bias in Sampling- Sampling Techniques/Designs- Analysis Of Variance
IV	Statistical Inference: Estimation- Point Estimation- Criteria ofa Good Estimator- Methods Of Estimation
V	Stochastic Process-Markov Chain-Transition Probabilities-Classification of States

Course Outcomes		
CO1	Our study of statistics closely parallels the scientific method, which is a set of principles and procedures used by successful scientists in their pursuit of knowledge	PO1
CO2	The method involves the formulation of research goals, the design of observational studies and/or experiments, the collection of data, the modeling/ analyzing of the data in the context of research goals, and the testing of hypotheses.	PO1,PO2
CO3	These steps are often the formulation of new research goals for another study	PO4,PO6
CO4	When dealing with probability, the outcomes of a process are the possible results	PO4,PO5, PO6
CO5	In mathematical language, an event is a set of outcomes, which describe what outcomes correspond to the "event" happening	PO3,PO8

Text Books (Latest Editions)	
1	Probability and Statistics by Michael J. Evans and Je§rey S. Rosenthal Second Edition.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Fundamental of Mathematical Statistics by S. C. Gupta & V. K. Kapoor.
Web Resources	
1	https://Mrcet.Com/Downloads/Digital_Notes/Cseds/Statistical%20foundations%20in%20data%20science.Pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

SECOND YEAR -SEMESTER IV
Part-IV

Skill Enhancement Course
COMPUTING MATHEMATICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112SEC47	SEC	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	The basic mathematics to the students. It assumes that the students have minimal knowledge to the subject
LO2	To help them acquire skills in solving quantitative aptitude by simple methods (mainly based on demonstration).
LO3	During class time students are expected to engage in pair work
LO4	The main focus of the students will be on quantitative aptitude in short span of time.
LO5	understand how trigonometric functions relate to right triangles and solve word problems involving right triangles.

UNIT	DETAILS
I	Problems based on Ages, Simplification
II	Simple and Compound interest
III	Time and work, Work and Wages
IV	Problems on Clocks, Problems on Calendars
V	Trigonometry, Odd man out and Series

Course Outcomes		
CO1	Provide a platform to the students for building the fundamentals of basic mathematics for competitive examinations preparation strategy.	PO1
CO2	Establish a framework to help students acquire knowledge and expertise necessary to secure employment opportunities in the Government sector	PO1,PO2
CO3	the ability to apply mathematics to real-world problems	PO4,PO6
CO4	appreciation for the abstract structures and abstract reasoning at the heart of mathematics;	PO4,PO5, PO6
CO5	Understand the basic applications of the analytical plane and solid geometry.	PO3,PO8

Text Books (Latest Editions)	
1	Quantitative Aptitude by R.V.Praveen, PHI Learning Private Limited, Delhi, ISBN:978-81-203-4777-9 Unit-I Chapter: 7, 39 Unit-II Chapter: 17, 18 Unit-III Chapter: 19, 20 Unit-IV Chapter: 27, 28 Unit-V Chapter: 31, 32
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Quantitative Aptitude by RS Aggarwal
Web Resources	
	https://drive.google.com/file/d/1bUy6LdvObe-OoSDY8LJT4IrF-sbQq3eo/view
	https://sarkaribooklet.com/math-book-pdf/

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

SECOND YEAR -SEMESTER IV
Part-IV
Ability Enhancement Compulsory Course
ENVIRONMENTAL STUDIES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCEVS	AECC	1	-	-	-	1	1	25	75	100

Learning Objectives	
LO1	Understand the multidisciplinary nature of environmental studies
LO2	Describe the importance, need, scope and public awareness of environmental studies
LO3	Write about natural resources and their consumption as well as overexploitation
LO4	Explain the different types of ecosystem and energy flow
I	**ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY** Definition, scope, and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – the concept of an ecosystem – structure, and function of an ecosystem – producers, consumers, and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes
II	**ENVIRONMENTAL POLLUTION** Definition - causes, effects, and control measures of (a) Air pollution (Atmospheric chemistry - Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen, and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission,
III	**NATURAL RESOURCES** Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and groundwater, dams-benefits and problems – Mineral resources: Use and exploitation,

	environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing.
IV	**SOCIAL ISSUES AND THE ENVIRONMENT** From unsustainable to sustainable development – urban problems related to energy – water conservation, rainwater harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – the role of non-governmental organization environmental ethics:
V	**HUMAN POPULATION AND THE ENVIRONMENT** Population growth, variation among nations – population explosion – family welfare program – environment and human health – human rights – value education – HIV / AIDS – women and child welfare.

Course Outcomes		
CO1	Understand the multidisciplinary nature of environmental studies	PO1
CO2	Describe the importance, need, scope and public awareness of environmental studies	PO1,PO2
CO3	Write about natural resources and their consumption as well as overexploitation	PO4,PO6
CO4	Explain the different types of ecosystem and energy flow	O4,PO5, PO6
CO5	Understand the multidisciplinary nature of environmental studies	PO3,P O8

Text Books (Latest Editions)	
1	Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi,(2006).
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2	Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia',Jaico Publ., House, Mumbai, 2001.
3	Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.
4	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)
Web Resources	

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

SECOND YEAR -SEMESTER IV
Part-IV
Audit Course
LEADERSHIP AND MANAGEMENT SKILLS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECCLMS	AC	-	-	-	-	1	-	25	75	100

Learning Objectives	
LO1	Help students to develop essential skills to influence and motivateothers
LO2	Inculcate emotional and social intelligence and integrative thinking for effective leadership
LO3	Create and maintain an effective and motivated team to work for thesociety
LO4	Nurture a creative and entrepreneurialmindset
LO5	Make students understand the personal values and apply ethical principles inprofessional and social contexts.

UNIT	DETAILS
I	**Leadership Skills** 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
II	**Managerial Skills** a. **Basic Managerial Skills** • Planning for effective management • How to organize teams? • Recruiting and retaining talent • Delegation of tasks • Learn to coordinate • Conflict management b. Self Management Skills • Understanding self concept • Developing self-awareness • Self-examination • Self-regulation
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

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?
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

Course Outcomes		
CO1	Examine various leadership models and understand/assess their skills, strengths andabilities that affect their own leadership style and can create their leadership vision	PO1
CO2	Learnand demonstrate asetofpracticalskillssuchastimemanagement,self management,handling conflicts, team leadership, etc.	PO1,PO2
CO3	Understand the basics of entrepreneurship and develop business plans	PO4,PO6
CO4	Apply the design thinking approach for leadership	PO4,PO 5, PO6
CO5	Appreciate the importance of ethics and moral values for making of a balanced personality.	PO3,P O8

Text Books (Latest Editions)	
1	Ashokan, M. S. (2015). *Karmayogi: A Bbiography of E. Sreedharan*. Penguin,UK.
2	Brown, T. (2012). *Change by Design.* HarperBusiness
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Elkington, J., &Hartigan, P. (2008). *The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change*

	the World. Harvard Business Press.
2	GolemanD. (1995). *Emotional Intelligence*. Bloomsbury Publishing India PrivateLimited
3	Kalam A. A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin BooksIndia
4	Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential WithinUsAll.*WilliamCollins
5	KurienV.,& Salve G. (2012). *I Too Had a Dream*. Roli Books PrivateLimited
6	Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success*. New York: American ManagementAssociation
7	McCormackM.H.(1986).*WhatTheyDon'tTeachYouatHarvardBusinessSchool:NotesFromA Street-Smart Executive*. RHUS
8	O'Toole J. (2019) *The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good.*Harpercollins
9	SinekS. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action.*Penguin
10	Sternberg R. J., Sternberg R. J., &BaltesP. B. (Eds.). (2004). *International Handbook of Intelligence*. Cambridge UniversityPress.
Web Resources	

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
ABSTRACT ALGEBRA

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC51	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Concepts of Sets, Groups and Rings
LO2	Construction, characteristics and applications of the abstract algebraic structures
LO3	Enable to use in the solution of some of the stiff problems in arithmetic.
LO4	It helps to secure communication, in physics to understand symmetries and conservation laws, and in engineering to design error-correcting codes.
LO5	ToDetermine the domain and range of a functional relationship.

UNIT	DETAILS
I	Introduction to groups- Subgroups- cyclic groups and properties of cyclic groups- Lagrange's Theorem-A counting principle – Examples
II	Normal subgroups and Quotient group- Homomorphism-Automorphism -Examples
III	Cayley's Theorem-Permutation groups - Examples
IV	Definition and examples of ring- Some special classes of rings- homomorphism of rings- Ideals and quotient rings-More ideals and quotient rings
V	The field of quotients of an integral domain-Euclidean Rings - The particular Euclidean Ring – Examples

Course Outcomes		
CO1	Explain groups, subgroups and cyclic groups	PO1
CO2	Explain about Normal subgroup, Quotient groups, Homomorphisms and Automorphisms and verify the functions for homomorphism and automorphism properties	PO1,PO2
CO3	Explain Permutation groups and apply Cayley's theorem to problems	PO4,PO6
CO4	Explain Rings, Ideals and Quotient Rings and examine their structure	PO4,PO 5, PO6
CO5	Discuss about the field of quotient of an integral domain and to Explain in detail about Euclidean Rings	PO3,P O8

Text Books (Latest Editions)	
1	M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2	Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
Web Resources	
	https://mdu.ac.in/UpFiles/UpPdfFiles/2020/Jan/BASIC%20ABSTRACT%20ALGEBRA.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
REAL ANALYSIS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC52	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Real Numbers and properties of Real–valued functions.
LO2	Connectedness, Compactness, Completeness of Metric spaces
LO3	Convergence of sequences of functions, Examples and counter examples
LO4	Describe the fundamental properties of the real numbers that under pin the formal development of realanalysis
LO5	demonstrate an understanding of the theory of sequences and series, continuity, differentiation and integration.
UNIT	**DETAILS**
I	Continuous Functions on Metric Spaces: Open sets– closed sets–Discontinuous function on R^1. Connectedness, Completeness and Compactness: More about open sets-Connected sets.
II	Bounded sets and totally bounded sets: Complete metric spaces- compact metric spaces, continuous functions on a compact metric space, continuity of inverse functions, uniform continuity
III	Calculus: Sets of measure zero, definition of the Riemann integral, existence of the Riemann integral-properties of Riemann integral.
IV	Derivatives-Rolle's theorem, Law of mean, Fundamental theorems of calculus
V	Derivatives-Rolle's theorem, Law of mean, Fundamental theorems of calculus

Course Outcomes		
CO1	Explain the concepts of Continuous and Discontinuous functions, open and close sets, Connectedness, Completeness and Compactness	PO1
CO2	Explain the concepts of bounded and totally bounded sets, continuity of inverse functions and Uniform continuity	PO1,PO2
CO3	Define the sets of measure zero, to Explain about the existence and properties of Riemann integral	PO4,PO6
CO4	Explain the concept of differentiability and to Explain Rolle's theorem, Law of mean, and Fundamental theorem of calculus	PO4,PO5, PO6
CO5	Explain the point wise and uniform convergence of sequence of function and to derive the Taylor's theorem	PO3,PO8

Text Books (Latest Editions)	
1	Principles of Mathematical Analysis by Walter Rudin, Tata McGraw Hill Education, Third edition (1 July 2017).
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Introduction to Real Analysis byWilliam F. Trench,2003 published by Prentice Hall/Pearson Education
2	Mathematical Analysis Tom M A postal, Narosa Publishing House, 2nd edition (1974), Addison-Wesley publishing company, New Delhi
Web Resources	
	https://s2pnd-matematika.fkip.unpatti.ac.id/wp-content/uploads/2019/03/Real-Analysis-4th-Ed-Royden.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
MATHEMATICAL MODELLING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC53	CORE	4	1	-	-	4	5	25	75	100

Learning Objectives	
LO1	Construction and Analysis of Mathematical models found in real life problems
LO2	Modelling through differential and difference equations
LO3	introduce students to the elements of the mathematical modeling process;
LO4	Present application-driven mathematics motivated by problems from within and outside mathematics;
LO5	Demonstrate connections among different mathematical topics.
UNIT	**DETAILS**
I	Mathematical Modelling: Simple situations requiring mathematical modelling, characteristics of mathematical model
II	Mathematical Modelling through differential equations: Linear Growth and Decay Models. Non-Linear growth and decay models, Compartment models
III	Mathematical Modelling, through system of Ordinary differential equations of first order: Prey-predator models, Competition models, Model with removal and model with immigrations. Epidemics: simple epidemic model, Susceptible-infected- susceptible (SIS) model, SIS model with constant number of carriers. Medicine: Model for Diabetes Mellitus
IV	Introduction to difference equations.
V	Mathematical Modelling through difference equations: Harrod Model, cob web model application to Actuarial Science

Course Outcomes		
CO1	Explain simple situations requiring Mathematical Modelling and to Determine the characteristics of such models	PO1
CO2	using differential equations in-terms of linear growth and Decay models	PO1,PO2
CO3	Model using systems of ordinary differential equations of first order, to discuss about various models under the categories 'Epidemics' and 'Medicine'	PO4,PO6
CO4	Explain in detail about difference equations	PO4,PO5, PO6
CO5	Model using difference equations	PO3,PO8

Text Books (Latest Editions)	
1	Mathematical Modeling applications with Geogebra by Jonas Hall & Thomas Ligefjard, John Wiley & Sons, 2017
2	Mark M. Meerschaert: Mathematical Modeling, Elsevier Publ., 2007.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Mathematical Modeling by Bimalk. Mishra and DipakK.Satpathi. Ane Books Pvt. Ltd(1 Janauary 2009)
2	Mathematical Modeling Models, Analysis and Applications, by Sandip Banerjee, CRC Press, Taylor & Francis group, 2014
3	Edward A. Bender: An introduction to mathematical Modeling, CRC Press,2002
4	Walter J. Meyer, Concepts of Mathematical Modeling, Dover Publ., 2000
Web Resources	
	http://mtm.ufsc.br/~daniel/matap/IntMatMod.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
MECHANICS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC54	CORE	4	1	-	-	3	5	25	75	100

Learning Objectives	
LO1	Determine the components of a force in rectangular or nonrectangular coordinates
LO2	Determine the resultant of a system of forces.
LO3	Draw complete and correct free-body diagrams and write the appropriate equilibrium equations from the free-body diagram.
LO4	Determine the support reactions on a structure.
LO5	Determine the connection forces in trusses and in general frame structures
UNIT	**DETAILS**
I	Force: Newton's laws of motion – Resultant of two forces on a particle - Equilibrium of a Particle: Equilibrium of a particle – Limiting equilibrium of a particle on an inclined plane
II	Forces on a Rigid Body: Moment of a Force – General motion of a body – Equivalent systems of forces- Parallel Forces – Forces acting along a Triangle - A specific reduction of Forces: Reduction of coplanar forces into a force and couple – Problems involving frictional forces
III	Work, Energy and Power: Work – Conservative field of force – Power -Rectilinear Motion under Varying Force: Simple Harmonic Motion - along a horizontal line – along a vertical line.
IV	Projectiles: Forces on a projectile – Projectile projected on an inclined plane
V	Central Orbits**:** General orbits – Central orbit – Conic as a centered orbit

Course Outcomes		
CO1	Define Resultant, Component of a Force, Coplanar forces, like and unlike parallel forces, Equilibrium of a Particle, Limiting equilibrium of a particle on an inclined plane	PO1
CO2	Define Moment of a force and Couple with examples. Define Parallel Forces and Forces acting along a Triangle, Solve problems on frictional forces	PO1,PO2
CO3	Define work, energy, power, rectilinear motions under varying forces. Define Simple Harmonic Motion and find its Geometrical representation.	PO4,PO6
CO4	Define Projectile, impulse, impact and laws of impact. Prove that the path of a projectile is a parabola. Find the direct and oblique impact of smooth elastic spheres	PO4,PO5, PO

CO5	Define central orbits, explain conic as centered orbits and solve problems related to central orbits	PO3,PO8

Text Books (Latest Editions)	
1	A. K. Dhiman, P.Dhinam and D. Kulshreshtha, Engineering Mechanics (Statics and Dynamics) ,McGraw Hill Education(India) Private Limited, New Delhi, 2015.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	J.L. Meriam and L. G. Kraige, Engineering Mechanics: Statics, Seventh Edition,Wiley and so Pvt ltd., New York, 2012.
2	J.L. Meriam, L. G. Kraige, and J.N. Bolton, Engineering Mechanics: Dynamics, 8thedn, Wil and sons Pvt ltd., New York, 2015.
Web Resources	
	https://www.ae-info.org/attach/User/Gallavotti_Giovanni/gallavotti_giovanni_publicatios.pdf/book.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

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

THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
FUZZY SETS AND ITS APPLICATIONS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112DSC55	CORE	4	-	-	-	3	4	25	75	100

Learning Objectives	
LO1	Humans have a remarkable capability to reason and make decisions in an environment of uncertainty, imprecision, incompleteness of information, and partiality of knowledge, truth and class membership
LO2	The principal objective of **fuzzy logic** is formalization/mechanization of this capability.
LO3	Make applications on Fuzzy logic membership function and fuzzy inference systems.
LO4	Use the fuzzy set theory on the statistical method which is given and analyse statistical data by using fuzzy logic methods.
LO5	Compare statistical methods against fuzzy logic methods and get theory of the statistics fuzzy logic theory together
UNIT	**DETAILS**
I	Fuzzy sets-basic types-basic concepts- α cuts-additional properties of α cuts-extension principle for fuzzy sets
II	Operation on fuzzy sets-types of operations- fuzzy complements-t-norms- fuzzy unions-combinations of operations
III	Fuzzy Arithmetic - Fuzzy numbers-Arithmetic operations on intervals Arithmetic operations on fuzzy numbers
IV	Fuzzy relations-Binary fuzzy relation-fuzzy equivalence relation-fuzzy compatibility relation-fuzzy ordering relations-fuzzy morphism
V	Fuzzy relation equation-general discussion-problem partition ing-soluti on method-fuzzy relation equations based on sup-i compositions-fuzzy relation equations based on $w_i$compositions

Course Outcomes		
CO1	Be able to get the knowledge and understand Classical Sets vs Fuzzy Sets (FS) – Types of FS – Operations on FS	PO1
CO2	Be able to get the knowledge and understandZadeh's Extension Principle	PO1,PO2
CO3	Be able to get the knowledge and understand Fuzzy Relations – Fuzzy Relational Equations – Possibility Theory	PO4,PO6
CO4	Be able to get the knowledge and understand Fuzzy Measures.	PO4,PO5, PO6
CO5	Fuzzy relation equations based on sup-i compositions-fuzzy relation equations based on wicompositions	PO3,PO8

Text Books (Latest Editions)	
1	Introduction to Fuzzy Sets, Fuzzy Logic, and Fuzzy Control Systems, By Guanrong Chen, Trung Tat Pham,2000
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Fuzzy Sets, Fuzzy Logic and Their Applications, MDPI - Multidisciplinary Digital Publishing Institute,2020
2	Introduction to FUZZY LOGICBy RAJJAN SHINGHAL, 2012 published by phi learning
Web Resources	
	https://cours.etsmtl.ca/sys843/REFS/Books/ZimmermannFuzzySetTheory2001.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

THIRD YEAR -SEMESTER V
Part-III
CORE PAPER
OPTIMIZATION TECHNIQUES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112DSC56	CORE	4	-	-	-	3	4	25	75	100

Learning Objectives	
LO1	Optimization is an important tool of modern applied mathematics
LO2	This course gives an idea to the student to recognize potential linear programming problems.
LO3	The objective of this paper is to highlight the theoretical, computational and applied aspects of linear programming problems
LO4	To humiliate such problems as linear programming models, to employ the proper computational techniques
LO5	To solve these problems, and to understand the mathematical aspects that tie together these elements of linear programming
UNIT	**DETAILS**
I	Introduction to operations Research — Elementary treatment of linear programming simplex Method <,=,>,= constraints
II	Application to Transportation problem - Transportation Algorithm - Degeneracy in Transportation problem, unbalanced transportation problem, Assignment problem - The assignment algorithm - unbalanced assignment problem
III	PERT and CPM network — critical and sub critical jobs — Determining the critical path. Network calculation PERT networks probability aspect of PERT — PERT time — PERT cist (omitting Crashing)
IV	Sequencing Problems – Introduction – Step-wise procedure for determing the optimal sequence for n jobs on 2 machines (Johnson's method) – Processing n jobs on three machines – Processing n jobs on m machines – Processing of two jobs on 'n ' machines
V	Inventory Theory--Variables in an Inventory problem Techniques of

	InventoryControl 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

Course Outcomes		
CO1	Students using OR techniques in business tools for decision making	PO1
CO2	Students develop PERT and CPM networks and finding the shortest path	PO1,PO2
CO3	Understand the concept of sequencing problems and game theory	PO4,PO6
CO4	Students gets the knowledge about inventory theory	PO4,PO5, PO6
CO5	Iteratively improving the accuracy of a machine learning model, lowering the degree of error.	PO3,PO8

Text Books (Latest Editions)	
1	Resource Management Techniques (Operations Research) V.Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan
2	Operations Research Methods and Applications, P.Mariappan
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Operations Research by Kantiswarup, P.K. Gupta and Manmohan
Web Resources	
	http://www.math.chalmers.se/Math/Grundutb/CTH/tma947/0405/kompendium_sub.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

THIRD YEAR -SEMESTER V
Part-IV
Skill Enhancement Course
VALUE EDUCATION - 1

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
231AECVED	SEC	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	Provide insights into the central dogma of molecular biology and explain the mechanism of DNA replication.
LO2	Elaborate the mechanism of transcription and reverse transcription.
LO3	Highlight the characteristics of genetic code and describe the process of protein synthesis.
LO4	Introduce the concept of regulation of gene expression in prokaryotes
LO5	Familiarize the different types of mutations and explain the mechanism of DNA repair.

UNIT	DETAILS
I	Central Dogma of molecular Biology, DNA as the unit of inheritance. Experimentalevidences by Griffith's transforming principle, Avery, McLeod and McCarthy'sexperiment,andHersheyandChaseExperiment.Replicationinprokaryotes:Modesofreplication,MeselsonandStahl'sexperimental proof for semiconservative replication. Mechanism of Replication – Initiation, events at Ori C, Elongation – replicationfork, semi discontinuous replication, Okazaki fragments, and termination. Bidirectional replication, Inhibitorsofreplication. Modelsofreplication-theta,rolling circleandD loop model.
II	Transcription - Mechanism of transcription: DNA dependent RNA polymerase(s), recognition, binding and initiation sites, TATA/ Pribnow box, elongation and termination. Post-transcriptional modifications;inhibitorsoftranscription.RNAsplicing and processing of mRNA, tRNA and rRNA. Reverse transcription.

III	GeneticCode and its characteristics, Wobble hypothesis. Translation: Adaptor role of tRNA, Activation of amino acids, Initiation, elongationandterminationofproteinsynthesis,post-translationalmodificationsandinhibitors of protein synthesis.
IV	RegulationOfGeneExpressionInProkaryotes– Principlesofgeneregulation,negativeandpositiveregulation,conceptofoperons,regulatory proteins, activators, repressors, regulation of lac operon and trp operon.
V	Mutation:Types-Nutritional,Lethal,Conditionalmutants.Missensemutationandother point mutations. Spontaneous mutations; chemical and radiation – induced mutations.DNA repair: Direct repair, Photoreactivation, Excision repair, Mismatch repair, Recombination repair and SOS repair.

Course Outcomes		
CO1	IllustratetheCentralDogmaofmolecularbiology, explainthe multiplication of DNA in the cell and describe the types andmodesofreplication.	PO1
CO2	Elaborate the mechanism of transcribing DNA into RNA, discuss the formationofdifferenttypesofRNA.	PO1,PO2
CO3	Decipher the genetic code and summarize the processoftranslation.	PO4,PO6
CO4	Comprehend the principles ofgeneexpression and explain the concept of operon inprokaryotes.	PO4,PO5, PO6
CO5	Distinguish the types of mutations and explain the various mechanismsofDNArepair.	PO3,PO8

Text Books (Latest Editions)	
1	Veer BalaRastogi, 2008, Fundamentals of Molecular Biology, 1st edition,AnebooksIndia.
2	David Friefelder,1987, Molecular Biology, 2nd edition, Narosa PublishingHouse.
	Dr.P.S.VermaandDr.V.K.Agarwal,2013,Cellbiology, Genetics,MolecularBiology,EvolutionandEcology,1stedition,S.Chand&CompanyPvt.Ltd.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Karp,G.,2010,CellandMolecularBiology:ConceptsandExperiments,6thedition,JohnWiley&Sons.Inc.
2	DeRobertis,E.D.P.andDeRobertis,E.M.F.,2010,CellandMolecularBiology,8thedition,LippincottWilliamsandWilkins,Philadelphia.
3	James.D.Watson,2013,MolecularBiologyoftheGene7thedition,BenjaminCummings.
Web Resources	

	www.mednotes.net/notes/biology
	https://www.onlinebiologynotes.com/repair-mechanism-of mutation/
	https://teachmephysiology.com/biochemistry/protein-synthesis/dna-translation/

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3						3			3
CO 4	3	2					3			3
CO 5	3	2					3	1		3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

THIRD YEAR -SEMESTER VI
Part-III
CORE PAPER
COMPLEX ANALYSIS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112AEC61	CORE	5	1	-	-	4	6	25	75	100

Learning Objectives	
LO1	Apply concept and consequences of analyticity and C-R equations.
LO2	Understand the concept of mappings and transformations
LO3	Compute complex contour integrals and applying Cauchy's integral in various versions
LO4	Understand zeros and singularities of an analytic function, apply their properties in the evaluation of definite integral
LO5	

UNIT	DETAILS
I	**Analytic functions**: Functions of a Complex variable – Limits –Theorem on limits –Continuity – Derivatives – Differentiation formulas – Cauchy Riemann equation – conditions for differentiability – Polar coordinates– Analytic functions– Harmonic functions
II	**Conformal mapping:** Mappings – Mapping by exponential function – Linear transformation – The transformation w= $\frac{1}{z}$– Mappings by $\frac{1}{z}$ – Linear fractional transformations (bilinear)
III	**Complex Integration**: Contour integrals– Some examples – Simply and Multiply connected domains– Cauchy integral formula – Formula for derivatives– Liouville's theorem –Fundamental theorem of Algebra– Maximum modulus principle
IV	**Sequences and Series:** Convergence of sequences – Convergence of series– Taylor's series – Laurent series– Absolute and uniform convergence of power Series – Continuity of sums of power series–Integration & differentiation of power series
V	**Residues and Poles:** Isolated singular points – Residues– Cauchy Residue theorem – Residue at infinity – The three types of isolated singular points – Residues at poles – Zeros of analytical functions – Zeros and poles – Evaluation of real improper integrals (excluding poles on the real axis).

Course Outcomes		
CO1	Explain about analytic functions, their differentiation and continuity and to verify the Harmonic functions using analyticity conditions	PO1
CO2	Explain the concept of Conformal mappings and mappings by linear transformations and linear fractional transformations	PO1,PO2
CO3	Explain about the integrations of functions over simply and multiply connected domains and to derive the Cauchy integral formula, Liouvlle's theorem, Fundamental theorem of Algebra and Maximum Module Principle	PO4,PO6
CO4	Find the convergence the sequences and series, to derive Taylor's and Laurent's series	PO4,PO 5, PO6
CO5	Find the nature of singularities, to find the residue of a given function at a given singular point, to Explain about zeros and poles and to evaluate real improper integrals (Excluding poles on the real axis)	PO3,P O8

Text Books (Latest Editions)	
1	Richard A. Silverman, Introductory Complex Analysis. Dover Publications, 1972
2	S. Ponnusamy and H. Silverman, Complex variables with applications, Birkhauser, 2006
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Theodore W. Gamelan, Complex Analysis, Springer Verlag, 2008
2	Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.
Web Resources	
	https://s2pnd-matematika.fkip.unpatti.ac.id/wp-content/uploads/2019/03/John-M.-Howie-Complex-Analysis-Springer-Undergraduate-Mathematics-Series-Springer-2007.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

THIRD YEAR -SEMESTER VI
Part-III
CORE PAPER
GRAPH THEORY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112DSC64	CORE	4	1	-	-	3	5	25	75	100

Learning Objectives	
LO1	Graph Theory is an integral part of Discrete Mathematics
LO2	It has applications to many fields, including computer science, physics, chemistry, psychology and sociology
LO3	In this course we teach basic topics in graph theory 20 such as Trees, Directed graphs, Connectivity, Euler tours, Hamilton cycles, Matchings, Colourings, Planar graphs
LO4	Able to define the properties of bipartite graphs, particularly in trees.
LO5	Able to understand the concept of colorings and theory.
UNIT	**DETAILS**
I	Definitions of graph — finite and infinite graphs — incidence and degree isolated and pendent vertices — isomorphism — sub graphs — walks, puths and circuits — Connected and disconnected graphs — components — Euler graphs — Operations on graphs — more on Euler graphs — Harniltonian paths and circuits
II	Properties of trees — pendent vertices in a tree — distances and centers in a tree — Rooted and binary trees — Spanning trees — fundamental Circuits — Finding all spanning trees of a graph — Spanning trees in a weighted graph.
III	Cut-sets — Properties of cut-set- All cut-sets in a graph — Fundamental circuits and cut-sets — connectivity and reparability.
IV	Planar graphs — Knratowski's two graphs — Representation of a planar graph — Detection of planarity — Geometrical dual — Combinational dual
V	Matrix representation of graphs — Incidence Matrix — circuit matrix Fundamental circuit and matrix and rank of the circuit matrix — cut-set matrix — Adjacency matrix. Chromatic number — Chromatic partitioning — Chromatic

	polynomial. Treatment and content as in "Graph Theory with applications to engineering and computer science" by NarsingDeo, Prentice Hall of India, New Delhi.

Course Outcomes		
CO1	Knowledge in Graph Theory	PO1
CO2	Understanding the properties of Graph Theory	PO1,PO2
CO3	Understanding the concept of Kuratowski's graph	PO4,PO6
CO4	Understanding Matrix representation of graphs	PO4,PO 5, PO6
CO5	Explains basic results related with Eulerian and Hamiltonian graphs.	PO3,P O8

Text Books (Latest Editions)	
1	Graph Theory — S.A. Choudum, Macmillan India Limited —New Delhi — Madras.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Invitation to graph Theory' by Dr.S. Arumugam and Dr. S. Ramachandran
2	Graph Theory' — F. E-Haray, Narosa Publishing House, New Delhi — Madras - Bombay.
Web Resources	
	https://www.maths.ed.ac.uk/~v1ranick/papers/wilsongraph.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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

THIRD YEAR -SEMESTER VI
Part-III
CORE PAPER
ASTRONOMY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23112DSC63	CORE	5	1	-	-	4	6	25	75	100

Learning Objectives	
LO1	Knowledge and understanding about celestial objects
LO2	Apply scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations
LO3	Discuss the astronomical refraction zones of Earth, phases of Moon, seasonalVariations, Kepler's law of motion, anomalies, eclipses.
LO4	Able to identify, classify and compare the stars on the Hertzsprung-Russell diagram.
LO5	Acquire knowledge of the Physical universe and its evolution.

UNIT	DETAILS
I	Relevant properties of a sphere & relevant formulae for spherical trigonometry (all without proof) -Celestial sphere -Diurnal motion
II	Earth- Dip of the horizon-Twilight- Astronomical refraction- Tangent& Cosines Formula- Properties & simple problems applying them
III	Keplar's laws of planetary motion (statement only) - Newton's deductions from them -Three anomalies of the Earth and relation between them .
IV	Time: Equation of time – Seasons - Years and calendar – Conversion of time - Geocentric parallax - Heliocentric parallax- Aberration of light -simple problems in the above
V	Moon(except Moon's liberations)-Motions of planet(assume that orbits are circular- Eclipses

Course Outcomes		
CO1	Understand about celestial objects	PO1
CO2	Knowledge about Eclipses	PO1,PO2
CO3	Different zones of Earth	PO4,PO6
CO4	Astronomical refraction	PO4,PO 5, PO6
CO5	Different phases of Moon	PO3,P O8

Text Books (Latest Editions)	
1	J V.Thiruvenkatacharya, A Text Book of Astronomy, S. Chand and Co., PvtLtd., 1972
2	An Introduction Of Astronomy and Cosmology by ianmarison, published by University of Manchester, UK
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	S. Kumaravelu and Prof. SusheelaKumaravelu, Astronomy, SKV Publications,2004 UNIT-I — 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—Chapter12,13&14
Web Resources	
	http://staff.ustc.edu.cn/~xuey/IAC/000_Introduction_to_Astronomy_and_Cosmology.pdf

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme

Specific Outcomes

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

Part-IV
Core Paper
PROFESSIONAL COMPETENCY SKILL

Subject Code	Category	L	T	P	S		Credits	Inst. Hours	Marks		
									CIA	External	Total
231SECPCS5	CORE	2	-	-	-		2	2	25	75	100

		Learning Objectives
LO1		To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.
LO2		To prepare and explain the fundamentals related to various possibilities and probabilities related to quantitative aptitude.
LO3		To critically evaluate numerous possibilities related to puzzles.
LO4		To categorize and explain various principles of grammar in order to help students to minimize errors in English
LO5		To critically evaluate a given reading material for improving ones' reading skills and comprehension
UNIT		**DETAILS**
I		**Arithmetic:** Profit, Loss and Discount Simple Interest and Compound Interest Time and Work Work and wages
II		**Problem Solving:** Puzzle Number series Inequalities Missing number Arithmetic problems
III		**Analogy:** Semantic Symbolic Number Figural
IV		**Series:** Semantic Number Figural
V		**Coding and Decoding:** Alphabetic codes Word-group Meaning words Symbolic coding and decoding

Course Outcomes		
CO1	Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests	PO1
CO2	Solve questions related to Time and distance and time and work etc. from company specific and other competitive tests.	PO1,PO2
CO3	Understandandsolvepuzzlerelatedquestionsfromspecificandothercompetitivetests	PO4,PO6
CO4	Detect errors of grammar and usage in a given sentence/text and rectify them by making appropriate changes	PO4,PO5, PO6
CO5	Solve questions based on critical reasoning	PO3,PO8

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

Mapping with Programme Outcomes

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

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

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