SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (AUTONOMOUS) MADURAI - 2

DEPARTMENT OF MATHEMATICS

CBCS course structure for B.Sc. Mathematics as directed by Tamilnadu State Council for Higher Education

From June 2021 Onwards

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
DEPARTMENT OF MATHEMATICS

The Department of Mathematics is offering B.Sc. Mathematics since 1966 and M.Sc. Mathematics since 1980.

The department has an enterprising faculty team and provides an enriched academic ambience for the students. Seven of the faculty members have a Ph.D. Three of them are recognized research guides of Madurai Kamaraj University. Four of the faculty members are currently pursuing Ph.D.

Five of the staff members have degree in pedagogy. Four faculty members have PGDCA qualification.

Vision

The Vision of our department is to empower the Women Students to attain academic excellence.

Mission

The Mission of Mathematics department is to provide a strong foundation in Mathematics which will enable our students to excel in pedagogy and research.

Program Outcomes:

The successful completion of B.Sc. program will enable the students to:

PO1 Demonstrate the comprehensive knowledge in core subjects and allied Disciplines

PO2 Develop scientific aptitude and analytical skills

PO3 Apply the acquired knowledge and skills to tackle the real life situations

PO4 Act as socially responsible and effective team player

PO5 To exhibit appropriate soft skills to attain professional competencies

Program Specific Outcomes:

On successful completion of B.Sc. Mathematics program the students will be able to:

PSO1 Acquire a good foundation in the core subjects of Algebra, Calculus, Analysis, and Differential equations and applications of mathematics such as Statistics, Mechanics, Optimization techniques.

PSO2 Absorb and understand the abstract concepts that lead to various advanced theories in mathematical sciences.

PSO3 Develop the ability to model problems in the actual physical world using the abstract mathematical concepts.

PSO4 Demonstrate effective problem solving skills appropriate to the situation.

PSO5 Tackle competitive exams like Bank recruitment, IAS, TNPSC, TANCET with confidence.

B.Sc. Mathematics (2021 onwards)

Semester	Part	Course / Title of the Paper	Code	Hours	Credit
I	I	Tamil / Hindi	1A1/1H1	6	3
	II	English	2A1	6	3
	III	Core 1 – Calculus	M11	5	4
		Core 2 – Classical Algebra	M12	6	4
		Allied – 1 : Statistics – I	AL1	6	5
	IV	Value Education	AV1	1	-
				30	**19**
II	I	Tamil / Hindi	1A2/1H2	6	3
	II	English	2A2	6	3
	III	Core 3 - Analytical Geometry & Trigonometry	M21	6	4
		Core 4 - Vector Calculus & Fourier Series	M22	5	5
		Allied – 1 : Statistics – II	AL2	6	5
	IV	Value Education	AV1	1	2
				30	**22**
III	I	Tamil / Hindi	1A3/1H3	6	3
	II	English	2A3	6	3
	III	Core 5 – Discrete Mathematics	M31	4	4
		Core 6 – Statics	M32	4	4
		Allied – II : Physics – Theory Physics – Practical	AP1 PPA	4 3	3 -
	IV	Skill Based Elective 1	SM31	2	2
		Skill Based Elective 2		1	-
	V	Extension activity	EXA	-	1
				30	**20**

Semester	Part	Course / Title of the Paper	Code	Hours	Credit
	I	Tamil/Hindi	1A4/1H4	6	3
	II	English	2A4	6	3
	III	Core 7 – Differential Equations and its applications	M41	4	4
		Core 8 –Dynamics	M42	4	4
		Allied II Physics – Theory Physics – Practical	AP2 PPA	4 3	4 3
	IV	Skill Based Elective 2	SM42	1	2
		Skill Based Elective 3	SM43	2	2
				30	**25**
V	III	Core 9 - Modern Algebra	M51	5	4
		Core 10 - Real Analysis – 1	M52	5	4
		Core11- Linear Programming	M53	5	4
		Major Electives – 1	EM51	5	5
		Major Electives – 2	EM52	5	5
	IV	Skill Based Elective 4 General Knowledge	SGK4	2	2
		Skill Based Elective 5		1	-
		Non Major Elective 1		2	2
				30	**26**
VI	III	Core 12 - Complex Analysis	M61	6	5
		Core 13 - Linear Algebra	M62	5	5
		Core 14 - Real Analysis – II	M63	6	5
		Major Elective 3	EM63	4	4
		Major elective Practical	EMP1	2	1
	IV	Skill Based Elective 5	SM65	1	2
		Skill Based Elective 6	SM66	2	2
		Non Major Elective 2		2	2
		Environmental Science	ENS6	2	2
				30	**28**
		Total		**180**	**140**

LIST OF MAJOR ELECTIVE COURSES

V SEMESTER

Two out of the following five papers to be chosen

1. Graph Theory
2. Numerical Analysis
3. Astronomy
4. Application of Mathematics in Insurance
5. Mathematical Modeling

VI SEMESTER

One of the following combinations to be chosen

1. (i) C Programming
   (ii) Practical – C Programming Lab
2. (i) OOPs with C++
   (ii) Practical – C++ Programming Lab

LIST OF SKILL BASED ELECTIVES

1. Mathematical Aptitude for Competitive Exams
2. Integral Transforms
3. Optimization Techniques I
4. Optimization Techniques II
5. History of Mathematics I
6. History of Mathematics II
7. Combinatorics
8. Pure Geometry

LIST OF NON MAJOR ELECTIVES

1. Modern Algebra for Physical Sciences
2. Linear Programming
3. Optimization Techniques I
4. Optimization Techniques II
5. Quantitative Aptitude for Competitive Exams
6. Data Interpretation and Reasoning

ALLIED COURSES FOR B.Sc. PHYSICS AND B.Sc. CHEMISTRY

1. Allied Mathematics – Paper I
2. Allied Mathematics – Paper II

LIST OF VALUE ADDED COURSES

. 1. Logical Reasoning

2. History of Mathematics

3. Problem Solving

MAPPING PATTERN

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

B.Sc. Mathematics

CORE, ELECTIVE AND ALLIED

Evaluation Pattern

Internal : 25

External : 75

Total : 100

Passing Minimum : 40 Marks

No Internal Minimum

External Minimum : 35% (27 Marks)

Internal and External together : 40%

Question Paper Pattern

Time : 3 hours Maximum Marks :75

Section A :

5 Compulsory Questions

5×2 Marks = 10 Marks

Section B :

5 Questions to be answered under 'either - or' pattern

That is each question has an internal choice

5×7 Marks = 35 Marks

(1 Question from each unit)

Section C :

3 out of 5 Questions

3×10 Marks = 30 Marks

(1 Question from each unit)

BLOOM'S TAXONOMY

REMEMBERING	**50%**
UNDERSTANDING	**30%**
APPLYING	**20%**

Semester: I **Hours: 5/W 75hrs/Sem**

Course Code: M11 **Credits: 4**

Title of the Paper: CALCULUS **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Acquire a good foundation in the topics of curvature, evolutes.	1	15
CO2. Gain understanding of mathematical concepts of asymptotes, singularity .	2	15
CO3. Solve problems related to tracing of curves.	3	15
CO4.Analyse the properties of definite integrals.	4	15
CO5.Demonstrate the techniques of integration .	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	5	4	2	2	5	5	2	4	2	3.5
CO2	4	5	4	2	2	5	5	3	4	2	3.6
CO3	4	5	5	3	2	5	5	4	3	2	3.8
CO4	3	5	4	2	2	5	5	4	5	2	3.7
CO5	3	5	4	3	2	5	3	2	5	2	3.4

Overall Mean Score : 3.6

SEMESTER I

M11 - CORE 1 - CALCULUS

Lecture hours: 5 Credits: 4

UNIT I

Leibnitz formula for the n^{th} derivative of the product – Envelopes – Curvature – Circle, radius and centre of curvature – Cartesian formula for the radius of curvature – The co-ordinates of the centre of curvature.

UNIT II

Evolutes and involutes – Radius of curvature in polar coordinates – p-r equation – Pedal equation of a curve – chord of curvature.

UNIT III

Linear asymptotes – Singular points – Tracing of curves.

UNIT IV

Properties of definite integrals – Integration by parts.

UNIT V

Reduction formulae – Bernoulli's formula

TEXT BOOKS

1. Calculus Volume I by S. Narayanan and T.K.Manicavachagom Pillay, S.Viswanathan (Printers and Publishers) Pvt. Ltd., 2010 print.
2. Calculus Volume II by S. Narayanan and T.K.Manicavachagom Pillay, S.Viswanathan (Printers and Publishers) Pvt. Ltd., 2010 print.

UNIT I : Volume I : Chapter III : Section 2.1,
Chapter X: Section 1, Section 2 – 2.1 to 2.4

UNIT II: Volume I: Chapter X: Sections 2.5 - 3.1

UNIT III: Volume I : Chapters XI,XII and XIII.

UNIT IV: Volume II: Chapter I: sections 11 and 12.

UNIT V: Volume II: Chapter I: sections 13-15.1.

Semester : I **Hours: 6/W 90 hrs/Sem**

Course Code: M12 **Credits: 4**

Title of the Paper: CLASSICAL ALGEBRA **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	4	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Analyse and sum the series of binomial, exponential and logarithm	1	18
CO2. Understand relation between roots and coefficients of n^{th} degree equation	2	18
CO3. Solve reciprocal equation, apply Rolle's theorem, Transformation of equation, Descarte's rule of sign	3	18
CO4. Apply Strum's theorem and Solve equation by using Horner's method	4	18
CO5. Solve cubic equation by using Cardon's method, biquadratic equation by using Ferrari's method	5	18

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	4	3	2	2	3	4	3	4	3	3.1
CO2	4	4	3	2	2	4	5	3	2	3	3.2
CO3	4	4	3	2	2	3	4	3	3	3	3.1
CO4	4	4	4	2	2	3	4	3	4	3	3.3
CO5	5	3	4	2	2	3	5	3	3	3	3.3

Overall Mean Score : 3.2

SEMESTER-I

M12 - CORE 2 – CLASSICAL ALGEBRA

Lecture hours: 6 Credit : 4

UNIT I

Vandermonde's theorem – Binomial theorem for rational index – Particular cases of the Binomial expansion – Sign of terms in the Binomial expansion – Application of the Binomial theorem to the summation of series – Sum of coefficients – Approximate values. Exponential series – Summation – The logarithmic series .

UNIT II

Theory of equations –Remainder theorem – Every n^{th} degree equation has exactly n roots and no more – Relations between roots and coefficients of equations – Symmetric function of the roots – Sum of powers of the roots of an equation – Newton's theorem on the sum of the powers of the roots.

UNIT III

Transformations of equations – Reciprocal equation – Reciprocal roots – Removal of terms – Transformation in general – Descarte's Rule of signs – Rolle's theorem and its applications – Multiple roots.

UNIT IV

Strum's theorem – Solutions of numerical equations – Horner's method (upto 2 decimals).

UNIT V

General solution of the cubic equations – Cardon's method – Solution of biquadratic equations – Ferrari's method.

TEXT BOOK

Algebra Volume I- T. K. Manicavachagom Pillay, T. Natarajan and K.S. Ganapathy S.Viswanathan Printers and Publishers Pvt. Ltd., 2008

UNIT I :Chapter 3 : Sections 4 to 11,14 and Chapter 4 : Sections 3 & 5

UNIT II :Chapter 6 :Sections 1 to 14

UNIT III :Chapter 6 :Sections 15 to 26

UNIT IV :Chapter 6:Sections 27 to 30 (excluding section 29.4)

UNIT V :Chapter 6 :Sections 34 and 35.

Semester: I **Hours:6/W 90hrs/Sem**

Course Code: AL1 **Credits: 5**

Title of the Paper: STATISTICS-I **ALLIED**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	4	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Acquire basic knowledge in probability theory	1	18
CO2. Understand probability and density function of discrete and continuous random variable	2	18
CO3. Define and calculate Mathematical expectation and Moment Generating Function	3	18
CO4. Get clear concept of Binomial and Poisson distributions	4	18
CO5. Understand and apply the concept of normal distribution	5	18

ourse Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	3	4	3	3	3	4	4	3	3	3.4
CO2	4	2	4	2	2	3	4	4	3	2	3.0
CO3	3	3	3	2	2	3	5	5	3	2	3.1
CO4	3	2	3	3	2	3	4	5	3	2	3.0
CO5	3	3	3	3	2	3	3	5	3	2	3.0

Overall Mean Score : 3.1

SEMESTER I

AL1 – ALLIED 1 – STATISTICS – I

Lecture hours : 6 Credit : 5

UNIT I Theory of Probability

Introduction – Definitions of various terms – Axiomatic approach to probability – Probability – Mathematical Notion – Law of Multiplication – Baye's Theorem.

UNIT II Random Variables and Distribution Functions

Random variable – Distribution function – Discrete Random Variable – Continuous Random Variable.

UNIT III Mathematical Expectation and Generating Functions

Mathematical Expectation – Addition Theorem of Expectation – Multiplication Theorem of Expectation – Covariance – Expectation of Linear Combination of Random Variables – Variance of Linear combination of Random Variables – Moment Generating Function.

UNIT IV Theoretical Discrete Distributions

Introduction – Bernoulli Distribution – Binomial Distribution – Poisson Distribution.

UNIT V Theoretical Continuous Distributions

Rectangular Distribution – Normal Distribution: Normal Distribution as a Limiting form of Binomial Distribution – Chief Characteristics of the Normal Distribution and Normal Probability Curve – Mode of Normal Distribution – Median of Normal Distribution – Moment generating distribution of Normal Distribution.

TEXT BOOK

Elements of Mathematical Statistics by S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi, Third Edition, 2006

UNIT I : Chapter 4 : Sections 4.1, 4.3, 4.5 to 4.8

UNIT II : Chapter 5 : Sections 5.1 to 5.4

UNIT III : Chapter 6 : Sections 6.1 to 6.6 and 6.9

UNIT IV : Chapter 7 : Omitting Sections 7.2.7, 7.2.8, 7.2.9, 7.3.6 and 7.3.7

UNIT V : Chapter 8 : Sections 8.1, 8.2 to 8.2.5

Semester: II **Hours: 6 /W 90 /Sem**

Course Code: M21 **Credits: 4**

Title of the Paper: ANALYTICAL GEOMETRY AND TRIGONOMETRY **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	3	1	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Derive the polar equation of straight lines, circles, conics	1	18
CO2. Understand the concept of direction cosines of a line and normal of the plane	2	18
CO3. Interpret plane and straight line and coplanar lines	3	18
CO4. Expand hyperbolic functions and find logarithm of complex numbers	4	18
CO5. Sum up trigonometric series	5	18

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	4	4.5	4	4.5	5	4.5	4	5	4.5	4.4
CO2	4	4.5	4	4.5	4	4	4	4.5	4	4	4.15
CO3	4	4	4	4.5	4	4	3.8	4.5	4	4	4.08
CO4	4	4.5	4	4.5	4	4	3.8	4	4	4	4.08
CO5	4	4.5	4.5	4.5	4	4	3.8	4.5	4	4	4.18

Overall Mean score : 4.18

SEMESTER II

M21 - CORE 3 - ANALYTICAL GEOMETRY AND TRIGONOMETRY

Lecture hours: 6 Credit: 4

UNIT I

Polar equations – Straight lines – Circles – Conics – Tangent – Normal.

UNIT II

Rectangular Cartesian Co-ordinates – Direction cosines of a line – The plane.

UNIT III

The straight line –The Plane and the straight line – Coplanar lines.

UNIT IV

Expansions – Hyperbolic functions – Logarithm of complex number.

UNIT V

Summation of trigonometric series.

TEXT BOOK

TB1. Analytical Geometry Part I - Two Dimensions by T. K. Manicavachagom Pillay and T. Natarajan - S.Viswanathan (Printers and Publishers) Pvt.Ltd.,-2004 print.

TB2. Analytical Geometry Part II -Three Dimensions by T. K. Manicavachagom Pillay and T. Natarajan - S.Viswanathan (Printers and Publishers) Pvt.Ltd.,-2004 print.

TB3. Trigonometry by S. Narayanan and T. K. Manicavachagom Pillay- S.Viswanathan (Printers and Publishers Pvt.Ltd.,-2004 print)

UNIT I : TB1 : Chapter 9

UNIT II : TB2 : Chapters 1 & 2

UNIT III : TB2 : Chapter 3: Sections 1 to 8

UNIT IV : TB3 : Chapters 3,4 and Chapter 5: Section 5 only

UNIT V : TB3 : Chapter 6

Semester: II **Hours 5/W 75 hrs/Sem**

Course Code: M22 **Credits: 5**

Title of the Paper: VECTOR CALCULUS AND FOURIER SERIES **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	1	½	½

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1 Compute multiple integrals	1	15
CO2 Find and interpret the gradient, curl and divergence of a function at a given point	2	15
CO3 Evaluate line, surface and volume integrals	3	15
CO4 Apply Green's theorem, Stoke's theorem and Gauss divergence theorem	4	15
CO5 Expand any periodic function as a Fourier series	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4.8	4.5	5	4.5	4	5	5	4	4	4	4.48
CO2	4.8	4.5	4.8	4	4	4.5	4.5	4.5	4	4	4.36
CO3	4.5	4.5	4.5	4.5	4	4	4	4	4	4	4.2
CO4	4.8	4.5	4.5	4	4	4	4	4.5	4	4	4.23
CO5	5	4.5	5	4.5	4	4.5	4.5	4	4	4	4.4

Overall Mean Score : 4.334

SEMESTER II

M22 – CORE 4 – VECTOR CALCULUS AND FOURIER SERIES

Lecture hours: 5 Credit: 5

UNIT I

Multiple integrals – Changing the order of integration – Change of variables – Jacobian – Beta and Gamma functions.

UNIT II

Differentiation of vectors – Physical Applications – Gradient – Divergence and Curl

UNIT III

Integration of vectors: Line integral – Surface integral – Volume integral.

UNIT IV

Gauss divergence theorem – Green's theorem in space– Stoke's theorem– Green's theorem in plane (without proofs).

UNIT V

Fourier series – Even and Odd functions – The Cosine and Sine series — Half range series.

TEXT BOOKS

TB1. Calculus Volume II by S. Narayanan and T.K.Manicavachagom Pillay, S.Viswanathan (Printers and Publishers) Pvt. Ltd., 2010 print.

TB2. Vector Algebra and Analysis – S. Narayanan and T.K. Manicavachagom Pillay, S. Viswanathan (printers and publishers) Pvt. Ltd., – 1995 print.

TB3. Ancillary Mathematics Volume III (Revised) – Dr. S. Arumugam and Issac.

UNIT I : TB 1: Chapter 5: Sections 1 to 4
TB 1: Chapter 6 and 7: Sections 2 to 5

UNIT II : TB 2: Chapter 4

UNIT III : TB 2: Chapter 6: Sections 1 to 5

UNIT IV : TB 2: Chapter 6: Sections 6, 7, 9, 10

UNIT V : TB 3: Chapter 9

Semester: II **Hours: 6/W 90 hrs/Sem**

Course Code: AL2 **Credits: 5**

Title of the Paper: STATISTICS II **ALLIED**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	4	1	½	1/2

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Fit a straight line & second degree parabolic to sample data	1	18
CO2. Calculate correlation coefficient, rank correlation, regression coefficient and angle between two lines of regression	2	18
CO3. Define attributes, verify consistency of data, independence of data	3	18
CO4. Test of significance for small samples and large samples	4	18
CO5. Apply t-distribution, F-distribution and chi-square distribution	5	18

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4.9	4.8	4.7	4.5	4	5	4.8	4.5	4	4	4.52
CO2	4.6	4.5	4.5	4.5	4	4.5	4	4.5	4.5	4.5	4.41
CO3	4.5	4	4	4	4	4.3	4	4.3	4	4	4.11
CO4	4.5	4	4	4.5	4	4	4	4.3	3.8	3.8	4.09
CO5	4.5	4	4	4.5	4	4.5	4	4.2	3.8	3.8	4.13

Overall Mean Score : 4.25

SEMESTER II

AL2-ALLIED 2 – STATISTICS-II

Lecture hours: 6 Credit: 5

UNIT I Curve fitting and Principle of Least Squares

Curve fitting – Fitting of a straight line – Fitting of second degree parabola – Change of origin – Conversion of data into linear form

UNIT II Correlation and Regression

Bivariate distribution, Correlation – Scatter diagram – Karl Pearson coefficient of correlation – Calculation of the correlation coefficient for a bivariate frequency distribution – Rank correlation – Regression- Lines of regression – Regression coefficients – Properties of regression coefficients – Angle between two lines of regression.

UNIT III Theory of Attributes

Introduction – Notations – Dichotomy – Classes and class frequencies – Order of classes and class frequencies – Class symbols as operators – Consistence of data – Independence of attributes – Association of attributes.

UNIT IV Sampling and Large Sample Tests

Sampling introduction – Types of sampling – Parameters and statistic – Test of significance – Null hypothesis – Errors in sampling – Critical region and level of significance – Test of significance for large samples – Sampling of attributes – Sampling of variables – Unbiased estimates for population mean μ and variance σ^2 – Standard error of sample mean – Test of significance for single mean –Test of significance for difference of means – Test of significance for the difference of standard deviations.

UNIT V Exact Sampling Distributions

Chi-square variate – Derivation of the Chi-square distribution – M.G.F. of ψ^2-distribution – Applications of Chi-square distribution – Yate's correction – Students 't'(Definition) – Fisher's 't' (Definition) – Applications of t-distribution –Test for single Mean–t-test for difference of means – t-test for Testing Significance of an Observed Sample Correlation Coefficient – F-statistic(definition) – Applications of F-distribution– F-test for equality of Population Variance.

TEXT BOOK

Elements of Mathematical Statistics by S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi, Third Edition, 2006

UNIT I : Chapter 9: Sections 9.1 and 9.3

UNIT II : Chapter 10: omitting the sections 10.5, 10.7.2 and 10.7.6

UNIT III : Chapter 11

UNIT IV : Chapter 12

UNIT V : Chapter13 omitting sections 13.3.1, 13.3.2, 13.3.3 and 13.4

Chapter 14 omitting sections 14.2.1, 14.2.3 and 14.2.4

Semester: III **Hours: 4 /W 60 hrs/Sem**

Course Code: M31 **Credits: 4**

Title of the Paper: DISCRETE MATHEMATICS **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	2	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand the concepts of basic counting principles, permutations and combinations	1	10
CO2. Demonstrate the basic logical operations, propositions and algebra of propositions	2	10
CO3. Acquire a good foundation in languages and finite state automata	3	10
CO4. Interpret partially ordered sets and lattices	4	15
CO5. Gain understanding of Boolean Algebra, Boolean expression, logic gates and circuits	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	5	4	4	4	2	3	3	4	4	4	3.7
CO2	3	2	3	3	2	2	2	3	3	1	2.4
CO3	3	2	3	3	2	2	2	3	2	1	2.3
CO4	3	3	3	3	2	3	2	3	2	5	3.1
CO5	4	3	2	3	2	3	3	4	4	3	3.1

Overall Mean Score : 2.92

SEMESTER III

M31 - CORE 5 - DISCRETE MATHEMATICS

Lecture hours: 4 Credit: 4

UNIT I Counting and Algorithms

Introduction – Basic counting principles – Factorial notation – Binomial coefficients – Permutations – Combinations – The pigeon hole principle – Inclusion and Exclusion principle

UNIT II Logic and propositional calculus

Introduction – Propositions and compound propositions – Basic logical operations- Propositions and truth tables – Tautologies and contradictions – Logical equivalence – Algebra of propositions – Conditional and bi-conditional statements – Arguments – Logical implications – Propositional functions – Quantifiers – Negation of quantified statements

UNIT III Languages, Grammars and Machines

Introduction – Alphabet – words – Free semi group – languages – Regular expressions – Regular languages – Finite state automata – Grammars

UNIT IV Ordered Sets and Lattices

Introduction – Ordered Sets – Hasse diagrams of Partially Ordered Sets – Well -Ordered Sets – Lattices – Bounded Lattices – Distributive Lattices

UNIT V Boolean Algebra

Introduction – Basic definitions – Duality- Basic theorems – Sum of products form for sets – Sum of products form for Boolean Algebras – Minimal Boolean expressions – Prime implicants – Logic gates and circuits – Truth tables, Boolean functions – Karnaugh maps

TEXT BOOK

Schuam's Outlines – Discrete Mathematics - Semyour Lipschutz, Marc Lipson (III Edn) Tata Mc Graw Hill Publishing Company Ltd. New Delhi

UNIT I	:	Chapter 5: Sections 5.1 - 5.7
UNIT II	:	Chapter4: Sections 4.1 – 4.11
UNIT III	:	Chapter12: Sections 12.1 – 12.6
UNIT IV	:	Chapter 14: Sections 14.1 – 14.3, 14.7 - 14.10
UNIT V	:	Chapter15: Sections 15.1 – 15.4, 15.7 – 15.12

Semester: III **Hours: 4/W 60 hrs/Sem**

Course Code : M32 **Credits: 4**

Title of the Paper: STATICS **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	2	1	½	1/2

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Gain the knowledge about forces and resultant of forces acting at a point	1	12
CO2. Predict the effectiveness of parallel forces and moments	2	12
CO3. Use conditions of equilibrium of forces and moments to solve external and internal forces acting on objects	3	12
CO4. Describe the force of friction on stationary & moving objects	4	12
CO5. Explain the principle of virtual work & basic concepts and to solve the problems	5	12

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	5	4	4	4	4	5	5	5	5	4	4.5
CO2	4	4	5	4	4	5	4	4	5	4	4.3
CO3	4	3	5	5	4	5	5	5	5	4	4.5
CO4	5	4	4	4	4	5	4	4	4	3	4.1
CO5	4	5	4	5	4	5	4	5	4	4	4.4

Overall Mean Score : 4.36

SEMESTER III
M32 – CORE 6 – STATICS

Lecture hours: 4 Credit: 4

UNIT I

Forces acting at a point: Resultant and Components – Parallelogram of Forces – Triangle of Forces – Perpendicular Triangle of Forces – Converse of the Triangle of Forces – Polygon of Forces – Lami's Theorem – Extended form of Parallelogram law of Forces – Resolution and Components of a Force – Theorem on Resolved Parts – Resultant of any number of Forces acting at a point - Resultant of any number of coplanar forces acting at a point – Conditions of Equilibrium of forces – Problems.

UNIT II

Parallel forces and moments: The resultant of two like and unlike parallel forces acting on a rigid body - Conditions of equilibrium of three coplanar parallel forces – Centre of two parallel forces – Moment of a force – Sign and Unit of moment – Varigon's Theorem of moments – Moment of a force about an axis – Problems

Couples: Equilibrium of two couples – Equivalence of two couples – Couples in Parallel Planes – Resultant of coplanar couples- Resultant of a Couple and a force – Problems.

UNIT III

Equilibrium of Three Forces Acting on a Rigid body: Rigid body subjected to any three forces – Three coplanar forces – Two Trigonometrical Theorems – Problems.

Coplanar Forces: Introduction – Reduction of any number of coplanar forces – Conditions for a system of forces to reduce to a single force or to a couple – Change of the base point – Equation to the line of action of the resultant – Conditions of equilibrium – Problems.

UNIT IV

Friction: Introduction – Statistical, Dynamical and Limiting Friction – Laws of Friction – Friction – A passive force – Co-efficient, Angle and Cone of Friction - Equilibrium of a body on

a rough inclined plane under a force parallel to the plane - Equilibrium of a body on a rough inclined plane under any force – Problems.

UNIT V

Virtual Work: Work – Method of Virtual Work – Principal of Virtual Work for a system of coplanar forces acting on a body – Forces which may be omitted in forming the equation of Virtual Work – Work done by an extensible string –Work done by a weight of a body – Application of the principle of Virtual work – Problems.

Equilibrium of Strings: Uniform string under the action of gravity – Equation of the common catenary – Definitions – Tension at any point – Geometrical properties of the common catenary – Approximations to the shape of the catenary- The parabolic Catenary – Suspension Bridges – Problems.

TEXT BOOK

Statics by Dr. K. Venkataraman, Agasthiar Publications, 12th Edition, Trichy.

UNIT I : Chapter 2
UNIT II : Chapter 3 & 4
UNIT III : Chapter 5 & 6
UNIT IV : Chapter 7
UNIT V : Chapter 9 & 11

Semester: IV **Hours: 4 /W 60 /Sem**

Course Code: M41 **Credits: 4**

Title of the Paper: DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	2	1	½	½

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Acquire good knowledge in first & second order linear differential equations and solving techniques	1	12
CO2. Develop the idea about homogeneous linear differential equations and solving techniques	2	12
CO3. Develop the solving techniques of simultaneous differential equations & method of variation of parameters	3	12
CO4. Form the partial differential equations and evaluation of some standard forms	4	12
CO5. Explore the use of differential equations as models in various applications	5	12

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	5	4.8	4.9	4.8	4.7	5	4.9	4.8	4.7	4.5	4.8
CO2	5	4.9	4.8	4.6	4.7	5	4.7	4.7	4.8	4.7	4.8
CO3	5	4.7	4.6	4.8	4.5	5	4.8	4.9	4.6	4.9	4.8
CO4	5	4.7	4.8	4.7	4.6	5	4.7	4.8	4.6	4.7	4.8
CO5	5	4.8	4.7	4.8	4.7	5	4.6	4.7	4.5	4.8	4.8

Overall Mean Score : 4.8

SEMESTER IV

M41- Core 7 - DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

Lecture hours: 4 Credit: 4

UNIT I

Differential equations of first order -Equation of the first order and first degree, exact differential equations - Integrating factors - Linear equations – Bernoulli's equation – Equation solvable for p – solvable for y – solvable for x, Clairaut's equation.

UNIT II

Linear equation of second order with constant co-efficients .Methods of finding complementary functions – Methods of finding particular integrals. Homogeneous linear equations – Linear equations with variable coefficients - The general solution in terms of known integral of the C.F. - Removal of the first derivative – Changing the independent variables.

UNIT III

Method of variation of parameters - Simultaneous linear differential equations.

UNIT IV

Differential equations – Formation of partial differential equations - Methods of solving first order partial differential equations - Some standard forms – Charpit's method.

UNIT V

Applications of differential equations – Orthogonal trajectories – Growth and decay – Continuous compound interest – The Brachistochrone problem - Tautochronous property of the cycloid - Simple electric circuits - Falling bodies – simple harmonic motion – Simple pendulum – Central forces – Planetary motion – Dynamical problem with variable mass.

TEXT BOOK

Differential equations and applications by Dr.S.Arumugam and A.Thanga pandi Isaac, New gamma publishing house, Palayamkottai – 627 002.

UNIT I : Chapter 1 – 1.2, 1.3, 1.4, 1.5, 1.6, 1.7 and Chapter 2 – 2.1, 2.2, 2.3

UNIT II : Chapter 2 – 2.4, 2.5

UNIT III : Chapter 2 – 2.5, 2.6

UNIT IV : Chapter 4 – 4.1, 4.3, 4.4, 4.5

UNIT V : Chapter 5 – 5.1 to 5.5

Semester: IV **Hours: 4 /w 60/Sem**

Course Code: M42 **Credits: 4**

Title of the Paper: DYNAMICS **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	½	½

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand the basic laws of forces and their effects on motion	1	12
CO2. Identify and explain the properties of a projectile. Determine the location & velocity of a projectile at different points	2	12
CO3. Solve problems involving the impulse on an object, the forces acting on it.	3	12
CO4. Solve problems related to circular motion, define the period of motion, frequency for SHM, can relate the period & frequency	4	12
CO5. Determine the motion under the action of central forces	5	12

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	5	4.2	4.4	4	4.1	5	4.9	4.8	4.9	4	4.5
CO2	5	4.5	4.3	4.7	4	5	4.6	4.7	4.8	4.2	4.7
CO3	4.8	4.6	4.5	4	4.2	5	4.7	4.6	4.5	4.4	4.5
CO4	5	4.7	4.8	4.4	4.3	5	4.8	4.9	4.6	4.5	4.7
CO5	5	4.5	4.9	4.6	4.5	5	4.7	4.8	4.7	4.5	4.7

Overall Mean Score : 4.62

SEMESTER IV

M42 - CORE 8 - DYNAMICS

Lecture hours : 4 Credit: 4

UNIT I

The laws of motion: Momentum, Newton's law of Motion-Absolute Units of Forces-Gravitational Units of Force -Distinction between Mass and Weight - Force of Friction-Motion of a particle on a rough horizontal plane under the action of a constant force- Motion of a particle up a rough inclined plane under the action of a constant force-Pressure of a body resting on a moving horizontal plane - Motion of connected particles - Atwood's Machine - Work function of a varying force - Tension in an elastic string ,Work done in stretching an elastic string - Power energy - Kinetic energy -Work energy - Potential energy –velocity and acceleration of the centre of inertia of a system of particles

Motion in a resisting medium: Terminal or Limiting velocity in a resisting medium - Resistance proportional to the speed and square of the speed.

UNIT II

Path of a Projectile – Motion of a Projectile – velocity of the Projectile – Enveloping parabola – Problems on Projectiles.

UNIT III

Impulsive Forces: Impact of two bodies – Loss of kinetic energy in Impact – Motion of a shoot and gun– Impact of water on a surface.

Collision of elastic bodies: Fundamental laws of Impact – Impact of a smooth sphere on a fixed smooth plane – Direct Impact and Oblique Impact of two smooth spheres – Loss of kinetic energy due to Direct and Oblique Impact of two smooth spheres – Dissipation of energy due to Impact – Compression and Restitution – Impact of a particle on a rough plane.

UNIT IV

Motion in a Circle: Differentiation of a vector – Tangential and normal acceleration - Canonical pendulum – Governors of steam engine – Motion of a cyclist and railway carriage – Upsetting of a carriage –Motion of a carriage on a banked up track-Relative rest – Motion of a particle along a smooth curve – Motion on the outside of a smooth vertical circle –Motion of a

suspended particle in a vertical circle- Motion under constraints – Hodograph and normal acceleration.

Simple harmonic motion: simple harmonic motion is a straight line, General solution of the S.H.M. equation, geometric representation of a simple harmonic motion, composition of two simple harmonic motion, Motion of a particle suspended by a spiral spring. Horizontal oscillations of a particle tied to an elastic spring, period of oscillations of a simple pendulum, equivalent simple pendulum, the Seconds Pendulum, loss or gain in the number of oscillations made by a pendulum.

UNIT V

Motion under the action of Central forces: velocity and acceleration in polar coordinates, Motion under a central force- Differential equation of central orbits- perpendicular from the pole on the tangent, pedal equation of central orbit ,pedal equation of some well- known curves, velocities in a central orbit Two fold problems in central orbits, Apses and apsidal distances, given the law of force to the pole, to find the orbit, law of the inverse square and cube:

TEXT BOOK

Dynamics by Dr. M. K.Venkatraman, Agasthiar publications, Thirteenth Edition.

UNIT I : Chapters: 4 & 5

UNIT II: Chapter : 6

UNIT III: Chapters: 7 & 8

UNIT IV: Chapters: 9 & 10

UNIT V : Chapter : 11

Semester: V **Hours: 5 /W 75 /Sem**

Course Code: M51 **Credits: 4**

Title of the Paper: MODERN ALGEBRA **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a group, permutation group and subgroups	1	15
CO2. Students will be knowledgeable of different types of subgroups such as Cyclic subgroups, Normal subgroups, quotient groups and understand the structure and characteristics of these subgroups	2	15
CO3. Write precise and accurate mathematical definition of objects in Ring Theory	3	15
CO4. Understand subrings, Ideals and Integral domain	4	15
CO5. Demonstrate theorems about Euclidean domains PIDs and UFDs	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2.5	2	3	2.5	1.5	4	2	3	3	2.6
CO2	3	2	3	2.5	2	2	4	2	2.5	3	2.6
CO3	3	3	2	3	2.5	1.5	4	2.5	2	3	2.65
CO4	3	2.5	2	1.5	2	2	4	1.5	3	2	2.35
CO5	3	3	1.5	2.5	3.5	2	4	2.5	3	2.5	2.75

Overall Mean Score : 2.59

SEMESTER V

M51- CORE 9 - MODERN ALGEBRA

Lecture hours: 5 Credit: 4

UNIT I

Binary operations - Definitions and examples- Elementary properties of a group - Equivalent definitions of a group - Permutation groups - Sub groups.

UNIT II

Cyclic groups – Order of an element – Cosets and Lagrange's theorem – Normal subgroups and quotient groups – Isomorphism – Homomorphism.

UNIT III

Rings – Definition and examples – Elementary properties of rings – Isomorphism – Types of rings – Characteristics of a ring.

UNIT IV

Subrings - Ideals – Quotient rings – Maximal and prime ideals – Homomorphism of rings – Fields of quotients of an integral domain – Ordered integral domain.

UNIT V

Unique factorization domain – Euclidean domain – Every P.I.D is a U.F.D – Polynomial rings over UFD– Polynomials over Q.

TEXT BOOK

Modern Algebra by Dr. S. Arumugam and Thangapandian Issac - Scitech Publications (India) Pvt Ltd., Chennai.

UNIT I : Chapter 2: Section 2.5 and Chapter 3: Sections 3.1 – 3.5

UNIT II : Chapter 3: Sections 3.6 -3.11

UNIT III : Chapter 4: Sections 4.1 - 4.5

UNIT IV : Chapter 4: Sections 4.6 - 4.12

UNIT V : Chapter 4: Sections 4.13 - 4.18

Semester: V **Hours: 5 /W 75 hrs/Sem**

Course Code: M52 **Credits: 4**

Title of the Paper: REAL ANALYSIS-I **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	1	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Define the inequalities, write clear and precise proofs	1	15
CO2. Determine which sequences are bounded, monotonic, convergent, divergent, oscillating.	2	15
CO3. Prove the theorems on limits and calculate the limits	3	15
CO4. Apply the comparison test, Kummer's test, Root test and condensation test and Integral test	4	15
CO5. Understand the concepts of Alternating series, convergence of arbitrary series, Power series, Multiplication of series and Rearrangement of series.	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2.5	3.5	3	4	4	2.5	3	3	2.7
CO2	3	2	3	2	3	4	4	3	2.5	3	2.6
CO3	3	2.5	3	2.5	3	4	4	3	2	3.5	2.7
CO4	3	2.5	2	3	2	4	4	3.5	3	2	2.5
CO5	3	1.5	2.5	3	2.5	4	4	2.5	2	3	2.5

Overall Mean Score : 2.6

SEMESTER V

M52- CORE 10- REAL ANALYSIS-I

Lecture hours: 5 Credit: 4

UNIT I

Preliminaries – Inequalities – Triangle inequalities – Arithmetic, Geometric and Harmonic means – Cauchy-Schwarz inequality – Weierstrass's inequalities.

UNIT II

Sequences – Bounded, Monotonic, Convergent, Divergent and Oscillating sequences – Algebra of limits – Behaviour of monotonic sequences.

UNIT III

Some theorems on limits – Sub sequences – Limit points - Cauchy sequences – Upper and lower limits of a sequence.

UNIT IV

Infinite series – Comparison test – Kummer's test – Root test and condensation test – Integral test.

UNIT V

Alternating series – Absolute convergence – Tests for convergence of series of arbitrary terms - Rearrangement of series – Multiplication of series – Power series.

TEXT BOOK

Sequences and Series by Dr. S. Arumugam and M. Thangapandi Issac, New Gamma Publishing House.

UNIT I : Chapters 1 and 2

UNIT II : Chapter 3 : Sections 3.1 - 3.7

UNIT III : Chapter 3 : Sections 3.8 – 3.12

UNIT IV : Chapter 4

UNIT V : Chapter 5

Semester: V **Hours: 5 /W 75/Sem**

Course Code: M53 **Credits: 4**

Title of the Paper: LINEAR PROGRAMMING **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	1	-	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Develop the ability to understand mathematical formulation of the problem and graphical solution	1	15
CO2. Apply simplex method for solving optimization problems and simultaneous linear equations	2	20
CO3. Describe the underlying theory of duality and dual simplex method	3	15
CO4. Understand transportation problem and develop solutions by MODI method	4	15
CO5. Analyse Assignment problem and Travelling salesman problem	5	12

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	5	4	4	4	1	5	4	5	4	2	3.8
CO2	5	3	4	3	1	5	3	4	4	2	3.4
CO3	4	3	3	4	1	5	3	4	3	1	3.1
CO4	5	2	3	4	1	4	1	3	2	1	2.6
CO5	5	2	3	3	1	5	2	3	3	1	2.8

Overall Mean Score : 3.14

SEMESTER V

M53 - CORE 11- LINEAR PROGRAMMING

Lecture hours: 5 Credit: 4

UNIT I

Introduction – Mathematical formulation of the problem - Graphical solution

UNIT II

Simplex method – Introduction – The computational procedure – Use of artificial variables – Two-phase method – Big-M method - Solutions of simultaneous linear equations – Inverting a matrix using simplex method

UNIT III

Duality in Llinear Programming – Introduction – General Primal- Dual pair – Formulating a dual problem – Primal-Dual pair in matrix form - Duality theorems – Complementary slackness theorem - Duality and simplex method – Dual simplex method.

UNIT IV

Transportation problem – Finding initial basic feasible solution – Test for optimality – degeneracy - MODI method – Stepping Stone method – Exceptional cases.

UNIT V

Assignment problem – Mathematical formulation – Assignment method – Special cases – Typical assignment problem – The Travelling Salesman Problem

TEXT BOOK

Operations Research by Kanti Swarup, P.K. Gupta and Manmohan, Sultan Chand & sons, revised 16th Edition

UNIT I : Chapters : 2 and 3

UNIT II : Chapter : 4 Section 4.1, 4.3 to 4.7

UNIT III : Chapter : 5 Section 5.1 – 5.7, 5.9

UNIT IV : Chapter : 10 Section 10.1,10.8,10.9, 10.10,10.12,10.13,10.14,10.15

UNIT V : Chapter : 11 (Except 11.6)

Semester: VI **Hours: 6 /W 90 hrs/Sem**

Course Code : M61 **Credits: 5**

Title of the Paper: COMPLEX ANALYSIS **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	3	1	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand the geometric interpretation of Complex number , apply CR conditions determine which functions are harmonic ,conformal	1	18
CO2. Understand the elementary transformation and also bilinear transformation	2	18
CO3. Describe basic properties of complex integration and having the ability to compute such integrals	3	18
CO4. Decide where a given function is analytic and be able to find it series development	4	18
CO5. Prove the Cauchy Residue theorem and use it to evaluate integrals	5	18

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	3	2.5	3.5	2.5	4	4	2	2.5	3	4.1
CO2	4	2.5	3	3	2	4	4	3	3.5	2.5	3.85
CO3	4	3.5	3	2	3	4	4	2	3	3.5	4.2
CO4	4	3	3	2	2.5	4	4	3.5	2	3	2.9
CO5	4	2.5	2	3.5	3	4	4	3	3	2	3.2

Overall Mean Score : 3.65

SEMESTER VI

M61 - CORE 12 - COMPLEX ANALYSIS

Lecture hours: 6 Credit: 5

UNIT I

Complex numbers – Conjugation and Modulus – Amplitude – Geometrical representation of complex numbers – Circles and Straight lines – Stereographic projections - Cauchy-Riemann Equations - Analytic function – Harmonic functions – Conformal mapping.

UNIT II

Elementary transformations – Bilinear transformations – Cross ratio – Fixed points of linear transformation – Special bilinear transformation – The mapping $w = z^2$, $w = e^Z$, $w = \sin z$, $w = \cos z$

UNIT III Complex Integration

Definite integral - Cauchy's theorem – Cauchy's integral formula - Higher derivatives

UNIT IV Series Exapansion

Taylor's series **-** Laurent's theorem (without proof) –Zeros of an analytic function - Singularities

UNIT V

Calculus of residues – Cauchy's Residue theorem - Evaluation of definite integrals

TEXT BOOK

Complex Analysis Dr.S.Arumugam, Scitech Publications, Pvt. Ltd. Chennai, 2003.

UNIT I : Chapters 1 & 2 : Sections : 1.1, 1.2, 1.7, 1.9, 2.6, 2.9

UNIT II: Chapters 3 & 5 : Sections : 3.1 – 3.5, 5.1, 5.3, 5.4, 5.5

UNIT III : Chapter 6 : Sections : 6.1 – 6.4

UNIT IV: Chapter 7 : Sections : 7.1 – 7.4

UNIT V: Chapter 8 : Sections : 8.1 – 8.4

Semester: VI **Hours: 5 /W 75 hrs/Sem**

Course Code: M62 **Credits: 5**

Title of the Paper: LINEAR ALGEBRA **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	1	-	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Gain theoretical knowledge of vector spaces, and Linear transformations	1	10
CO2. Acquire good knowledge of Linear independence, basis and dimension	2	17
CO3. Develop the knowledge of Rank of matrix, bilinear and quadratic forms	3	17
CO4. Gain ability to compute eigen values and eigen vectors	4	16
CO5. Understand the concepts related to inner product spaces	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	4	3	3	3	5	5	4	3	2	3.5
CO2	4	4	3	4	4	5	5	3	3	2	3.7
CO3	5	5	5	5	5	5	5	4	3	2	4.4
CO4	5	5	5	5	5	5	5	5	4	2	4.6
CO5	4	4	4	3	3	4	4	4	3	1	3.4

Overall Mean Score : 3.92

SEMESTER VI

M62- CORE 13 - LINEAR ALGEBRA

Lecture hours: 5 Credit: 5

UNIT I

Introduction – Vector spaces – Definition and Examples – Subspaces – Linear transformation.

UNIT II

Span of set – Linear Independence - Basis and Dimension - Rank, Nullity and Matrix of linear transformation.

UNIT III

Elementary transformations – Rank of a matrix – Simultaneous linear equations - Bilinear forms and Quadratic forms

UNIT IV

Characteristic equation and Cayley Hamilton theorem - Eigen values and Eigen vectors

UNIT V

Inner product spaces – Definition and Examples – Orthogonality – Orthogonal complement

TEXT BOOK

Modern Algebra by Dr. S.Arumugam, Scitech Publications Pvt. Ltd., Chennai.

UNIT I : Chapter 5: Sections :5.0 – 5.3.

UNIT II: Chapter 5: Sections :5.4 - 5.8.

UNIT III : Chapter 7 : Sections : 7.4 – 7.6, Chapter 8.

UNIT IV: Chapter 7: Sections : 7.7 – 7.8

UNIT V: Chapters 6

Semester: VI **Hours: 6 /W 90 hrs/Sem**

Course Code: M63 **Credits: 5**

Title of the Paper: REAL ANALYSIS II **CORE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	3	1	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand the concept of countable and uncountable sets and bounded sets in a metric space	1	11
CO2. Acquire the knowledge of limit point, dense set and complete metric spaces.	2	17
CO3. Develop the ability to model continuous functions, Homeomorphism and Isometry of a function.	3	17
CO4. Identify connected subsets of R	4	15
CO5. Gain the knowledge of Compact subsets of R	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	4	3	3	3	4	5	5	3	2	3.6
CO2	5	5	5	4	4	5	5	5	4	2	4.4
CO3	5	5	4	3	3	5	5	3	3	2	3.8
CO4	4	4	4	3	3	5	5	3	3	2	3.6
CO5	4	4	4	3	3	5	5	3	3	2	3.6

Overall Mean Score : 3.8

SEMESTER VI

M63 CORE 14 - REAL ANALYSIS II

Lecture hours: 6 Credit: 5

UNIT I Preliminaries

Sets and Functions – Countable sets - Uncountable sets – Inequalities of Holder and Minkowski – Metric spaces - Definitions and examples – Bounded sets in a metric space.

UNIT II

Open ball in a metric space – Open sets - Subspaces- Interior of a set. Closed sets – Closure – Limit point – Dense sets – Complete metric spaces –Completeness - Cantor's intersection theorem – Baire's category theorem.

UNIT III Continuity

Definition and examples of continuous functions – Homeomorphism - Isometry – Uniform continuity – Discontinuous functions on R – Definition and examples only.

UNIT IV Connectedness

Definition and examples – Connected subsets of R- Connectedness and continuity.

UNIT V Compactness

Definition and examples – Compact subsets of R – Equivalent characterization for compactness – compactness and continuity.

TEXT BOOK

Modern Analysis – Dr. S. Arumugam & Isaac, New Gamma Publishing House, Palayamkottai.

UNIT I : Chapter 1: Sections 1.1 – 1.4, Chapter 2: Sections 2.1 – 2.2

UNIT II : Chapter 2: Sections 2.3 -2.10, Chapter 3: Sections 3.0 -3.2

UNIT III: Chapter 4 : Sections 4.0 -4.4

UNIT IV: Chapter 5: Sections 5.0 – 5.3

UNIT V : Chapter 6: Sections 6.0 – 6.4

MAJOR ELECTIVE COURSES

Semester: V **Hours: 5 /W 75 hrs/Sem**

Credits: 5

Title of the Paper: GRAPH THEORY **ELECTIVE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	1	-	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Acquire the knowledge of basic definitions of Graphs, degrees of a graph, types of graph	1	10
CO2. Gain the knowledge of Walks, Trails, Paths and connectedness and components of graph	2	17
CO3. Identify the concept of Eulerian and Hamiltonian graphs	3	15
CO4. Perceive the idea of Trees and planarity of a graph	4	17
CO5. Recognize the concept of chromatic number and Four, Five colour problem	5	16

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	5	5	5	4	3	5	5	5	5	4	4.6
CO2	5	5	5	4	3	5	5	5	5	4	4.6
CO3	4	4	4	3	3	3	3	4	4	3	3.5
CO4	5	5	5	4	3	4	4	4	4	3	4.1
CO5	4	4	4	4	4	4	4	4	4	4	4

Overall Mean Score : 4.16

ELECTIVE

GRAPH THEORY

Lecture hours : 5 Credit : 5

UNIT I Graphs, Subgraphs and Degree Sequences

Introduction : The Konigberg Bridge Problem – Four Colour Problem – Graph Theory in India - Graphs and subgraphs : Introduction – Definition and examples – Degrees - Subgraphs - Isomorphism – Ramsey Numbers – Independent Sets and Coverings – Intersection Graphs and Line graphs – Matrices – Operations on Graphs, Degree Sequences: Introduction – Degree Sequences – Graphic Sequences.

UNIT II Connectedness

Introduction – Walks - Trails and Paths Connectedness and Components – Blocks - Connectivity .

UNIT III Eulerian and Hamiltonian graphs

Introduction – Eulerian Graphs – Hamiltonian Graphs.

UNIT IV Trees and Planarity

Trees: Introduction – Characterization of trees – Centre of a tree , Planarity : Introduction – Definition and Properties Characterization of Planar Graphs – Thickness - Crossing and Outer Planarity.

UNIT V Colourability

Introduction – Chromatic Number and Chromatic Index – The Five Colour Theorem – The Four Colour Problem – Chromatic Polynomials.

TEXT BOOK

Invitation to Graph Theory by Dr.S.Arumugam and Dr. S.Ramachandran, Scitech Publications (India) Pvt. Ltd., Chennai

UNIT I : Chapter 1 – 3

UNIT II : Chapter 4

UNIT III : Chapter 5

UNIT IV : Chapter 6 and 8

UNIT V : Chapter 9

Semester: V **Hours: 5 /W 75 hrs/Sem**

Credits: 5

Title of the Paper: Numerical Analysis **ELECTIVE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	1	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand forward and backward differences their properties, differences of polynomial and factorial.	1	15
CO2. Find one or more missing values of equidistant term and apply Newtons formula.	2	15
CO3. Understand divided differences and their properties and apply Lagrange's interpolation formula.	3	15
CO4. Understand numerical differentiation & integration and apply Strilings formula to find derivatives.	4	15
CO5. Apply Euler's and Runge-Kutta method of second & fourth order	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4.5	4	4	4	4.5	5	4	5	4	4	4.3
CO2	4.5	4	4.5	4	4	4.5	4.5	4	4	4.5	4.25
CO3	4.5	4	4	4.5	4	5	4.5	4	4.5	4.5	4.55
CO4	4.5	4	4	4.5	4	4.5	4	5	4	4	4.15
CO5	4.5	4	4.5	4	4	4.5	4	4.5	4	5	4.3

Over all Mean Score : 4.31

ELECTIVE

NUMERICAL ANALYSIS

Lecture hours : 5 Credit : 5

UNIT I

Finite Differences: Introduction –First differences – Higher Differences - Difference Tables – Backward Differences – Central Difference Notation – Properties of the operator Δ - Differences of a Polynomial – Factorial Polynomials – Simple Problems – Error Propagation in a difference table – Operators E, ∇, δ, μ - Basic Properties

UNIT II

Interpolation: Introduction – Linear Interpolation – Gregory- Newton Forward and Backward Interpolation Formula – Equidistant terms with one or more missing values – Error in Polynomial Interpolation – Error in Newton's Interpolation Formulae

Central Difference Interpolation Formulae: Central Difference Tables – Central Difference Interpolation Formulae – Gauss's Forward and Backward Interpolation Formulae – Stirling's Formula – Bessel's Formula – Laplace –Everett Formula – Simple Problems

UNIT III

Interpolation with Unequal Intervals: Divided Differences – Properties of Divided Differences – Newton's Interpolation Formula for Unequal Intervals – Lagrange's Interpolation Formula – Inverse Interpolation – Simple Problems

UNIT IV

Numerical Differentiation : Introduction – Newton's Forward and Backward Difference Formula to compute the derivatives upto second order – Derivatives using Stirlings formula – Maxima and Minima of a tabulated function

Numerical Integration : The Trapezoidal Rule – Romberg's method – Simpson's rule – Truncation error in Simpson's formula

UNIT V

Difference Equations : Introduction - Difference Equations – Solution of First and Second order Equation With Constant Co-efficients

Numerical Solution of Ordinary Differential Equations : Euler's Method – Runge – Kutta method of Second and Fourth order

TEXT BOOK

Numerical Methods in Science and Engineering by Dr.M.K.Venkataraman, The National Publishing Company , Chennai, Fourth Edition (Revised and Enlarged)

UNIT I : Chapter V : Sections 1 - 18
UNIT II : Chapter VI ; Chapter VII : Sections 1 - 7
UNIT III : Chapter VIII
UNIT IV : Chapter IX : Sections 1 - 11
UNIT V : Chapter X, Chapter XI : Sections 10, 13, 14, 15

Semester: V **Hours: 5 /W 75 hrs/Sem**

Credits: 5

Title of the Paper: ASTRONOMY **ELECTIVE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	1	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Undrstand Celestial co-ordinates, sidereal time	1	15
CO2. Demonstrate effects of Geocemtric, Heliocentric, Parallax.	2	15
CO3. Find equation of time and conversion of time	3	15
CO4. Understand relation between sidereal month Lunation and relation between theorem	4	15
CO5. Undersand Planetary phenomena & Astronomical instruments	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	4	4.5	4.5	4	5	4.5	4	3.9	4	4.25
CO2	4	4	4.5	4.5	4.5	4.5	4	3.9	4.5	4	4.34
CO3	4.5	4.5	4	4	4	4	4	3.9	4.5	5	4.34
CO4	4	4.5	4	4	4	5	4.5	4.5	3.9	4.5	4.39
CO5	4.5	4	4	4	4	3.8	4	4.5	5	4	4.28

Over all Mean Score : 4.32

ELECTIVE

ASTRONOMY

Lecture hours: 5 Credit: 5

UNIT I

Spherical Trigonometry – Spherical Triangle – The fundamental formulae of spherical Trigonometry, the sine, cosine, four parts and Napier formulae (without proof)-The Celestial sphere: Celestial coordinators – Diurnal motion - Rising and setting of a star – Sidereal time – Circumpolar star – Morning and Evening stars – Twilight – Earth – Length of the day.

UNIT II

Refraction – Tangent formula – Cassini's formula Effects of Refraction – Geocentric parallax – Effects of Geocentric parallax – Heliocentric parallax – Effects of Heliocentric parallax – Aberration – Its Effects.

UNIT III

Kepler's Laws–Verification of Kepler's Laws– True anomaly, Mean Anomaly–Eccentric Anomaly, Relation between them – Time - Equation of Time – Seasons – Conversion of Time.

UNIT IV

Moon – Sidereal Month, Lunation and Relation between them – Phases of the Moon – Lunar Libration surface of the Moon – Metonic cycle – Tides – Eclipses. Shadow cone – Minimum and Maximum number of Eclipses.

UNIT V

Planetary phenomena - Bodes law – Elongation – Sidereal period, synodic period and the relation between them – Phase of a planet– stationary points – Solar system – Stellar universe – A brief history of Astronomy – Astronomical Instruments.

TEXT BOOK

Astronomy for degree classes by Prof. S. Kumaravelu and Prof. Susheela Kumaravelu –Rainbow Printers, Nagercoil (2005).

UNIT I : Chapters I, II & III

UNIT II : Chapters IV, V, VIII & IX

UNIT III : Chapters VI & VII

UNIT IV : Chapters XII & XIII

UNIT V : Chapters XIV, XV, XVI, XVII & XVIII

Semester: V **Hours: 5/W 75 hrs/Sem**

Credits: 4

Title of the Paper: APPLICATION OF MATHEMATICS IN INSURANCE **ELECTIVE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand fundamentals	1	15
CO2. Demonstrate benefits to the society	2	15
CO3. Understand the premium for all periods	3	15
CO4. Finds the claim	4	15
CO5.Understands the claim models	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	3	3	4	5	2	3	3	4	4	3.3
CO2	3	3	4	2	2	3	3	4	4	4	3.2
CO3	3	3	4	4	3	3	4	4	4	4	3.6
CO4	2	2	3	3	3	4	4	3	3	3	3.0
CO5	3	3	4	4	3	3	3	2	2	2	2.8

Overall Mean Score : 3.2

ELECTIVE
APPLICATION OF MATHEMATICS IN INSURANCE

Lecture hours: 5 Credit: 5

UNIT I

Insurance Fundamentals – Insurance defined - Meaning of loss - Chances of loss, peril, hazard and proximate cause in Insurance.

UNIT II

Costs and benefits of insurance to the society and branches of insurance – life insurance and various types of general insurance - Insurable loss exposures feature of a loss that is ideal for insurance.

UNIT III

Life insurance Mathematics – Construction of Mortality Tables - Computation of premium of Life Insurance for a fixed duration and for the whole life.

UNIT IV

Determination of claims for General Insurance – Using Poisson Distribution and Negative Binomial Distribution – The Polya case.

UNIT V

Determination of the amount of claims in General Insurance – Compound Aggregate claim model and its properties and claims of reinsurance function F – recursive and approximate formulae for F.

TEXT BOOK

Sheldon M. Ross, "An Introduction to Mathematical Finance", Cambridge University Press.

Semester: V **Hours: 5/W 75 hrs/Sem**

Credits: 4

Title of the Paper: MATHEMATICAL MODELING **ELECTIVE**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	3	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand models	1	15
CO2. Develop models in medicine	2	15
CO3. Explain models through differential equations	3	15
CO4. Explain models through difference equations	4	15
CO5. Understand models through graphs	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	3	3	4	5	2	3	3	4	4	3.3
CO2	3	3	4	2	2	3	3	4	4	4	3.2
CO3	3	3	4	4	3	3	4	4	4	4	3.6
CO4	2	2	3	3	3	4	4	3	3	3	3.0
CO5	3	3	4	4	3	3	2	2	2	2	2.8

Overall Mean Score : 3.2

ELECTIVE

MATHEMATICAL MODELING

Lecture hours: 5 Credit: 5

UNIT I

Mathematical modeling through Ordinary differential Equations (First Order) - Linear growth and Decay models – Non linear growth and Decay models – Compartment models – Dynamics problems – Geometrical problems.

UNIT II

Population Dynamics – Epidemics - Compartment models – Economics, medicine, Arms Race, Battles and International Trade.

UNIT III

Mathematical modeling through Ordinary differential Equations (Second Order) - Planetary motion – circular motion – Motion of satellites – Modeling through Linear difference equations of second order.

UNIT IV

Mathematical modeling through Difference Equations - Basic theory of difference equation with constant coefficients – Economics and finance – Population Dynamics and Genetics – Probability theory.

UNIT V

Modeling through Graphs - Solutions that can be modelled through graphs – Models in terms of directed graphs – Signed graphs weighted digraphs and unoriented graphs.

REFERENCES

1. J.N. Kapur – Treatment as in “Mathematical Modeling” by J.N. Kapur - New age International Publishers, 2004.
2. J.N. Kapur – Mathematical Modeling in Biology and Medicine – East Singh – Mathematical Modeling, International Book House – 2003.

Semester: VI **Hours: 4 /W 60 hrs/Sem**

Credits: 4

Title of the Paper: C PROGRAMMING **Elective**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	2	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Acquire the knowledge of basic structure of a C Program, constants, variables and data types, Managing input and output operations	1	15
CO2. Study about Operators	2	15
CO3. Implement decision making with branching & looping	3	15
CO4. Learn about one dimensional & two dimensional arrays, string handling functions	4	15
CO5. Study about user defined fnctions, structures, unions and pointers	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	4	3	5	3	2	2	3	3	2	3
CO2	3	4	3	5	3	2	2	3	3	2	3
CO3	3	4	3	5	3	2	2	3	3	2	3
CO4	3	4	3	5	3	3	2	3	3	2	3.1
CO5	3	4	4	5	3	3	2	3	3	2	3.2

Overall Mean Score: 3.06

ELECTIVE
C PROGRAMMING

Lecture hours: 4 Credit: 4

UNIT I

Basic structure of a C program – Constants – Variables – Data types – Managing input and output operations

UNIT II

Operators – Arithmetic – Relational – Logical – Assignment – Increment and decrement – Conditional – Bit wise and special Operators – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Some computational problems – Type conversion in expression – Operator precedence and associativity – Mathematical functions

UNIT III

Decision making – Branching – Simple IF, IF – ELSE – Nesting of IF.. ELSE, ELSE if ladder switch statement – Operator – Go to statements – while, do- while and for statements

UNIT IV

One dimensional and two dimensional arrays – Initialization of arrays – Handling of character strings – String handling functions

UNIT V

User defined functions – Structure and unions - Pointers

TEXT BOOK

Programming in ANSI – C by E. Balagurusamy III Edn. Tata McGraw Hill Publishing Company Ltd. New Delhi

UNIT I : Chapter 1: Sections: 1.8, 2 & 4

UNIT II : Chapter 3

UNIT III : Chapters 5 and 6 : 6.1 – 6.4

UNIT IV : Chapter 7: Sections: 7.1 – 7.6

Chapter 8 : 8.1 – 8.8

UNIT V : Chapter 9, 10 & 11: Sections 11.1 – 11.10

C PROGRAMMING LAB

Lab hours: 2 Credit: 1

UNIT I

1. Programs to illustrate input, output operations
2. Programs using symbolic constants, library functions
3. Program using various operators and arithmetical expressions

UNIT II

4. Programs illustrating concepts of branching
5. Programs illustrating concept of looping

UNIT III

6. Programs using arrays
7. Programs using string handling functions

UNIT IV

8. Programs using concept of user defined functions
9. Programs using recursions
10. Programs illustrating global and local variables

UNIT V

11. Programs using structures and unions
12. Programs using pointers

TEXT BOOKS

Programming in ANSI-C by E. Balagurusamy III Edition, Tata McGraw Hill Publishing Company Ltd., NewDelhi

Semester: VI **Hours: 4 /W 60 /Sem**

Credits: 4

Title of the Paper: OOP with C++ **Elective**

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	2	-	1	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand the principles, benefits and applications of OOP & begin with C++	1	15
CO2. Understand the functions in C++ programming	2	15
CO3. Gain knowledge about classes and objects in C++ programming	3	15
CO4. Present knowledge of constructors and destructors	4	15
CO5. Understand inheritance	5	15

Course Outcomes	Programme Outcomes					Programme Specific Outcomes					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	4	4	4	2	2	4	4	3	2	3.1
CO2	3	4	4	3	3	3	4	4	2	3	3.3
CO3	2	3	4	4	3	2	3	4	4	3	3.2
CO4	3	4	4	4	2	3	4	4	3	3	3.4
CO5	2	4	4	3	3	3	4	4	3	2	3.2

Overall Mean Score: 3.2

ELECTIVE

OOP WITH C++

Lecture hours: 4 Credit: 4

UNIT I

Principles of OOP – Basic concepts – Benefits of OOP – Applications of OOP – Beginning with C ++ - Tokens, Expressions and Control Structures

UNIT II

Functions in C++ - Main function – Function prototyping – Call by reference – Return by reference – Function overloading

UNIT III

Classes and objects – Introduction – Specifying a class – Defining member functions – Private member functions – Memory allocation for objects – Objects as function arguments – Friendly functions – Local classes.

UNIT IV

Constructions and destructions – Constructors – Parameterized constructors – multiple constructors – Copy constructors – Destructors – Operator overloading

UNIT V

Inheritance – Working with files – Introduction – Classes for file stream operators – Opening and closing a file – Detecting end of a file – More about open file models – Command line arguments.

TEXT BOOK

Object Oriented Programming with C++ by E.Balagurusamy 2nd Edn.

UNIT I : Chapters 1, 2 & 3

UNIT II : Chapter 4

UNIT III: Chapter 5

UNIT IV: Chapter 6 & Chapter 7 : 7.1 – 7.5

UNIT V : Chapter 8 & Chapter 11 : 11.1-11.5, 11.10

C++ PROGRAMMING LAB

Lab hours: 2 Credit : 1

UNIT I

Programs using tokens - Expressions and Control Structures

UNIT II

Programs using functions

UNIT III

Programs illustrating concept of objects and classes

UNIT IV

Programs using constructions and destructions - Programs using operator overloading

UNIT V

Programs using concept of inheritance - Programs using pointers - Programs using C++ streams

TEXT BOOK

Object Oriented Programming with C++ by E. Balagurusamy 2nd Edn.

SKILL BASED ELECTIVES

SKILL BASED ELECTIVE
MATHEMATICAL APTITUDE FOR COMPETITIVE EXAMS

Lecture hours: 2 Credit: 2

UNIT I

Numbers – HCF and LCM of numbers - Decimal Fractions – Simplification - Average.

UNIT II

Percentage - Profit and Loss - Ratio and Proportion - Partnership.

UNIT III

Time and Work - Pipes and cisterns - Time and distance - Problems on Trains-boats and streams - Alligation or Mixtures.

UNIT IV

Simple interest - Compound Interest – Area - Volume and surface area.

UNIT V

Odd man out and series - Data interpretation- Tabulation - Bar graphs - Pie charts - Line graphs.

TEXT BOOK

Quantitative Aptitude for competitive examinations by Dr. R.S.Aggarwal (3rd Edn) Published by S.Chand

UNIT I : Chapters 1,2,3,4,6

UNIT II : Chapters 10-13

UNIT III : Chapters 15-20

UNIT IV : Chapters 21,22,24,25

UNIT V : Chapters 35-39

SKILL BASED ELECTIVE
INTEGRAL TRANSFORMS

Lecture hours: 2 Credit: 2

UNIT I

Laplace Transform – Definition – Laplace transforms of e^{ax}, cosax, sinax, coshax, sinhax, x^n, e^{ax} f(x), x^n f(x), $f^n(x)$, n is a positive integer.

UNIT II

Inverse Laplace transform – Definition - Inverse Laplace transform of standard functions.

UNIT III

Applications of Laplace transform – Solutions of differential equations of second order with constant co-efficient and simultaneous equations using Laplace transform

UNIT IV

Fourier transforms – Sine and Cosine transforms – Properties – Inversion theorem - Sine and Cosine transforms – Convolution theorem.

UNIT V

Parseval's identity – Infinite Fourier Cosine Transform and Sine Transform -Transform of derivatives.

TEXT BOOKS

TB1. Differential equations and its applications by Dr. S. Arumugam and A.Thanga Pandi Issac, New Gamma Publishing house, Palayamkottai.

TB2. Engineering Mathematics, P. Kandasamy, K.Thilagavathy and K.Gunavathy. (Vol. III), S. Chand and Co., Ltd.

UNIT I : TB1 Chapter 3 Section 1

UNIT II : TB1 Chapter 3 Section 2

UNIT III : TB1 Chapter 3 Section 3

UNIT IV : TB2 Chapter 4

UNIT V : TB2 Chapter 4

SKILL BASED ELECTIVE
OPTIMIZATION TECHNIQUES-I

Lecture hours: 2 Credit: 2

UNIT I

Games and strategies - Introduction – Two person zero-sum games – The maximin-minimax principle – Games without saddle points – Mixed strategies.

UNIT II

Graphic solution of 2×n and m×2 games

UNIT III

Dominance property - Arithmetic method for n×n games.

UNIT IV

Replacement of equipment / asset that deteriorates gradually – Replacement of equipment that fails suddenly.

UNIT V

Network and basic components – Rules of network construction – Critical path analysis.

TEXT BOOK

Operations Research by Kanti Swarup, P.K. Gupta and Manmohan, Sultan Chand & Sons, ninth edition.

UNIT I :Chapter 17 : Sections :17.1 - 17.5
UNIT II :Chapter 17 : Section: 17.6
UNIT III :Chapter 17 : Sections: 17.7 and 17.8
UNIT IV :Chapter 18: Sections: 18.1 - 18.3
UNIT V :Chapter 21 : Sections : 21.1 - 21.5 (except 21.3)

SKILL BASED ELECTIVE

OPTIMIZATION TECHNIQUES – II

Lecture hours: 2 Credit: 2

UNIT I

Sequencing Problem: Introduction – Problem of Sequencing - Basic terms – Processing *n* jobs through 2 machines - Processing *n* jobs through *k* machines

UNIT II

Queueing Theory - Introduction – Elements of Queueing System – Classification of Queueing Models – Model I $\{(M/M/1):(\infty/FIFO)\}$

UNIT III

Model II $\{(M/M/1):(\infty/SIRO)\}$ and Model III $\{(M/M/1):(N/FIFO)\}$

UNIT IV

Model IV (Generalized Model: Birth-Death Process)

UNIT V

Model V $\{(M/M/C):(\infty/FIFO)\}$ and Model VI $\{(M/M/C):(N/FIFO)\}$

TEXT BOOK

Operations Research by Kanti Swarup, P.K.Gupta and Manmohan, Sultan Chand & Sons, ninth edition.

UNIT I: Chapter 12: Sections : 12.1 to 12.5

UNIT II,III, IV & V: Chapter 20: Sections 20.1 to 20.3, 20.6 and 20.8

SKILL BASED ELECTIVE
HISTORY OF MATHEMATICS – I

Lecture Hours : 2 Credit : 2

UNIT I Mathematics in Ancient Civilizations

Babylonian Mathematics - Egyptian Mathematics - Chineese Mathematics - Mathematics in IndusValley.

UNIT II

Introduction - Thales's Mathematical School – Pythograss – Zeno - Eudoxus

UNIT III

Euclid - Appollonius –Archemides

UNIT IV Indian Mathematics

The History of Indo - Arabic Numerals - Sulbastras

UNIT V

Aryabhatta - Varahamitra - Bhaskaracharya etc.

TEXT BOOK

Mactutor History of Mathematics www-history, mcs.st-andrews.ac.uk

SKILL BASED ELECTIVE

HISTORY OF MATHEMATICS --II

Lecture hours: 2 Credit: 2

UNIT I European Mathematics

Factors aiding progress of Mathematics in Europe - Fibonacci – Cardan – Ferrari– Theory of equations – Coppernicus – Galileo – Kepler.

UNIT II

Napier – Descartes - Fermat – Pascal.

UNIT III

Newton – Leibnitz – Bernoullis

UNIT IV

Euler – Lagrange – Fourier – Gauss – Abel.

UNIT V

Galois – Cauchy – Cayley – Cantor – Others.

TEXT BOOK

Mactutor History of Mathematics www-history, mcs,st-andrews.ac.uk.

SKILL BASED ELECTIVE

COMBINATORICS

Lecture hours: 2 Credit: 2

UNIT I

Perfect covers of chessboards, Cutting a cube, Magic Squares.

UNIT II

The problem of the 36 officers, Shortest – Route problem, The game of Nim.

UNIT III

Pigeonhole Principle : Simple form and Strong form.

UNIT IV

A Theorem of Ramsey, Four basic counting principles.

UNIT V

Permutations of sets, Combinations of sets.

TEXT BOOK

Introductory Combinatorics by Richard A. Brualdi, Fourth Edition, Prentice Hall, 2008.

Unit I : Chapter 1 : Sections 1.1 to 1.3

Unit II : Chapter 1 : Sections 1.5 to 1.7

Unit III : Chapter 2 : Sections 2.1 to 2.2

Unit IV : Chapter 2 : Sections 2.3 and Chapter 3 : Section 3.1

Unit V : Chapter 3 : Sections 3.2 to 3.3

SKILL BASED ELECTIVE

PURE GEOMETRY

Lecture Hours :2 Credits : 2

Unit I :

Loci – Theorems 1, 2 (Appolonius circles) – Basic Properties of a triangle.

Unit II :

Harmonic Ranges and pencils – Definitions – Cross ratio – Harmonic range –Theorems 1,2,3,4,5.

Unit III :

Properties of circles – Orthogonal circles –Theorems 1, 2 – Inverse points – Theorem 3.

Unit IV :

Properties of circles – Theorems 8,9,10 – Coaxial circles – Orthogonal circles of Coaxical systems.

Unit V :

Complete quadrangles and quadrilaterals – Theorem 1 to 5.

Text Book :

Pure Geometry by T.K.Manicavachagom Pillay, The National Co., Madras – 1.

Unit I : Chapter 1

Unit II : Chapter 2

Unit III : Chapter 3 (upto Theorem 7)

Unit IV : Chapter 4 (Theorem 8 to 16)

Unit V : Chapter 4 (Theorem 1 to 5)

Reference Book :

1. Quantitative Aptitude by R.Gupta Unique Publishers Pvt. Ltd., 2013.

NON MAJOR ELECTIVES

NON MAJOR ELECTIVE
MODERN ALGEBRA FOR PHYSICAL SCIENCES

Lecture hours: 2 Credit: 2

UNIT I

Matrices – Rank of a matrix – Elementary transformations

UNIT II

Simultaneous linear equations – Matrix form of a set of linear equations

UNIT III

Cayley Hamilton theorem – Eigen values – Eigen vectors.

UNIT IV

Groups – Definition and examples – Elementary properties of a group – Equivalent definitions of a group – Permutation groups – Subgroups – Cyclic groups.

UNIT V

Isomorphism – Homomorphism

TEXT BOOK

Ancillary Mathematics – Volume III (Revised) by Dr.S.Arumugam and Issac, New Gamma Publishing House, Palayamkottai.

UNIT I : Chapter 7: Section: 7.1

UNIT II : Chapter 7: Section: 7.2

UNIT III : Chapter 7 : Sections: 7.3 and 7.4

UNIT IV : Chapter 8: Sections: 8.1 – 8.6

UNIT V : Chapter 8: Sections: 8.10 – 8.11

NON-MAJOR ELECTIVE
LINEAR PROGRAMMING

Lecture hours: 2 Credit: 2

UNIT I

Formulation of Linear Programming Problem

UNIT II

Solution of Linear Progarmming Problem: Graphical method

UNIT III

Solution of Linear Progarmming Problem: Simplex method

UNIT IV

Solution of Linear Progarmming Problem: Big M method

UNIT V

Solution of Linear Progarmming Problem: Two phase method

TEXT BOOK

Linear Programming by Dr. S. Arumugam and Prof. A.Thangapandi Issac, New Gamma Publishing House, Palyamkottai

UNIT I: Chapter 3 : Section: 3.1

UNIT II: Chapter 3 : Section : 3.4

UNIT III: Chapter 3 : Section : 3.5

UNIT IV: Chapter 3 : Section: 3.6

UNIT V: Chapter 3 : Section: 3.7

NON MAJOR ELECTIVE

OPTIMIZATION TECHNIQUES – I

Lecture hours : 2 Credit : 2

UNIT I Assignment Problem

Introduction – Mathematical Formulation of the Problem – Solution Methods of Assignment Problem.

UNIT II Games and Strategies

Introduction – Two - person Zero- Sum Games – Some Basic Terms – The Maxmin – Minimax Principle – Games Without Saddle Points – Mixed Strategies

UNIT III Games and Strategies

Graphic Solution of $2 \times n$ and $m \times 2$ Games

UNIT IV Replacement Problem and System Reliability

Introduction - Replacement of Equipment / Asset that Deteriorates Gradually

UNIT V Network Scheduling by PERT/CPM

Introduction – Network: Basic Components – Logical Sequencing - Rules of Network Construction – Critical Path Analysis.

TEXT BOOK

Operations Research by Kanti Swarup, P.K. Gupta and Manmohan, Sultan Chand and Sons, New Delhi, Fifteenth Edition

UNIT I : Chapter 11 : Section 11.1 to 11.3

UNIT II : Chapter 17 : Section 17.1 to 17.5

UNIT III : Chapter 17 : Section 17.6

UNIT IV : Chapter 18 : Section 18.1 & 18.2

UNIT V : Chapter 25 : Section 25.1 to 25.4 and 25.6

NON MAJOR ELECTIVE

OPTIMIZATION TECHNIQUES -II

Lecture hours: 2 Credit: 2

UNIT I Transportation Problem

Introduction – Linear Programming Formulation of the Transportation Problem – Existence of Solution in T. P. – Duality in Transportation Problem – The Transportaion Table – Loops in Transportaion Tables – Solution of a Transportation Problem – Finding an Initial Basic Feasible Solution.

UNIT II Transportaion Problem

Test for Optimality – Degeneracy in Transportation Problem – Transportation Algorithm (MODI Method).

UNIT III Sequencing Problem

Introduction – Problem of Sequencing - Basic Terms Used in Sequencing – Processing n Jobs through 2 Machines – Processing n Jobs through k Machines.

UNIT IV Queuing Theory

Introduction – Queuing System - Elements of a Queuing System – Classification of Queuing Models – Definition of Transient and Steady States – Poisson queuing systems –- Model I $(M/M/1):(\infty/FIFO)$.

UNIT V Queuing Theory

Poisson queuing systems – Queuing Model III $(M/M/1):(N/FIFO)$.

TEXT BOOK

Operations Research by Kanti Swarup, P.K.Gupta and Manmohan, Sultan Chand & sons, Fifteenth Edition.

UNIT I : Chapter 10 : Sections: 10.1 – 10.6 and 10.8-10.9

UNIT II : Chapter 10 : Sections: 10.10 , 10.12 and 10.13

UNIT III : Chapter 12: Sections: 12.1 – 12.5

UNIT IV : Chapter 21 : Sections: 21.1 – 21.3, 21.7, 21.8 and 21.9(Model I only)

UNIT V : Chapter 21: Section : 21.9(Model III only)

NON MAJOR ELECTIVE

QUANTITATIVE APTITUDE FOR COMPETITIVE EXAMINATIONS

Lecture hours: 2 Credit: 2

UNIT I

H.C.F and L.C.M of Numbers, Decimal Fractions and Simplification.

UNIT II

Average and Percentage.

UNIT III

Profit and Loss, Ratio and Proportion.

UNIT IV

Partnership, Time and work.

UNIT V

Simple Interest, Compound Interest.

TEXT BOOK

Quantitative Aptitude for Competitive Examinations by R. S. Aggarwal published by S. Chand (Seventh Revised Edition).

UNIT I: Chapters 2, 3 and 4

UNIT II: Chapters 6 and 10

UNIT III: Chapters 11 and 12

UNIT IV : Chapters 13 and 15

UNIT V: Chapters 21 and 22

NON MAJOR ELECTIVE
DATA INTERPRETATION AND REASONING

Lecture hours: 2 Credit: 2

UNIT I

Logical Venn Diagrams – Mathematical Operations

UNIT II

Arithmetical Reasoning – Series

UNIT III

Tabulation

UNIT IV

Pie Charts

UNIT V

Bar graphs and Line graphs

TEXT BOOKS

1. A Modern Approach to Verbal & Non-Verbal Reasoning by Dr. R. S. Aggarwal, published by Sultan Chand & Company Ltd.
2. Quantitative Aptitude for Competitive Examinations by R.S.Aggarwal, published by Sultan Chand & Company Ltd.(7^{th} edition)

UNIT I : TB.1 – Section I– General Mental Ability – Chapters 9 and 13

UNIT II : TB.1 – Section I– General Mental Ability – Chapter 15

Part II – Non-verbal Reasoning – Chapter 1

UNIT III: TB.2 – Section II – Data Interpretation –Chapter 36

UNIT IV: TB.2 – Section II – Data Interpretation –Chapter 38

UNIT V : TB.2 – Section II – Data Interpretation – Chapter 37 and 39

ALLIED COURSES
FOR
B.Sc. PHYSICS AND
B.Sc.CHEMISTRY

AM1 - ALLIED MATHEMATICS – PAPER I

Lecture hours: 7 Credit: 5

UNIT I Algebra

Binomial – Exponential Logarithmic series (proof of the theorem, not expected)

UNIT II Algebra

Theory of Equations – Formation of equations – Relation between roots and co-efficients – Reciprocal Equations – Transformation of Equations – Newtons and Horners method of finding roots upto 2 decimals

UNIT III Calculus

Radius of curvature – Centre of curvature – Definite integrals – Reduction formulae for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\text{cosec}^n x$, $\sec^n x$, $\cot^n x$.

UNIT IV Trigonometry

Expansions – Hyperbolic functions – Logarithm of complex number.

UNIT V Differential Equations and Partial Differential Equation

Differential Equations of first order – Second order equations with RHS of the form X^n, e^{ax}, sinbx, cosbx, e^{ax}sinbx, e^{ax}cosbx, $e^{ax}x^n$.

Partial Differential Equations –Formation – Solutions : standard form $Pp + Qq = R$

TEXT BOOK

1. Ancillary Mathematics Paper - I (Revised Vol. I) By Dr.S.Arumugam and Isaac
2. Ancillary Mathematics Paper – II (Revised Vol. II) by Dr.S.Arumugam and Issac

UNIT I : TB1: Chapter 1

UNIT II : TB1: Chapter 2

UNIT III : TB1: Chapter 3, Sections 3.2, 3.3, 3.4, 3.5

UNIT IV : TB1: Chapter 4 and 5

UNIT V : TB2: Chapters 3, 4, and 6

AM2 - ALLIED MATHEMATICS – PAPER II

Lecture hours : 7 Credit : 5

UNIT I Vector Differentiation

Differentiation of vectors – Velocity – Acceleration – Gradient – Divergence and Curl .

UNIT II Vector Integration

Line and surface integrals – Line integral – Surface integral – Green, Gauss and Stokes theorems (without proofs).

UNIT III Differential Equation

Laplace Transform – Inverse Laplace Transform – Solution of Differential Equation using Laplace Transform.

UNIT IV Statistics

Correlation and Rank Correlation – Interpolation – Lagrange and Newton's methods – Index numbers.

UNIT V Calculus

Fourier series – The Cosine and Sine series

TEXT BOOK

TB1. Ancillary Mathematics Paper II (Revised) By Dr.S.Arumugam and Isaac.

TB2. Ancillary Mathematics III (Revised) by Dr.S.Arumugam and Isaac.

UNIT I : TB1: Chapter 1

UNIT II : TB1: Chapter 2

UNIT III : TB1: Chapter 5

UNIT IV : TB2: Chapter 3, Chapter 4: Sections 4.1 and 4.2, Chapter 6

UNIT V : TB2: Chapter 9

VALUE ADDED COURSES

Value Added Course

LOGICAL REASONING

Lecture Hours : 2 Credits : 2

UNIT I

Series completion, Analogy

UNIT II

Classification, Coding- Decoding, Blood Relation

UNIT III

Puzzle test-seating arrangements, Direction sense test, Ranking Test

UNIT IV

Data sufficiency , Statement- Arguments and Assumptions

UNIT V

Completion of incomplete pattern, Figure Matrix , cubes and dice

TEXT BOOKS

1. A Modern Approach to Verbal and Non- Verbal Reasoning by R.S.Aggarwal, published by Sulthan Chand and Company Ltd.

UNIT I : Section 1- General Mental Ability- Chapter 1,2

UNIT II : Section 1 – General Mental Ability – Chapter 3,4,5

UNIT III : Section 1 – General Mental Ability Chapter - 6,8,12

UNIT IV: Section 1- General Mental Ability Chapter - 17 and

Section II – Logical Deduction Chapter- 2, 3

UNIT V : Non Verbal Reasoning - Chapter 8,9,14

Value Added Course

HISTORY OF MATHEMATICS

Lecture Hours : 2 Credits : 2

UNIT I Early Number Systems and Symbols

Primitive Counting - Number Recording of the Egyptians and Greeks - Number Recording of the Babylonians.

UNIT II Mathematics in Early Civilizations

Egyptian Arithmetic - Babylonian Mathematics.

UNIT III The Beginnings of Greek Mathematics

Pythagorean Mathematics - Zeno's Paradox - The Pythagorean Problem

UNIT IV Ancient Indian Mathematics

Indian Mathematics - Indian Numerals - Indian Sulbasutras.

UNIT V Indian Mathematicians

Aryabhata I, Aryabhata II, Bhaskara I, Bhaskara II, Bhaskaracharya, Brahmagupta and Ramanujan.

References:

1. Burton, David M. The History of Mathematics: An Introduction. McGraw Hill: 1997.

2. Eves, Howard, An Introduction to the History of Mathematics, Saunders, 1990, ISBN 0-03-029558-0

3. Heath, Sir Thomas (1981), A History of Greek Mathematics, Dover. ISBN 0-486-24073-8.

4. Katz, Victor J, A History of Mathematics: An Introduction, 2nd Edition. Addison-Wesley: 1998.

5. Katz, Victor J., ed. (2007), The Mathematics of Egypt, Mesopotamia, China, India, and Islam: A Sourcebook. Princeton, NJ: Princeton University Press, 685 pages, pp 385-514. ISBN 0-691-11485-4.

6. Suzuki, Jeff, A History of Mathematics, Saddle River, N.J.: Prentice-Hall, 2002.

7. mathshistory.st-andrews.ac.uk

Value Added Course

PROBLEM SOLVING

Lecture hours : 2 Credit : 2

UNIT I

Problems on Numbers, Problems on Ages.

UNIT II

Chain Rule, Pipes and Cistern.

UNIT III

Problems on Trains, Probability.

UNIT IV

Calendar, Permutations and Combinations.

UNIT V

Heights and Distances, Odd Man Out and Series.

REFERENCE BOOK :

Quantitative Aptitude by Dr.S.Aggarwal, S.Chand &Company LTD., New Delhi,2010.