

GOVERNMENT COLLEGE FOR WOMEN(AUTONOMOUS), KUMBAKONAM

(Common course structure – PG (2024- 2025))

Department :Mathematics

Programme Code: PSMA

SEMESTER – I

Part	Course Type	Course Code	Title of the Course	Hrs/ weeks	Credits	Exam Hours	Marks		
							CIA	ESE	Total
I	CC – I	PMC101	Abstract Algebra	6	5	3	25	75	100
I	CC – II	PMC102	Real Analysis – I	6	5	3	25	75	100
I	CC – III	PMC103	Ordinary Differential Equations	6	4	3	25	75	100
I	EC – I	PMDE1:1	Theory of numbers	5	3	3	25	75	100
		PMDE1:2	Numerical Analysis						
		PMDE1:3	Operator Theory *						
I	EC – II	PMDE1:4	Fuzzy Sets and their Applications	5	3	3	25	75	100
		PMDE1:5	Fluid Dynamics						
		PMDE1:6	Wavelets						
II	SEC – I	PMISEIP	Mathematical Documentation using Latex - Practical	2	2	3	40	60	100
			Total	30	22				600

SEMESTER – II

Part	Course Type	Course Code	Title of the Course	Hrs/ Week	Credits	Exam Hours	Marks		
							CIA	ESE	Total
I	CC – IV	PMC204	Linear Algebra	6	5	3	25	75	100
I	CC – V	PMC205	Real Analysis – II	6	5	3	25	75	100
I	CC – VI	PMC206	Partial Differential Equations	6	4	3	25	75	100
I	EC – III	PMDE2:1	Mechanics	5	3	3	25	75	100
		PMDE2:2	Elements of Stochastic Processes						
		PMDE2:3	Commutative Algebra						
I	EC – IV	PMDE2:4	Optimization Techniques.	5	3	3	25	75	100
		PMDE2:5	Formal Languages and Automata theory						
		PMDE2:6	Discrete Mathematics						
II	SEC – II	PM2SE2P	Programming in Sci Lab- Practical	2	2	3	40	60	100
II	ECC – I		Moocs/ Swayam Courses	-	2/3				
			Internship/ Industrial training*						
			Total	30	22				600

*Internship/industrial training during summer vacation. The credits shall be awarded in Semester III statement of marks.

G. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

SEMESTER – IV

SEMESTER – III

Part	Course Type	Course Code	Title of the Course	Hrs/ Week	Credits	Exam Hours	Marks		
							CIA	ESE	Total
I	CC – VII	P23MC307	Complex Analysis	6	5	3	25	75	100
I	CC – VIII	P23MC308	Topology	6	5	3	25	75	100
I	CC – IX	P23MC309	Graph Theory	6	5	3	25	75	100
I	CC – X	P23MC310	Mathematical Methods	6	4	3	25	75	100
I	EC – V	P23ME3:1	Mathematical Statistics	4	3	3	25	75	100
		P23ME3:2	Theory of Relativity						
		P23ME3:3	Applied Cryptography						
II	IDSEC -III	P23M3IDC	1.General Intelligence 2.Resource Management	2	2	3	40	60	100
II	ECC – II	MSC	Moocs / Swayam Courses	-	2/3	-	-	-	-
II	AEC	INT	Internship/Industrial training	-	2	-	-	-	-
			Total	30	26				600
II	ECC-III	SSC	General Studies for Research Fellowship and Lectureship.		2	2			100

Part	Course Type	Course Code	Title of the Course	Hrs/ Week	Credits	Exam Hours	Marks		
							CIA	ESE	Total
I	CC – XI		Functional Analysis	6	5	3	25	75	100
I	CC – XII		Differential Geometry	6	5	3	25	75	100
I	CC – XIII		Project with Viva Voce	8	5	3	20	80	100
I	EC – VI		Programming in C.	5	3	3	25	75	100
			Programming in C++ .						
			Mathematical Statistics using SPSS.						
II	SEC – IV		Mathematical science for Competitive Examination.	5	2	3	-	100	100
II	EA		Extension Activity	-	2				
			Total	30	22				500

S. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

Course Structure Abstract for

M.Sc., Programme 2024-2025 onwards

LIST OF ELECTIVE COURSES (EC)

1. THEORY OF NUMBERS
2. NUMERICAL ANALYSIS
3. FUZZY SETS AND THEIR APPLICATIONS
4. FLUID DYNAMICS
5. DISCRETE MATHEMATICS
6. WAVELETS
7. ELEMENTS OF STOCHASTIC PROCESSES
8. MECHANICS
9. COMMUTATIVE ALGEBRA
10. FORMAL LANGUAGES AND AUTOMATA THEORY
11. MATHEMATICAL STATISTICS
12. OPTIMIZATION TECHNIQUES
13. THEORY OF RELATIVITY
14. APPLIED CRYPTOGRAPHY

LIST OF ELECTIVE PRACTICALS

1. PROGRAMMING IN C.
2. PROGRAMMING IN C++ .
- 3 . MATHEMATICAL STATISTICS USING SPSS.

LIST OF INTER DISCIPLINARY COURSE

1. GENERAL INTELLIGENCE
2. RESOURCE MANAGEMENT

Part	Course	Total No Papers	Hours	Credit	Mark
III	Core Course(CC)	12	72	62	1200
III	Core Project	1	8	5	100
III	Major Based Elective Course – IV(MBEC)	6	29	18	600
III	Extra Disciplinary Course (EDC)	1	2	2	100
III	Skill Enhancement (SEC)	3	9	3	300
Total		23	120	90	2300
Extra Credit Courses					
	Self Study Course (SSC)	1	-	2	100
	NCGPA Course (Internship)	---	-	2	---
Total		1		94	2400


Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001.

LIST OF ELECTIVE COURSES (EC)

15. THEORY OF NUMBERS
16. NUMERICAL ANALYSIS
17. FUZZY SETS AND THEIR APPLICATIONS
18. FLUID DYNAMICS
19. DISCRETE MATHEMATICS
20. WAVELETS
21. ELEMENTS OF STOCHASTIC PROCESSES
22. MECHANICS
23. PROGRAMMING IN C++ - PRACTICAL
24. COMMUTATIVE ALGEBRA
25. FORMAL LANGUAGES AND AUTOMATA THEORY
26. MATHEMATICAL STATISTICS.
27. OPTIMIZATION TECHNIQUES
28. THEORY OF RELATIVITY
29. APPLIED CRYPTOGRAPHY

LIST OF ELECTIVE PRACTICALS

1. PROGRAMMING IN C.
2. PROGRAMMING IN C++ .
- 3 . MATHEMATICAL STATISTICS USING SPSS.

LIST OF INTER DISCIPLINARY COURSE

1. GENERAL INTELLIGENCE
2. RESOURCE MANAGEMENT

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), KUMBAKONAM
DEPARTMENT OF MATHEMATICS
M.Sc., Mathematics
OUTCOME BASED EDUCATION CHOICE BASED CREDIT SYSTEM
SEMESTER – I

CORE COURSE – I ABSTRACT ALGEBRA

PMCID1

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Theory	6	-	-	5	25	75	100

Course Contents

Objectives:

- The objective of this course is to introduce the basic ideas of counting principle. Sylow subgroups, finite abelian groups, field theory and Galois Theory and to see its application to the solvability of polynomial equations by radicals.

UNIT I: Sylow's Theorem: Another Counting Principle – 1 st , 2 nd and 3 rd parts of Sylow's Theorems (For Theorem 2.12.1 First Proof Only)– Double coset– The Normalizer of a group.	
UNIT II: Finite Abelian Groups: External and Internal direct Products – Structure theorem for finite abelian groups – Non iso-morphic abelian groups- Polynomial rings.	
UNIT III: Splitting Field: Polynomials over rational fields – The Eisenstein criterion - Extension fields– Roots of polynomials–Splitting fields.	
UNIT IV: Galois Theory: More about roots – Simple extension – Separable extension – Fixed fields – Symmetric rational functions – Normal extension - Galois group – Fundamental theorem of Galois theory.	
UNIT V: Solvability by radicals: Solvable group – The commutator subgroup– Solvability by radicals - Finite fields.	
UNIT I : Chapter 2 (Sections 2.11, 2.12) UNIT II : Chapters 2 and 3(Sections 2.13, 2.14 & 3.9) UNIT III : Chapters 3 and 5 (Sections 3.10 & 5.1.5.3) UNIT IV : Chapter 5 (Sections 5.5,5.6) UNIT V : Chapters 5 and 7 (Sections 5.7&7.1)	
TEXT BOOK [1] I.N. Herstein, Topics in Algebra, 2 nd Edition, John Wiley and Sons. New York, 1975.	
REFERENCES : 1. S. Lang, "Algebra", 3 rd Edition, Addison-Wesley, Mass, 1993. 2. John B. Fraleigh, "A First Course in Abstract Algebra", Addison Wesley, Mass, 1982. 3. M. Artin, "Algebra", Prentice-Hall of India, New Delhi, 1991. 4. V. K. Khanna and S.K. Bhambri, "A Course in Abstract Algebra", Vikas	

Publishing House Pvt Limited. 1993

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Recall the Another Counting Principle	K1
CO2	Extend the direct Products , Explain the abelian groups and Non isomorphic abelian groups.	K2
CO3	Apply Polynomials over rational fields and the Eisenstein criterion	K3
CO4	Analyze More about roots , Simple extension , Separable extension and Fixed fields .	K4
CO5	Solvable group , the Commutator subgroup and Solvability by radicals	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3 Medium - 2 Low - 1
 Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

S. Rajkumari
 Staff Incharge
 (Dr. S. Rajkumari)

S. Rajkumari
 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001.

CORE COURSE – II REAL ANALYSIS – I

PMc102

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Theory	6	-	-	5	25	75	100

Course Contents

Objectives: To develop a strong background on finding solutions to linear differential equations with constant

- To develop a strong background on finding solutions to linear differential equations with variable coefficients and also with regular singular points.

UNIT – I: Real number system and its order completeness. Sequences and series of real numbers :

Sequences - convergence - subsequences - Cauchy sequences - Upper and Lower Limits- some special sequences - Tests of convergence - Absolute convergence -Rearrangements

UNIT - II: Metric spaces:

Basic concepts, continuous functions, completeness, Baire category Theorem, Contraction mapping Theorem.

UNIT - III:

Connectedness, intermediate Value Theorem, Compactness, Heine-Borel Theorem.

UNIT - IV:

Differentiation, Taylor's Theorem, Riemann integral and its properties, improper integral.

UNIT - V:

Sequences and series of functions, Uniform convergence, power series, Weierstrass approximation theorem, Equi - continuity , Arzela-Ascoli theorem.

UNIT I : Chapter 1 (Page No. 1 to 5) and Chapter 3 (Page No. 47 to 58, 71, 72, 75 to 78)[1]

UNIT II : Chapter 2 (Page No. 30 to 36, 85 to 88, 220-221 [1]

UNIT III : Chapter 2 (Page No. 36 to 43) [1] , (86-87) [3]

UNIT IV : Chapter 5 (Page No. 103 to 107, 110 to 111) [1] and Chapter 7 (Page No. 157 – 163, 165 – 170, 189 - 195) [2]

UNIT V : Chapter 7 (Page No. 143 to 148), [1] Chapter 9 (Page No. 226 to 228) [3] and Chapter 11 (Page No. 322) [3]

TEXT BOOK :

[1]. Walter Rudin, Principles of Mathematical Analysis, Tata McGraw-Hill, New York, 1988.

[2]. Richard R. Goldberg, Methods of Real Analysis, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 2019.

[3]. Tom M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.

REFERENCE BOOKS:

1. Walter Rudin, Principles of Mathematical Analysis, Tata McGraw-Hill, New York, 1988.

2. Kenneth A. Ross, Elementary Analysis: The theory of Calculus, Springer, New York, 2004.

- R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, John Wiley & Sons, New York, 1982.
- Tom M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
- S. Kumaresan, Topology of Metric Spaces, 2nd Edition, Narosa Publishing House, 2011.
- S. Ponnusamy, Foundations of Mathematical Analysis, Springer Birkhauser, 2012.
- S. C. Malik and Savita Arora, Mathematical Analysis, Wiley Eastern Ltd., New Delhi, 1991.
- S. K. Mappa, Introduction to Real Analysis, 7th Edition, Sarat Book distributors, Kolkatta, 2015.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Analyze and evaluate functions Tests of convergence, Absolute convergence and Rearrangements.	K1
CO2	Basic concepts, continuous functions, completeness. Baire category Theorem and Contraction mapping Theorem.	K2
CO3	Demonstrate the concept of Connectedness, intermediate Value Theorem, Compactness, Heine- Borel Theorem.	K3
CO4	Describe the concept of Riemann integral and its properties.	K4
CO5	Formulate the concept and properties power series. Weierstrass approximation theorem, Equi - continuity and Arzela-Ascoli theorem.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	3	2	3	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	3	4	3
CO5	4	3	3	2	3	3	3
Weight age							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium – 2

Low – 1

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)
		3 × 10 = 30 (Each Unit Carries One Questions)

Staff in charge
(Dr. G. Sakithyabharathi)

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001

PMCI03

CORE COURSE –III ORDINARY DIFFERENTIAL EQUATIONS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Theory	6	-	-	4	25	75	100

Course Contents**Objectives:**

1. To develop a strong background on finding solutions to linear differential equations with constant
2. To develop a strong background on finding solutions to linear differential equations with variable coefficients and also with regular singular points.

UNIT I: Linear equations with constant coefficients:

Introduction - Second order homogenous equations - Initial value problem for second order equations - Linear dependence and independence - A formula for Wronskian.

UNIT II: Linear equations with constant coefficients: (Cont'd.)

The Non- homogenous equations of order two-homogenous and Non - homogenous equations of order n - Initial value problems for n^{th} order equations - Annihilator method to solve non- Homogenous equation.

UNIT III: Linear equations with variable coefficients:

Initial value problem - Existence and uniqueness theorem - The Wronskian and linear independence - Reduction of the order of a homogenous equation - The non- Homogenous equation - Homogenous equations with analytic coefficients - The Legendre equations.

UNIT IV: Linear equations with regular singular points:

The Euler equations- Second order equations with regular singular points - Exceptional cases - The Bessel equation – The Bessel equation contd.

UNIT V: Existence and uniqueness of solutions to first order equations:

Equations with variable separated - Exact equations - The method of successive approximation - The Lipschitz Condition - Convergence of the successive approximation - Non-local existence of solutions - Approximations to and uniqueness of solutions.

UNIT I : Chapter 2 (sections 1 to 5)

UNIT II : Chapter 2 (Sections 6 to 10)

UNIT III : Chapter 3 (Sections 1 to 8)

UNIT IV : Chapter 4 (Sections 1,2,3, 6,7,8)

UNIT V : Chapter 5 (sections 1 to 8)

TEXT BOOK:

[1] Earl A. Coddington, An Introduction to Ordinary Differential Equations – Prentice Hall of India Private Limited, New Delhi 2008.

REFERENCE BOOKS:-

1. George F. Simmons, Differential Equations with Application And Historical Notes, Tata McGraw Hill, New Delhi 1974.
2. Williams E. Boyce and Richard C. DiPrima Elementary Differential Equations and Boundary Value Problems, 10th edition John Wiley and Sons, New York

2012.

3. M.D. Raisinghania, Advanced Differential Equations, S.Chand Company Ltd., New Delhi 2012

4. B. Rai, D.P. Choudhury and H.I. Freedman, A Course in Ordinary Differential Equations, Narosa Publishing House Pvt. Ltd, New Delhi 2012.

5. Ravi P. Agarwal and Ramesh C. Gupta, Essentials of Ordinary Differential Equations, McGraw Hill, New York, 1991.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Apply concept of linear independence and dependence in solving linear ordinary differential equations	K2
CO2	Analyze the existence and uniqueness of solutions to both homogeneous and non homogeneous differential equations	K4
CO3	Evaluate and apply reduction of order techniques in solving higher – order homogeneous with variable coefficients.	K4
CO4	Investigate the properties and solutions of differential equations with regular singular points, including special cases.	K4
CO5	Critically assess the convergence and uniqueness of solutions to differential equations considering the Lipschitz's conditions and non local existence.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)


Staff incharge
(Mrs. M. Devi)


Head, Department
Government College for Women (Autonomous)
Kumbakonam - 612 001.

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives

1. To expose the students to the fascination, facts and touch in the world of numbers.
2. To highlight some of the Applications of the Theory of Numbers.

UNIT I: Fundamentals of Congruence's:

Basic properties of Congruence's – Residue Systems – Solving Congruence's: Linear Congruence's – The Theorems of Fermat and Wilson Revisited.

UNIT II:

The Chinese Remainder Theorem – Polynomial Congruence's. Arithmetic functions: Combinatorial study of $\Phi(n)$ – Formulae for $d(n)$ and $\sigma(n)$ – Multiplicative Arithmetic functions – The mobius Inversion formula.

UNIT III: Quadratic Residues:

Euler's criterion – The Legendre symbol – The Quadratic reciprocity law – Applications of the Quadratic reciprocity law.

UNIT IV: Sums of Squares:

sums of two squares – Sums of Four Squares – Elementary Partition theory: Graphical representation – Euler's partition theorem – Searching for partition identities.

UNIT V: Partition Generating Function:

Infinite products as Generating functions – Identities between infinite series and Products. Partitions Identities: History and Introduction – Euler's Pentagonal number theorem.

UNIT I : Chapter 4 (sections 4.1, 4.2) and Chapter 5 (sections 5.1, 5.2)

UNIT II : Chapter 5 (sections 5.3, 5.4) and Chapter 6 (sections 6.1 to 6.4)

UNIT III : Chapter 9 (sections 9.1 to 9.4)

UNIT IV : Chapters 11 and 12

UNIT V : Chapter 13 and Chapter 14 (sections 14.1, 14.2)

TEXT BOOK:

[1] George E. Andrews, Number theory, Dover Publication, INC, New York, Reprint 2013.

REFERENCES:

[1] Dr. Sudhir Pundir and Dr. Rimple Pundir, Theory of Numbers, First Edition, Pragati Prakashan Publications, 2006.

[2] Gareth A. Jones and J. Mary Jones, Elementary Number Theory, Springer Verlag, Indian Reprint, 2005.

[3] David M. Burton, Elementary Number theory, 6th edition, McGraw Hill, 2007.

[4] J. William, Fundamentals of Number Theory, Leveque, Addison-Wesley Publishing Company, Phillipines, 1977.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Basic properties of congruence's and solving congruence's	K1 & K2
CO2	Analyze the polynomial congruence's and arithmetic functions.	K2
CO3	Identify the Legendre symbol and applications of the quadratic reciprocity law	K3
CO4	Evaluate the Sums of Squares and elementary partition theory	K4
CO5	Discuss the Partition generating function and partitions identities	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	3	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	3	3	2	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Staff incharge
(Dr. G. Amudha)

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

EC-II NUMERICAL ANALYSIS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. The objective of this course is to develop Numerical computational skills and to study their applications.
2. This course focuses on the topics Interpolation by polynomials, the solution of nonlinear equations, Numerical differentiation and Numerical Integration. On the successful completion of the course, students will be able to learn various tools in solving numerical problems and prepare competitive examinations like CSIR-NET, SLET, etc.

UNIT I: Number Systems and Errors:

The Representation of Integers -The Representation of Fractions - Floating point arithmetic - Loss of Significance and Error Propagation – Computational Methods for error estimation-Some comments on convergence of sequences-Some mathematical preliminaries

UNIT II: Interpolation by polynomials:

Polynomial forms- Existence and Uniqueness of the Interpolating polynomial -The divided difference table- The error of the interpolating polynomial - Interpolation in a function table based on equally spaced points

UNIT II: Interpolation by polynomials::

Polynomial forms- Existence and Uniqueness of the Interpolating polynomial -The divided difference table- The error of the interpolating polynomial - Interpolation in a function table based on equally spaced points

UNIT IV: Matrices and Systems of Linear equations:

The solution of linear systems by elimination-The pivoting strategy - The triangular factorization

UNIT V: Differentiation and Integration:

Numerical differentiation - Numerical Integration: Some basic rules - Composite rules.

UNIT I : Chapter 1 (Sections 1.1 to 1.7)

UNIT II : Chapter 2 (Sections 2.1, 2.2, 2.3, 2.5, 2.6)

UNIT III : Chapter 3 (Sections 3.1, 3.3, 3.6, 3.7)

UNIT IV : Chapter 4 (Sections 4.2 to 4.4)

UNIT V : Chapter 7 (Sections 7.1, 7.2, 7.4)

TEXT BOOK :

[1] Elementary Numerical Analysis-An algorithmic approach by Samue ID. Conte and Carl de Boor

REFERENCE BOOKS:

1. Azmysackleh et al, Classical and modern Numerical Analysis, CRC Press,
2. S.S Sastry, Introductory methods of Numerical Analysis, Prentices Hall of India Pvt.Limited, 2001, Third Edition.
3. E. Kendall, Atkinson, An Introduction to Numerical Analysis, II Edition, John wiley & Sons, 1989.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Recall the numerical methods to find our solution of algebraic equations using Different methods.	K1
CO2	Illustrate the various interpolation methods and finite difference concepts.	K2
CO3	Apply numerical methods to obtain approximate solutions to mathematical problems.	K3
CO4	Analyze the solution of linear systems by elimination	K4
CO5	Formulate Numerical differentiation and Numerical Integration	K5 &

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern: Theory 40%; Problems: 60%

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)


 Staff incharge
 (Dr. G. Vembarsasi)


 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001.

EC – III FUZZY SETS AND THEIR APPLICATIONS

PMDEF 1:4

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1.Fuzzy is one of the latest topic in Mathematics that has real life applications. Hence it is essential for the students to learn this topic. This topic introduces the concept of uncertainty and fuzziness in logic that will enable the student to develop their intuitive mind further.

2.The two years M.Sc. program is to prepare every student to face the competitive world outside. It will help them to acquire sufficient knowledge and skill in the subject that will make them competent in various areas of mathematics.

UNIT I:

Crisp sets and fuzzy sets: Overview of Classical Sets, Membership Function, Height of a fuzzy set – Normal and sub normal fuzzy sets – Support – Level sets, fuzzy points, α -cuts – Decomposition Theorems, Extension Principle.

UNIT II:

Operation on fuzzy sets: Standard fuzzy operations – Union, intersection and complement – properties De. Morgan's laws - α -cuts of fuzzy operations.

UNIT III:

Fuzzy relations: Cartesian Product, Crisp relations – cardinality – operations and properties of Crisp and Fuzzy relations. Image and inverse image of fuzzy sets - Various definitions of fuzzy operations – Generalizations – Non interacting fuzzy sets, Tolerance and equivalence relations.

UNIT IV:

Decision making in Fuzzy environments: General Discussion – Individual Decision making – multi person decision making – multi criteria decision making – multi stage decision making – fuzzy ranking methods – fuzzy linear programming.

UNIT V:

Applications: Medicine – Economics – Fuzzy Systems and Genetic Algorithms – Fuzzy Regression – Interpersonal Communication – Other Applications.

UNIT I : Chapter1Sections(1.3,1.4) and Chapter 2 Sections(2.1,2.2,2.3)

UNIT II : Chapters3 Sections(3.1to 3.5)

UNIT III : Chapters5 Sections(5.1 to 5.8)

UNIT IV : Chapter15Sections(15.1 to 15.7)

UNIT V : Chapter17Sections(17.1 to 17.7)

TEXT BOOK:

[1] George J.Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic Theory and Applications, PHI Learning Private Limited, New Delhi(2013).

REFERENCE BOOKS:

1. A.K.Bhargava;FuzzySetTheory, FuzzyLogicandtheir Applications, published by S. Chand Pvt. Limited(2013).
2. K.Pundir and R.Pundir, Fuzzy sets and their application, Published by A Pragati edition(2012).
3. H.J.Zimmermann, Fuzzy set theory and its applications, Springer (2012).

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	List of fuzzy sets and related theorems.	K1
CO2	Explain Operation on fuzzy sets and α -cuts of fuzzy operations	K2
CO3	Identify the fuzzy and crisp relations.	K3
CO4	Classify the decision making in fuzzy environments.	K4
CO5	Conclude that the application of medicine, economics and genetic algorithms	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	2	2	3	3	3	4
CO3	3	3	3	2	2	4	4
CO4	4	4	2	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern: Theory 40%; Problems:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

K. K. P. J.
Staff incharge
(Mrs. K. Karpagam)

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

EC – IV FLUID DYNAMICS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. To establish an understanding of the fundamental concepts of fluid dynamics
2. To make students understand the importance of fluid dynamics in diverse real life applications
3. To build the necessary theoretical background for solving a variety of problems

UNIT I: Introductory ideas:

Quantities like velocity, density, pressure, etc. streamlines and path lines - stream tubes and filaments - fluid body - Bernoulli's theorem - differentiation w.r.to time - equation of continuity - transport theorem - boundary conditions - rate of change of linear momentum.

UNIT II:

Inviscid theory: Euler's equation - conservative forces - Lagrangian form of the equation of motion - steady motion - energy equation - rate of change of circulation - Kelvin's theorem - vortex motion and its permanence.

UNIT III:

Two dimensional motion: examples - stream function and velocity potential - complex potentials and flows - the singularities source, doublet and vortex - mixed flow - method of images - circle theorem - flow past a circular cylinder with circulation - Blasius's theorem-lift force.

UNIT IV:

Irrotational motion in three dimensions: Laplace equation - spherical harmonics - auxiliary symmetric field - Stoke's stream function - motion of a sphere - pressure distribution - drag force - axial distributions of sources and doublets - continuous distributions - flow near axis due to sources and doublets.

UNIT V:

Viscous theory: the Navier-Stokes equations - vorticity and circulation in a viscous fluid - some exact solutions - steady flow through an arbitrary cylinder

UNIT I : Chapter 2 (Sections 2.1 to 2.9), and Chapter 3 (Sections 3.2 to 3.6)

UNIT II : Chapter 3 (Sections 3.9 to 3.11) and Chapter 4 (Sections 4.1, 4.2, 4.3 and 4.5)

UNIT III : Chapter 5 (Sections 5.1 to 5.9) (omit 5.7)

UNIT IV : Chapter 5 (Section 5.10), and Chapter 8 (Sections 8.1 to 8.9)

UNIT V : Chapter 8 (Sections 8.10 to 8.16)

TEXT BOOK:

[1] F. Chorlton, Textbook of Fluid Dynamics, CBS Publishers & Distributors, New Delhi, Reprint 2004

REFERENCE BOOKS:

[1] J.D.Anderson, Computational Fluid Dynamics, The Basics with Applications, McGraw Hill, 1995.

[2] R.K.Rath, An Introduction to Fluid Dynamics, Oxford and IBG Publishing Co., New Delhi, 1976.

[3] S.W.Yuan, Foundations of Fluid Mechanics, Prentice Hall of India Pvt Ltd., New Delhi, 1976.

Note: Latest edition of the books may be used

Course Outcomes : On completion of the course, students will be able to:	Level
CO1 Find the velocity, density, pressure, etc. streamlines and path lines.	K1

staff Incharge: P. 

CO2	Explain the nature of two dimensional and three dimensional flows.	K2
CO3	Make Use the important definitions and introductory concept the Milne - Thomson circle theorem.	K3
CO4	Classify the motion of a mechanical system using the Navier - Stokes equations of motion of a Viscous Fluid.	K4
CO5	Determine the concept of the Prandtl's Boundary Layer	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	2	3	4
CO3	3	3	3	2	3	3	3
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern: Theory 40%; Problems:

Section A		Section B		Section C	
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)		3 × 10 = 30 (Each Unit Carries One Questions)	


 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001.

EC – VI WAVELETS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. Wavelet analysis has drawn much attention from both mathematicians and engineers alike. The emphasis of the course is on spline wavelets and time-frequency analysis. The only pre-requisite is a basic knowledge of function theory and real analysis.
2. The outcome of the course is to enable the learner to apply the pure mathematics in signal processing and image analysis.

UNIT I : An Overview : Fourier to Wavelets – Integral Wavelets Transform and Time frequency analysis – Inversion formulas and duals – Classification of Wavelets – Multi-resolution analysis – Splines and Wavelets.

Fourier Analysis : Fourier and Inverse Fourier Transformation – Continuous Time Convolution – The delta function – Fourier Transformation of square integrable functions.

UNIT II : Fourier Analysis (contd): Fourier Series – Basic Convergence Theory – Poisson Summation Formula.

Wavelet Transforms and Time Frequency Analysis : The Gabor Transforms – Short time Fourier Transforms and the uncertainty principle – The integral Wavelet Transform – Dyadic Wavelets – Inversion Frames – Wavelet Series

UNIT III : Cardinal Spline Analysis : Cardinal Spline spaces – B-splines and their basic properties – The time scale relation and an interpolating graphical display algorithm – B-Net representations and computation of cardinal splines – Constructions of cardinal splines – constructions of spline application formulas – Construction of Spline interpolation formulas.

UNIT IV : Scaling functions and Wavelets : Multi-resolution analysis – Scaling functions with finite two scale relation – Direction sum Decompositions of $L^2(R)$ – Wavelets and their duals.

UNIT V : Cardinal Splines Wavelets : Interpolating splines wavelets – Compactly supported spline – Wavelets – Computation of Cardinal spline Wavelets – Euler – Frebenious Polynomials.

Orthogonal Wavelets : Examples of orthogonal Wavelets - Identification of orthogonal two scale symbols - Construction of compactly supported orthogonal wavelets.

UNIT I : Chapter 1 (Sections 1.1 to 1.5)
Chapter 2 (Sections 2.1 to 2.3)

UNIT II : Chapter 2 (Sections 2.4, 2.5) and Chapter 3 (Sections 3.1 to 3.6)

UNIT III : Chapter 4 (Sections 4.1 to 4.6)

UNIT IV : Chapter 5 (Sections 5.1 to 5.4)

UNIT V : Chapter 6 (Sections 6.1 to 6.4) and Chapter 7 (Sections 7.1 to 7.3)

TEXT BOOK :

[1]. Charles K. Chui, An introduction to Wavelets, Academic Press, New York, 1992.

REFERENCE BOOKS:

1. Chui C. K. (ed), Approximation theory and Fourier Analysis, Academic Press Boston, 1991.

2. Daribechies I, Wavelets, CBMS-NSF Series in Appl, SIAM Philadelphia, 1992.
3. Schumaker L, L. Spline Functions : Basic Theory, Wiley, New York, 1981.
4. Nurnberger G, Applications to Spline Functions, Springer Verlag, New York, 1989

Note: Latest edition of the books may be used

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Show Integral Wavelets Transform and Time frequency analysis.	K1
CO2	Outline Wavelet Transforms and Time Frequency Analysis.	K2
CO3	Apply Construction of Spline interpolation formulas.	K3
CO4	Analyze the Scaling functions and Wavelets.	K4
CO5	Determine the Cardinal Splines Wavelets and orthogonal wavelets.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	4	4	3
CO2	3	4	2	3	2	2	4
CO3	3	2	3	2	3	4	4
CO4	4	4	3	3	3	3	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern: Theory 40%; Problems:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Staff incharge
(Dr. G. saithya bhavathi)

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), KUMBAKONAM
DEPARTMENT OF MATHEMATICS
M.Sc., Mathematics
OUTCOME BASED EDUCATION CHOICE BASED CREDIT SYSTEM
SEMESTER – I
SEC – I MATHEMATICAL DOCUMENTATION USING LATEX – PRACTICAL

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Practical	2	-	-	2	40	60	100

Objectives-

1. To make the students learn the art of typing mathematics text on their own.
2. To inculcate professional training required to become a scholar in mathematics.

UNIT I : Basic Structure of Latax 2e – Input file structure – Layout – Editors – Forward search – Inverse Search – Compling – Conversion to various formats
UNIT II : Typesetting simple documents – sectioning – Titles – page layout – listing – enumerating – quote letter formats.
UNIT III : Using package amsmath typing equations labeling and refreing.
UNIT IV: Figure inclusion – Table inclusion.
UNIT V: Bibliography – Intex typing – Beamer presentation Styles.
TEXT BOOK: [1] Leslie Lamport, LATEX: A Document preparation System, Addison – Wesley, Reading, Massachusetts, second edition, 1994
REFERENCES: 1. Tobias Oetiker, Hubert Partl, Irencehyna and Elisabeth Schlegl., The (Not So) Short Introduction to LATEX2e, Samurai Media Limited (or available online at http:// mirrors,ctan.org/info/lshort/English/lshort.pdf) 2. LATEX Tutorials – A Primer, Indian Tex Users Group, available online at https://www.tug.org/twg/mactex/tutorials/txprimer-1.0.pdf 3. H.J.Greenberg. A Simplified introduction to LATEX, available online at http://www.ctan.org/tex-archive/info/simplified-latex/ 4. Using Kile – KDE Documentation, https://docs.kde.org/trunk4/en/extragear-office/kile/quick_using.html .

Question pattern:

ANSWER ALL THE QUESTIONS:

2×15 = 30 Marks
1× 20 = 20 Marks
Record = 5 Marks
Viva – voce = 5 Marks

Total = 60 Marks

Accd. By
S. Hebbi
In Charge
DATA

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous),
Kumbakonam-602009

CORE COURSE-IV LINEAR ALGEBRA

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	6	-	-	5	25	75	100

Course Contents

Objectives:

- The objective of this course is to develop a strong foundation in linear algebra that provide a basic for advanced studies not only in mathematics but also in other branches like engineering, physics and computers, etc.
- Particular attention is given to canonical forms of linear transformations, diagonalizations of linear transformations, matrices and determinants.

UNIT I: Linear transformations: Linear transformations – Isomorphism of vector spaces – Representations of linear transformations by matrices – Linear functionals.
UNIT II: Algebra of polynomials: The algebra of polynomials – Polynomial ideals - The prime factorization of a polynomial – Determinant functions.
UNIT III: Determinants: Permutations and the uniqueness of determinants – Classical adjoint of a (square) matrix – Inverse of an invertible matrix using determinants – Characteristic values – Annihilating polynomials.
UNIT IV: Diagonalization: Invariant subspaces – Simultaneous triangulations – Simultaneous diagonalization – Direct-sum decompositions – Invariant direct sums – Primary decomposition theorem.
UNIT V: The Rational and Jordan forms: Cyclic subspaces – Cyclic decompositions theorem (Statement only) – Generalized Cayley – Hamilton theorem - Rational forms – Jordan forms.
UNIT I : Chapter3 (Sections 3.1 to 3.5) UNIT II : Chapters4 and 5 (Sections 4.1, 4.2,4.4,4.5 and 5.1.5.2) UNIT III : Chapters5 and 6 (Sections 5.3 ,5.4 and 6.1 to 6.3) UNIT IV : Chapter S6 (Sections 6.4 to 6.8) UNIT V : Chapter7 (Sections 7.1 to 7.3)
TEXT BOOK : [1] Kenneth M Hoffman and Ray Kunze, Linear Algebra, 2 nd Edition, Prentice –Hall of India Pvt. Ltd, NewDelhi, 2013.
REFERENCE BOOKS: 1. M.Artin, "Algebra", PrenticeHollofIndiaPvt.Ltd..2005.

- S.H. Friedberg, A.J. Insel and L.E Spence, "Linear Algebra", 4th Edition.Pritice-HallofIndiaPvt.Ltd.,2009.
- I.N. Herstein. "Topics in Algebra", 2nd Edition, Wiley Eastern Ltd. New Delhi.2013.
- J.J. Rotman, "Advanced Modern Algebra", 2nd Edition, Graduate Studies in Mathematics, Vol. 114, AMS, Providence, Rhode Island, 2010.
- G. Strang, "Introduction to Linear Algebra", 2nd Edition, Prentice Hall of India Pvt. Ltd.2013.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Recall the Linear transformations	K1
CO2	Explain the algebra of polynomial ideals.	K2
CO3	Make use of Permutations and the uniqueness of determinants.	K3
CO4	Discover the Simultaneous triangulations and diagonalization.	K4
CO5	Discuss the Rational forms and Jordan forms.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	4	4	3
CO2	3	3	2	3	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3 Medium - 2 Low - 1

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

S. Rajkumari
Staff incharge
(Dr. S. Rajkumari)

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous),
Kumbakonam - 612 001.

PMC205

CORE COURSE –V REAL ANALYSIS – II

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Theory	6	-	-	5	25	75	100

Course Contents

Objectives:

1. Aim of this course is to enable the students to learn the basic concepts of real analysis.
2. To proof of techniques in Analysis to well prepared for the advanced courses like Functional Analysis and Advanced Analysis.

UNIT – I : Functions of bounded variation:

Introduction- properties of monotonic functions – Functions of bounded variation- Total variation - Additive property of total variation – Total variation of $[a, x]$ as a function of x - function of bounded variation expressed as the difference of two increasing functions. Riemann – Stieltjes Integral: Definition and Existence of the Integral – Properties of the Integral– Integration and Differentiation – Integration of vector valued functions – Rectifiable curves.

UNIT – II : Functions of several variables:

Linear transformation – Differentiation – The inverse function theorem – The implicit function theorem.

UNIT – III :

Determinants- Derivatives of higher order- Differentiation of integrals.

UNIT – IV : Lebesgue measure:

Outer measure – Measurable sets and Lebesgue measure – Non – measurable sets – Measurable functions.

UNIT – V : The Lebesgue integral:

The Lebesgue integral of a bounded function over a set of finite measure – The integral of a non negative function – The general Lebesgue integral – Lebesgue's Monotone Convergence Theorem and Dominated Convergence Theorem.

UNIT I : Chapter6 (Sections 6.1 to 6.7) [1] and Chapter 6(Sections 6.1 to 6.5)[2]

UNIT II : Chapter9 (Sections 9.1, 9.2, 9.4, 9.5) [2]

UNIT III : Chapter9 (Sections 9.7 to 9.9) [2]

UNIT IV : Chapter2 (Sections 2.1, 2.2, 2.4) [3]

UNIT V : Chapter3 (Sections 3.1, 3.2) [3]

TEXT BOOK:

[1]. Tom M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1997

[2] Walter Rudin, Principles of Mathematical Analysis, Tata McGraw-Hill, New York, 1988.

[3] G. de Barra, Measure Theory and Integration, Wiley Eastern Ltd., New Delhi 1981.

REFERENCE BOOKS:

1. H. L. Royden, Real Analysis, Third Edition, Macmillan Publishing Company, New Delhi, 1988.

2. Inder K. Rana, An Introduction to Measure and Integration, 2nd Edition,

Narosa Publishing House, 2015.

3. Gelbaum, B. R. and J. Olmsted, Counter Examples in Analysis,

Holden day, San Francisco, 1964.

4. Burkill. J. C. The Lebesgue Integral, Cambridge University Press. 1951

5. Munroe. M. E. Measure and Integration. Addison- Wesley, Mass. 1

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Analyze integrals of given real valued function through limits and gain the knowledge of Riemann integration of real valued functions.	K1
CO2	Solve the problems of convergence and divergence of sequences and series	K2
CO3	Explain the applications and the usefulness of these special functions.	K3
CO4	Understand purpose and functions of the Inverse function and implicit function	K4
CO5	Evaluate the special functions of using in the integration of differential forms	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	2	3
CO2	3	4	2	3	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	2	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Dr. Anurag
Staff incharge
(Dr. A. K. R. Rajyal)

G. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

PMC206

CORE COURSE –VI PARTIAL DIFFERENTIAL EQUATIONS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Theory	6	-	-	4	25	75	100

Course Contents

Objectives:

1. Familiarize the students with the fundamental concepts of Partial differential equations which will be used as background knowledge for the specialized courses in any field
2. This course provides an introduction to the study and solution methods of solving
 - (i) Heat, Wave, Laplace, and Diffusion Equations
 - (ii) Integral Transforms
3. To increase self confidence in conducting research independently or within a team.

UNIT I:

First order P.D.E – Curves and Surfaces – Genesis of First order P.D.E. – Classification of Integrals – Linear Equation of the First Order.

UNIT II:

Pfaffian Differential Equations – Compatible Systems – Charpit's Method – Jacobi's Method – Integral surfaces through a given curve.

UNIT III:

Second order P.D.E: Genesis of second order P.D.E. – Classification of second order P.D.E. One - Dimensional wave Equation – Vibrations of an Infinite string – Vibrations of a semi - Infinite string - Vibrations of string of finite length.

UNIT IV:

Vibrations of a string of finite Length (Method of separation of variables) Laplace's Equation : Boundary value problems – Maximum and Minimum principles – The Cauchy problem – The Dirichlet problem for the upper Half plane – The Neumann problem for the upper Half plane.

UNIT V:

The Dirichlet interior problem for a circle – The Dirichlet Exterior problem for a circle – The Neumann problem for a circle – The Dirichlet problem for a Rectangle – Harnack's Theorem – Laplace's Equation – Green's Functions.

TEXT BOOK :

- [1] T.Amaranath, An Elementary Course in Partial Differential Equations, second Edition, Narosa publishing House, New Delhi, 1997.

REFERENCE BOOKS:

1. M.D. Raisinghania Advanced Differential Equations S. Chand and Company Ltd., New Delhi, 2001
2. K. Sankara Rao, Introduction to Partial Differential Equations, Second edition– Prentice–Hall of India, New Delhi 2006
3. J.N. Sharma & K. Singh Partial Differential Equations for Engineers & Scientists, Narosa Publishing House, 2001
4. R. Dennemeyer, Introduction to Partial Differential Equations and Boundary value Problems, McGraw Hill Book Company, New York, 1968.
5. Ian n. Sneddon – elements of partial differential equations – dover publications, inc. mineola, newyork, 2006.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Classify first order partial differential equation and their solutions.	K1
CO2	Solve the Pfaffian Differential Equations.	K2
CO3	Identify and solve the Vibrations of an Infinite string.	K3
CO4	Analyze the Dirichlet problem for the upper Half plane and Examine the Neumann problem for the upper Half plane.	K4
CO5	Justify the Dirichlet Interior and Exterior problem for a circle.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3 Medium - 2 Low - 1

Question pattern: Theory 40%; Problems: 60%

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

K. K. Karpagam
Staff incharge
(Mrs. K. Karpagam)

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

PMDE2:1

EC – VIII MECHANICS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. To create a foundation for understanding basic principles of mechanics and some classical problems
2. To learn Lagrangian and Hamiltonian formulations of classical mechanics
3. To learn the importance and consequences of canonical transformations

UNIT I:

Introductory concepts: mechanical system –generalized coordinates – constraints – virtual work – d'Alembert's principle - energy and momentum – equilibrium and stability – kinetic energy – angular momentum.

UNIT II:

Lagrange's equations: derivation of Lagrange's equations for different conditions – Lagrange equations for some simple systems -integrals of motion – Routhian procedure – natural system – Liouville's system – small oscillations.

UNIT III:

Hamilton's equations: stationary values - Hamilton's principle under different conditions – Hamilton's equations – the Legendre transformation – modified Hamilton's principle – principle of least action.

UNIT IV:

Hamilton-Jacobi theory: Hamilton's principle function – canonical integral – Pfaffian differential form – Hamilton-Jacobi equation – Jacobi's theorem – modified Hamilton-Jacobi equation – separability – Liouville's system Stackel's theorem.

UNIT V:

Canonical transformations: Differential forms and generating functions – some simple, point and momentum transformations - Lagrange and Poisson brackets.

UNIT I: Chapter 1 (Sections 1.1 to 1.5)

UNIT II : Chapter 2(Sections 2.1 to 2.4)

UNIT III : Chapter 4(Sections 4.1 to 4.3)

UNIT IV : Chapter 5(Sections 5.1 to 5.3)

UNIT V : Chapter 6 (Sections 6.1 to 6.3)

TEXT BOOK :

[1] D.T. Greenwood, Classical Dynamics, Prentice Hall of India Pvt. Ltd, New Delhi, 1979

REFERENCES:

1. H. Goldstein, C. Poole & J. Safko, Classical Mechanics, Pearson Education, New Delhi, 2002.
2. N.C.Rane and P.S.C.Joag, Classical Mechanics, Tata McGraw Hill, 1991.

3. J.L.Synge and B.A.Griffith. Principles of Mechanics (3rd Edition) McGraw Hill Book Co., New York, 1970.
4. L.N. Hand and J.D. Finch, Analytical Mechanics, Cambridge University Press, 1998.
5. S.L. Loney, An Elementary Treatise on Statics, Kalyani Publishers, New Delhi, 1979.
6. J. R. Taylor, Classical Mechanics, University Science Books, Sausalito 2005.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Recall the generalized coordinates, constraints virtual work, d'Alembert's principle to energy and momentum.	K1
CO2	Explain the Derivation of Lagrange's equation using elementary calculus as an alternative to the more advanced variational calculus derivation.	K2
CO3	Make use of Hamilton-Jacobi in identifying conserved quantities for a mechanical system, even when the mechanical problem itself cannot be solved completely.	K3
CO4	Classify Derivation of Hamilton-Jacobi theory	K4
CO5	Discuss the Lagrange and Poisson brackets using Canonical transformations.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage	4	3	3	3	4	4	3
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10) 5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

S. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001./

P. Latha (P. LATHA)
Staff Incharge

EC – VII ELEMENTS OF STOCHASTIC PROCESSES ✓

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. Mathematics is the core subject for all science. Therefore every student is expected to have sufficient knowledge in Mathematics. The two years M.Sc. program is to enable every student to face the tough situation in the world.
2. The study of stochastic process is precisely to give comparative knowledge to every student.

UNIT I: Continuous Time Markov Chain, Examples, Transient Analysis, Occupancy Times, Limiting Behavior
UNIT II: Renewal Process, Cumulative Process, Semi-Markov Process, Examples and Long term Analysis.
UNIT III: Queueing Systems, Single-Station Queues, Birth and Death queues with Finite and Infinite Capacity
UNIT IV: M/G/1 and G/M/1 Queues and Network of Queues.
UNIT V: Standard Brownian Motion, Brownian Motion and First Passage Times
UNIT I : Chapter 4 (Sections 4.1 to 4.6)) UNIT II : Chapter 5 (Sections 5.1 to 5.5) UNIT III : Chapter 6(Sections 6.1 to 6.4) UNIT IV : Chapter 6(Sections 6.5 to 6.7) UNIT V : Chapter7(Sections 7.3 to 7.6)
TEXT BOOK : [1] V.G. Kulkarni, Introduction to Modelling and Analysis of Stochastic Systems, Second Edition, Springer(2011)
REFERENCES: 1. J. Medhi, Stochastic Processes, NEW AGE(2009). 2. S. M. Ross, Stochastic Processes, Wiley Series in Probability and Statistics(1996).

CO3	Apply Birth and Death queues with Finite and Infinite Capacity.	K3
CO4	Analyze the M/G/1 and G/M/1 Queues and Network of Queues.	K4
CO5	Discuss the Standard Brownian Motion, Brownian Motion and First Passage Times.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)
		3 × 10 = 30 (Each Unit Carries One Questions)

S. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Recall the Continuous Time Markov Chain.	K1
CO2	Explain the Renewal Process and Cumulative Process.	K2

P. Latha (P. LATHA)
Statist. Incharge

EC - I X- COMMUTATIVE ALGEBRA ✓

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

The objective of this course is to study modules, exact sequences, tensor product of modules, local properties, primary decomposition, Noetherian rings and Artinian rings. Also, another important class of Dedekind domain is studied.

UNIT I: RINGS AND IDEALS Rings and ring homomorphism's – ideals – Extension and Contraction, modules and module homomorphism – exact sequences.
UNIT II: RINGS AND MODULES OF FRACTIONS Tensor product of modules – Tensor product of algebra – Local properties– extended and contracted ideals in rings of fractions.
UNIT III: PRIMARY DECOMPOSITION Primary Decomposition – Integral dependence – The going-up theorem – The going-down theorem – Valuation rings
UNIT IV: NOETHERIAN RINGS Chain conditions – Primary decomposition in Noetherian rings
UNIT V: Primary decomposition in Noetherian rings. Artin rings – Discrete valuation rings – Dedekind domains – Fractional ideals.
UNIT I : Chapter 1,2 (pages1-24) UNIT II : Chapter 2,3 (pages24-49) UNIT III : Chapter 4,5 (pages 50-73) UNIT IV : Chapter 6,7(pages74-88) UNIT V : Chapter 8,9 (pages89-99)
TEXT BOOK : [1] S.M Atiyah and I. G Macdonald, " Introduction to Commutative Algebra", Addison- Wesley Publications Company, Inc, 1969.
REFERENCE BOOKS: 1. N.S. Gopalakrishnan, "Commutative Algebra", Oxonian Press Pvt. Ltd, New Delhi, 2015. 2. I. Kaplansky, "Commutative Rings", University of Chicago Press, Chicago, 1974. 3. H. Matsumura, "Commutative Ring Theory", Cambridge University Press, 1986.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Define Rings and ring homomorphism's , ideals , Extension and Contraction, modules and module homomorphism , exact sequences	K1
CO2	Apply the Tensor product of modules and properties.	K3
CO3	Catageories of primary decomposition theorem.	K3
CO4	Criticize the Primary decomposition in Noetherian rings.	K4
CO5	Discuss the Noetherian rings.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	2	3	3
CO4	3	3	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)
		3 × 10 = 30 (Each Unit Carries One Questions)

AER. Anuj
Staff Incharge
M. M. R. PATIL

S. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

EC – XII- OPTIMIATION TECHNIQUES

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. Use integer programming problem to solve system of linear equations.
2. To provide the depth knowledge about inventory control theory and make students to solve the inventory problems.
3. To introduce the concept of non-linear programming problems.
4. Using optimization techniques to solve many practical problems.

UNIT I: INTEGER PROGRAMMING: Introduction – Integer Programming Formulations – Gomory's construction–Fractional cut method(all integer)–The Cutting – Plane Algorithm – Branch-and-Bound Technique – Zero-One Implicit Enumeration Algorithm.

UNIT II: DYNAMIC PROGRAMMING: Introduction – Application of ynamic Programming: Capital Budgeting Problem – Reliability Improvement Problem – Stage-coach Problem – Cargo Leading Problem – Minimizing Total Tardiness in Single Machine Scheduling Problem – Optimal Subdividing Problem – Solution of Linear Programming Problem through Dynamic Programming.

UNIT III: Games and strategies: Introduction – Two – Person Zero – Sum Games – Sum Basic Terns – The Maximin – Minimax Principle – Games without Saddle Points – Mixed Strategies – Graphic Solutions of $2 \times n$ and $m \times 2$ Games – Dominance Property.

UNIT IV: INVENTORY: Introduction–Inventory Decisions–Cost Associated with Inventories – Factors Affecting inventory –Economic Order Quantity– Deterministic Inventory Problems with No Shortages – Deterministic inventory Models with shortages – EOQ with Price Breaks – Multi Item Deterministic problems.

UNIT V: NON LINEAR PROGRAMMING: Introduction – General Non- Linear Programming Problem – Constrained Optimization with Equality Constraints - Constrained Optimization with Inequality Constraints – Saddle Point Problems – Saddle Point and NLPP.

UNIT I : Chapter 7 (Sections 7.1 – 7.8)

UNIT II : Chapter13(Sections 13.1 – 13.7)

UNIT III : Chapter17 (Sections 17.1 – 17.7)

UNIT IV : Chapter 19(Sections 19.1,19.4,19.6,19.7,19.9 – 19.13)

UNIT V : Chapter 27 (Sections.27.1,27.3 – 27.7)

REFERENCE BOOKS:

1. Hamdy A. Taha, Operations Research, (sixth edition) Prentice–Hall of India private Limited, New Delhi, 1997
2. Panneerselvam.R, Operations Research, 2nd Edition, PHI Learning Private Limited, Delhi, 2015
3. Hiller.F.S & Lieberman.J Introduction to Operation Research, 7th Edition, Tata– MCGraw Hill Publishing Company, NewDelhi, 2001.
4. Prem Kumar Gupta.Er, Hira.D.S. Operations Research,7th Edition,S.Chand & Company Pvt.Ltd.2014.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Find the Plane Algorithm , Branch and Bound Technique , Zero One Implicit Enumeration Algorithm.	K1
CO2	Demonstrate the Solution of Linear Programming Problem through Dynamic Programming	K2
CO3	Compute the Graphic Solutions of $2 \times n$ and $m \times 2$ Games and Dominance Property..	K3
CO4	Analyze the inventory Models with shortages and EOQ with Price Breaks , Multi Item Deterministic problems.	K4
CO5	Evaluate the Saddle Point Problems , Saddle Point and NLPP	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium – 2

Low – 1

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	$5 \times 5 = 25$ (Each Unit Carries Two Questions (Either or Type) $3 \times 10 = 30$ (Each Unit Carries One Questions)

Staff incharge
(Mrs. J. Indira)

G. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

EC – X- FORMAL LANGUAGES AND AUTOMATA THEORY

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

- 1.To provide an insight to theoretical computer science.
- 2.To get across to the students the notion of effective computability, using mathematical models.

UNIT I :

Finite State Automata: Introduction – Finite State Machine – Deterministic Finite Automata – Transition System –Acceptability of a String by Finite Automata – Non Deterministic Finite Automata – Difference between DFA and NFA– Equivalence of DFA and NFA – Finite Automata with ϵ -moves – Two way Finite Automata – Finite Automata with Outputs.

UNIT II :

Grammar and Chomsky Classification: Introduction – Grammar – Chomsky Classification – Languages and their Relations.

UNIT III :

Regular Languages and Expression: Introduction – Regular Languages – Regular Expressions – Finite Automata and Regular Expressions – Pumping Lemma –Regular Sets and Regular Grammar.

UNIT IV :

Context Free Languages: Introduction – Context free Grammar – Context free Languages – Simplification of Context free Grammars – Normal forms – Pumping Lemma for Context free Languages – Closure properties of Context free Languages.

UNIT V :

Pushdown Automata and Turing Machine: Introduction- Pushdown Automata – Working Principle of Pushdown Automata – Turing Machine Model – Instantaneous Description – Representation of Turing Machines – Acceptance of Language by Turing Machine.

UNIT I : Chapter 2 (Sections 2.0 to 2.10)

UNIT II : Chapter 3 (Sections 3.0 to 3.3)

UNIT III : Chapter 4 (Sections 4.0 to 4.5)

UNIT IV : Chapter 5 (Sections 5.0 to 5.6)

UNIT V : Chapter 6 (Sections 6.0to 6.2) and Chapter 7(Sections7.0to 7.4)

TEXT BOOK:

[1] D. P. Achariya , Theory of Computation, MJP Publishers, 2010.

REFERENCES:

[1] C. L. Liu, Elements of Discrete mathematics, Mcgraw Hill, International Editions, 2000.

[2] A.M. Natarajan, A. Tamilarasi and P. Balasubramanian, Theory of Automata and Formal Languages, New Age International (P) Limited Publishers, New Delhi.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Construct the mathematical proof for computation and algorithms	K1
CO2	Understand Mathematical foundations of computation including automata theory; the theory of formal languages and grammars	K2
CO3	Analyze the regular languages and expressions.	K3
CO4	Simplifying the techniques of the context free grammars and have an exposure in normal forms.	K4
CO5	Analyze and design finite automata, pushdown automata, Turing machines.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium – 2

Low – 1

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Staff incharge

(Dr. G. Sahithya bhargathi)

G. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

PMDE 2:6

EC – V DISCRETE MATHEMATICS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. To Prepare students to develop mathematical foundations to understand and create mathematical arguments.
2. To motivate students how to solve practical problems using discrete mathematics.

UNIT I: THE FOUNDATIONS : LOGIC & PROOFS: Propositional Logic - Applications of Propositional Logic - Propositional Equivalences - Predicates and Quantifiers – Nested Quantifiers. Algorithms: The Growth of Functions.

UNIT II:

COUNTING & ADVANCED COUNTING TECHNIQUES: The Basics of Counting - The Pigeonhole Principle - Permutations and Combinations - Generalized Permutations and Combinations - Generating Permutations and Combinations - Applications of Recurrence Relations - Solving Linear Recurrence Relations – Generating Functions.

UNIT III: BOOLEAN ALGEBRA & MODELING COMPUTATIONS: Boolean: Functions - Representing Boolean Functions - Logic Gates- Minimization of Circuits Finite- State machines with Output - Finite - State machines with No Output - Turing Machines.

UNIT IV: CODING THEORY: Introduction to Coding - Linear Codes - Cyclic codes - Special Cyclic codes.

UNIT V: FURTHER APPLICATIONS OF ALGEBRA:

Semi group- Semigroup and Automata – Semigroup and formal Languages - Linear Recurring sequences.

UNIT I : Chapter 1 (Sections 1.1 to 1.5) [1] and Chapter 3 (Sections 3.1,3.2) ([1])

UNIT II : Chapter 6 (Sections 6.1 to 6.3, 6.5 to 6.6) [1] and Chapter 8 (Sections 8.1,8.2,8.4) [1]

UNIT III : Chapter 12 (Sections 12.1 to 12.4) [1] and Chapter 13 (Sections 13.2,13.3,13.5) [1]

UNIT IV : Chapter 4 (Sections 16 to 19) [2]

UNIT V : Chapter 7 (Sections 28 to 30,33) [2]

TEXT BOOK :

- [1] . Kenneth H. Rosen, Discrete Mathematics and it's Applications, 7th Edition/ McGraw Hill Education, New York, 2012 Units I, I,III.
- [2]. Rudolf Lidl and Gunter Pilz, Applied Abstract Algebra 2nd Edition Springer, 1997 Units IV & V.

REFERENCE BOOKS:

1. J.P. Tremblay & R. Manohar, A First Course in Discrete Structures with Applications to Computer Science, McGraw Hill,1987.
2. T.Veerarajan, Discrete Mathematics with Graph Theory and Combinatorics, Tata McGraw Hills Publishing Company

Limited, 7th Reprint,2008

3. Liu C.L, Elements of Discrete Mathematics, McGraw Hill, New York,1978
4. Grimaldi R.P and Ramana B.V, Discrete and Combinatorial Mathematics- An Applied Introduction, Pearson Education,2004

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Recall logic & proofs.	K1
CO2	Explain counting & advanced counting techniques.	K2
CO3	Apply Boolean: Functions.	K3
CO4	Categorize of Coding Theory	K4
CO5	Application of Algebra.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	
CO2	3	4	2	4	3	3	
CO3	3	3	3	2	3	4	
CO4	4	4	3	3	4	4	
CO5	4	3	3	2	3	3	
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern: Theory 40%; Problems:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

S. Rajkumari

Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001

Staff incharge

(Dr. G. Sahithyabharathi)

PM2SE2P

EC – II PROGRAMMING IN SCI LAB – PRACTICAL

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Practical	2	-	-	2	40	60	100

Objectives:

1. To make the students learn the art of typing mathematics text on their own.
2. To inculcate professional training required to become a scholar in mathematics.

UNIT I:

An Introduction to Scilab: Introduction – Getting Started- Using Scilab as a calculator - Basic Elements of Scilab as a Programming Language - Input and output of Mathematical values in Scilab - Suppressing the display of output - Dynamic nature of variable in Scilab - Functions to manage complex numbers – Booleans.

UNIT II:

Matrices: Vectors - Operations on Vectors – Element-wise product or dot product (.*), division of vectors, - power of vectors (.^) - Two-dimensional matrices - Operations on matrices - Functions on matrices

UNIT III:

Scilab Programming: Branching statements – Looping statements - The while statement

UNIT IV:

Plotting: The 2-dimensional plot – Contour plot - The 3-dimensional plot (Surface plot) - Titles, axis, legends and Style options.

UNIT V:

Polynomials in Scilab: Defining polynomials - Matrices of polynomials - Operations on polynomials or matrices of polynomials - Evaluation of polynomials .

UNIT I : Chapter 1 (Sections 1.1 to 1.4)

UNIT II : Chapter 2 (Sections 2.1 to 2.2)

UNIT III : Chapter 3 (Sections 3.1 to 3.2)

UNIT IV : Chapter 5 (Sections 5.1 to 5.4)

UNIT V : Chapter 7 (Sections 7.1 to 7.4)

TEXT BOOK:

1. Dr. AKHILESHKUMAR PROGRAMMING USING SCILAB, THEORY & PRACTICALS. Copyrights reserved with the author-2022

Question Paper Pattern

ANSWER ALL THE QUESTIONS:

2×15 = 30 Marks
1×20 = 20 Marks
Record = 5 Marks
Viva – voce = 5 Marks

Total = 60 Marks

(Signature)
Staff incharge
(Dr. G. Vembarasi)
(Signature)
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

CORE COURSE -VII COMPLEX ANALYSIS

PMc307
P23Mc307

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	6	-	-	5	25	75	100

Course Contents

Objectives:

Complex analysis is one of the classical branches in mathematics, with roots in the 18th century and just prior. Important mathematicians associated with complex numbers include Euler, Gauss, Riemann, Cauchy, Weierstrass, and many more in the 20th century.

UNIT I : Cauchy's Integral Formula :

The index of a point with respect to a closed curve - The Integral formula - Higher derivatives. Local properties of analytical Functions: Removable singularities - Taylor's Theorem - Zeros and poles - The local mapping - The Maximum Principle..

UNIT II : The general form of Cauchy's Theorem:

Chains and cycles - Simple Continuity - Homology - The general statement of Cauchy's Theorem - Proof of Cauchy's Theorem - Locally exact differentials - Multiply connected regions - Residue Theorem - The argument principle.

UNIT III : Evaluation of Definite Integrals and Harmonic Functions:

Evaluation of definite integrals - Definition of Harmonic Function and basic properties - Mean value property - Poisson Formula..

UNIT IV : Harmonic Functions and Power Series Expansions:

Schwarz theorem - The reflection principle - Weierstrass theorem - Taylor's Series - Laurent series.

UNIT V : Partial Fractions and Entire Functions:

Partial fractions - Infinite products - Canonical products - Gamma Functions - Jensen's Formula - Hadamard's Theorem.

UNIT I : Chapter 4 : Section 2: 2.1, 2.2, 2.3.
Chapter 4 : Section 3: 3.1, 3.2, 3.3, 3.4

UNIT II : Chapter 4 : Section 4: 4.1 to 4.7
Chapter 4 : Section 5: 5.1, 5.2

UNIT III : Chapter 4 : Section 5: 5.3
Chapter 4 : Section 6: 6.1 to 6.3

UNIT IV : Chapter 4 : Section 6: 6.4, 6.5
Chapter 5 : Section 1: 1.1, 1.2, 1.3

UNIT V : Chapter 5 : Section 2: 2.1 to 2.4
Chapter 5 : Section 3: 3.1, 3.2

TEXT BOOK :

[1]. Lars F. Ahlfors, Complex Analysis, (3rd Edition) McGraw Hill Book Company, New York, 1979.

REFERENCE BOOKS:

1. H.A. Presfly, Introduction to complex Analysis, Clarendon Press, oxford, 1990.
2. J.B. Corway, Functions of one complex variables, Springer -Verlag, International student Edition, Narosa Publishing Co.
3. E.Hille, Analytic function Theory (2 vols.), Gonm & Co, 1959.
4. M.Heins, Complex function Theory, Academic Press, New York, 1968.

iii Semest

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Recal the index of a point with respect to a closed curve and the Integral formula.	K1
CO2	Explain the general statement of Cauchy's Theorem and Locally exact differential.	K2
CO3	Solve the Definite Integrals and Harmonic functions.	K3
CO4	Analyze Harmonic functions and Power Series expansions:	K4
CO5	Evaluate Canonical products and Gamma Functions.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	4	4	3
CO2	3	3	2	2	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)
		3 × 10 = 30 (Each Unit Carries One Questions)

Dr. G. Vembarsai

Staff incharge

(Dr. G. Vembarsai)

S. Rajkumari
Hod, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

CORE COURSE –VIII

TOPOLOGY

P23MC308

PMC308

Category	Hours			Credit s	Marks		
	Lectur e	Tutori al	Practica l		CI A	Externa l	Tota l
Theory	6	-	-	5	25	75	100

Course Contents

Objectives:

Mathematics is the fundamental subject for all science. Therefore every student is expected to have basic knowledge on Mathematics. The two years M.Sc. program is to prepare every student to face the competitive world outside. The study of topology in particular is to stimulate the analytical mind of the students, enable them to acquire sufficient knowledge and skill in the subject that will make them competent in various areas of mathematics.

UNIT I:

Types of Topological Spaces and Examples - Basics for a topology - The order topology - The product topology on $X \times Y$ - The subspace topology - Closed sets and limits points - Continuous functions - The Product Topology.

UNIT II:

The Product Topology - Metric Topology - Connected spaces - Connected subspaces of the real line - Components and Local connectedness.

UNIT III:

Compact spaces - Compact subspaces of the real line - Uniform continuity theorem - Limit Point Compactness.

UNIT IV:

First and Second countable spaces - Lindeloff and Separable spaces - Countability axioms - The separation axioms - Normal spaces - The Uryshon's lemma.

UNIT V:

The Urysohn Metrization Theorem - Tietze Extension Theorem - The Tychonoff theorem - Stone Cech compactifications.

UNIT I : Chapter2(Sections 12 to18)

UNIT II : Chapter 2(Sections 19,20)
and Chapter3(Sections 23 to25)

UNIT III : Chapter3(Sections 26 to28)

UNIT IV : Chapter4(Sections 30 to33)

UNIT V : Chapter4(Sections 34 ,35)andChapter5(Sections 37,38)

TEXT BOOK :

[1]. James R.Munkres, Topology (Second Edition), Prentice - Hall of India, Private Ltd, New Delhi(2006).

REFERENCE BOOKS:

1. G.F.Simmons, Introduction to Topology and Modern Analysis, Tata McGraw-Hill Edition, New Delhi(2004).
2. Fred H.Croom, Principles of Topology, Cengage India Pvt Ltd, New Delhi(2009)
3. Seymour Lipschutz, Theory and Problems of General Topology, McGraw-Hill Edition, New Delhi(2006).

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Define Basics for a topology, the order topology and the Closed sets, Continuous functions.	K1
CO2	Explain the Connected spaces.	K2
CO3	Apply the Compact subspaces and Limit Point Compactness.	K3
CO4	Examine the separation axioms, Normal spaces and analyze the Uryshon's lemma.	K4
CO5	Determine The Urysohn Metrization Theorem and discuss the Tietze Extension Theorem, The Tychonoff theorem, Stone Cech compactifications	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3

Medium - 2

Low -

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)
		3 × 10 = 30 (Each Unit Carries One Questions)

Staff incharge
(Dr. R. Gowri)

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

CORE COURSE –IX GRAPH THEORY P23MC309

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	6	-	-	4	25	75	100

Course Contents

Objectives:

Graph Theory is a growing field of Mathematics with applications in almost all the fields. This contains the beauty of abstract mathematics and applied mathematics. This is an important Research area. This helps students to understand various parameters of Graph Theory with algorithms. This stimulate the analytical mind of the students, enable them to acquire sufficient knowledge and skill in the subject that will make them competent in various areas of mathematics.

UNIT I :

Graphs, Sub graphs and Trees; Graphs and simple graphs – Graph Isomorphism – The Incidence and Adjacency Matrices – Sub graphs – Dijkstra's Algorithm- Trees – Cut Edges and Bonds – Cut Vertices. - Kruskal's Algorithm(only).

UNIT II :

Connectivity, Euler Tours and Hamilton Cycle: Connectivity – Blocks – Euler Tours – Hamilton Cycles.

UNIT III:

Fleury's Algorithm - Matching, Edge Colorings: Matching – Matching and Coverings in Bipartite Graphs – Tutte's Theorem- The Hungarian Algorithm Edge Chromatic Number – Vizing's Theorem.

UNIT IV

Independent sets and Cliques, Vertex Colorings: Independent sets – Ramsey's Theorem – Chromatic Number – Brook's Theorem- Hajos Conjecture. – Chromatic Polynomials.

UNIT V :

Planar graphs : Plane and Planar Graphs – Dual graphs-Euler's Formula – The Five – Color Theorem and the four – Color Conjecture— Planarity Algorithm.

UNIT I : Chapter 1(sections 1.1 -1.4, 1.8), Chapter 2 (sections 2.1 to 3.2,5)

UNIT II : Chapter 3 (sections 3.1, 3.2), Chapter 4 (sections 4.1, 4.2)

UNIT III : Chapter 4(Section4.3), Chapter 5 (sections 5.1, 5.2,5.3.5.4),and Chapter 6 (sections 6.1, 6.2)

UNIT IV : Chapter 7 (sections 7.1, 7.2), Chapter 8 (sections 8.1- 8.4)

UNIT V : Chapter 9 (sections 9.1 to 9.3, 9.6,9.8)

TEXT BOOK :

[1]. A. Bondy and U.S.R. Murthy, Graph Theory with applications, Macmillan Co., London 1976.

REFERENCE BOOKS:

1. M.Murugan, Graph Theory and Algorithms, Second Edition, Muthali Publishing House, Annanagar, Chennai, 2018.
2. R. Balakrishnan and K. Ranganathan, Text Book of Graph

3. Theory, Springer,2000.
 4. D.B.West, Introduction to graph theory, Prentice Hall of India, 2001.
 5. J. Clark and D.A. Holton, A First look at Graph Theory, Allied Publishers, New Delhi, 1995.Harary F, Graph Theory, Addison –Wesley, Reading Mass, 1969.
- Note: Latest edition of the books may be used.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Recall the basics of the graphs.	K1
CO2	Explain the Connectivity and Menger's Theorem.	K2
CO3	Compute the Fleury's Algorithm and the Hungarian Algorithm .	K3
CO4	Analyze the Colourings and Hajos Conjecture. Chromatic Polynomials.	K4
CO5	Determine the Planar Graphs and Compose the Planarity Algorithm.	K5 & K6

1. Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	3	3
CO2	3	2	2	3	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Staff incharge
(Dr. G. Amudha)

S. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

COURSE -X

MATHEMATICAL METHODS

PM C310

P23MC310

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	6	-	-	4	25	75	100

Course Contents

Objectives:

1. To obtain through analysis of various aspects to solve differential equations using variation methods. To acquire the knowledge of solving problems in the field of mechanics and Mathematical physics.
2. To introduce Fredholm & Volterra Integral equations and to study the methods of solving the above equations.
3. To introduce Fourier Transforms.

UNIT I:

Calculus of variations – Maxima and Minima – The simplest Case – Natural Boundary and Transition conditions – Variational notation – More general case – Constraints and Lagrange's Multipliers – Variable end points – Sturm Liouville problems.

UNIT II:

Fourier Transforms – Fourier Sine and Cosine transforms – Properties – Convolution – Solving Integral equations – Finite Fourier Transforms – Finite Fourier Sine and Cosine transforms – Fourier Integral Theorem – Parseval's identity.

UNIT III:

Hankel Transforms: Definition – Inverse formula – Some important results for Bessel functions – Linearity Property – Hankel Transform of the derivatives of the function – Hankel Transform of differential operators – Parseval's Theorem.

UNIT IV:

Linear Integral Equations: Definition, Regularity Conditions – Special kind of kernels – Eigen values and Eigen functions – Convolution Integral – The inner or scalar product of two functions – Notation – Reduction to a system of Algebraic equations – Examples – Fredholm alternative – Examples.

UNIT V:

Method of successive Approximations: Iterative scheme – Examples – Volterra Integral Equation – Examples – Some results about the Resolvent Kernel.
Classical Fredholm Theory: The method of solution of Fredholm – Fredholm's First Theorem – Second Theorem – Third Theorem.

UNIT I : Chapter 2 (sections 2.1 to 2.9) of (2)

UNIT II : Chapter 6 and Chapter 7 (sections 7.1 to 7.4) of [3]

UNIT III : Chapter 9 of [3]

UNIT IV : Chapters 1 and 2 of [1]

UNIT V : Chapters 3 and 4 of [1]

TEXT BOOKS:

- [1] Ram. P. Kanwal, Linear Integral Equations Theory and Technique, Academic Press 1971.
- [2] F.B. Hildebrand, Methods of Applied Mathematics, second Edition, PHI, New Delhi, 1972.
- [3] A.R. Vasishtha and R.K. Gupta, Integral Transforms, second Revised Edition Krishna Prakashan Media, Private Limited, India. 1975.

REFERENCE:

- [1] I.N. Shedden, Mixed Boundary value problems in practical Theory, North Holland, 1966.
- [2] S.J. Mikhlin, Linear integral equations (translated from Russian), Hindustan Book Agency, 1960.

[3] I.N. Snedden, Mixed Boundary value problems in potential theory, North Holland, 1966.

[4] R.T. Rockafellar and R.J.B. Wets, Variational Analysis, springer, Grundlehren 317 (1998).

[5] Differential Equations and Calculus of Variations by L.Elsgolts, Mir Publishers, Moscow, 1970.

[6] Integral Equations by Shanti Swarup, Krishna Prakashan Media Ltd, Meerut, 1982.

[7] Integral Transforms and their Applications by Lokenath Debnath, Dambaru Bhatta, Taylor & Francis Group, London, 2007.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Apply the Natural Boundary and Transition conditions and use appropriate modern technology to explore calculus concepts of variation and its properties.	K1
CO2	Describe and Understand Fourier Transforms and Finite Fourier Sine and Cosine Transforms	K2
CO3	Learns some important results for Bessel function and categorize Hankel Transform of differential operators	K3
CO4	Classify Fredholm, Volterra and Singular type integral equations	K4
CO5	Understand the integral equations using First- Second- Third Fredholm theorem, Alternative theorem and method of successive approximations	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

IC - U pfr
Staff incharge
(Mrs. K. Karpagam)

S. Rajkumar
Department of Mathematics
Government College for Women (Autonomous)
612 001.

C – XI- MATHEMATICAL STATISTICS

P23ME3:1

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

To study probability mass/density functions, mathematical expectations, moment generating functions, marginal and conditional distributions, some special distributions, limiting distribution and the Central Limit Theorem. The basic knowledge on statistics at UG level. After completing this course, the student will be able to understand mathematical expectations, marginal and conditional distributions, the gamma and chi-square distributions, the t & F distributions and their applications, moment generating function technique and the Central Limit Theorem.

UNIT I: The probability set function – Random variables – Probability density function – Distribution function – Mathematical expectation – Special mathematical expectations – Chebyshev's Inequality

UNIT II: Conditional probability – Marginal and conditional distributions.

Some special distributions: The Binomial, Trinomial and Multinomial distributions – The Poisson distribution

UNIT III: The Gamma and Chi-Square Distributions – The Normal distribution- Distributions of functions of random variables - Sampling theory – Transformations of variables of the discrete type.

UNIT IV: The, t and F distributions Distributions of order statistics- The moment generating function technique. The distributions of X and $nS^2/2$.

UNIT V: Limiting distributions -Limiting moment generating functions – The Central limit theorem – Some theorems on limiting distributions.

UNIT I : Chapter 1 (Sections 1.4 – 1.7, 1.9-1.11)

UNIT II : Chapters 2 and 3 (Sections 2.1, 2.2 and 3.1, 3.2)

UNIT III : Chapters 3 and 4 (Sections 3.3, 3.4 and 4.1, 4.2)

UNIT IV : Chapter 4 (Sections 4.4, 4.6-4.8)

UNIT V : Chapters 5 (Sections 5.1, 5.3-5.5)

TEXT BOOK:

[1] Robert V. Hogg and Allen T. Craig, Introduction to Mathematical Statistics (Fourth Edition).

REFERENCE BOOKS:

1. M.Fisz, Probability theory and Mathematical statistics, John Wiley & sons, New York, 1963.
2. E.J.Dudewicz and S.N.Mishra, Modern Mathematical Statistics, John Wiley & sons, New York, 1988.
3. V.N.Rohatgi, An introduction to Probability theory and Mathematical statistics, Wiley Eastern Limited, New Delhi, 1988.

PMDE 3:1

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Find the Mathematical expectation ,Special mathematical expectations and Chebyshev's Inequality	K1
CO2	Demonstrate the Conditional probability and Binomial, Poisson distribution	K2
CO3	Compute the Gamma and Chi-Square Distributions.	K3
CO4	Analyze the t and F distribution and The distributions of X and $nS^2/2$.	K4
CO5	Evaluate the Limiting moment generating functions and discuss the Central limit theorem	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	4	3	2	4	3
CO2	3	4	2	2	3	3	3
CO3	3	3	3	2	3	4	3
CO4	4	4	3	3	4	3	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)
		3 × 10 = 30 (Each Unit Carries One Questions)

K. U. P. P.
Staff in charge
(Mrs. K. Karpagam)

Q. Rajkumari
Government College for Women (Autonomous)
Kumbakonam - 612 001

EC – XIII - THEORY OF RELATIVITY

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. To introduce the fundamental principles of the general theory of relativity
2. To introduce the concepts like equivalence principles, inertial frames and curved space-time.

UNIT I: The special theory of relativity: inertial frames of reference - postulates of the special theory of relativity - Lorentz transformations - length contraction - time dilation - variation of mass - composition of velocities - relativistic mechanics - world events, world regions and light cone - Minkowski space-time - equivalence of mass and energy.

UNIT II: Energy-momentum tensors: the action principle - the electromagnetic theory - energy-momentum tensors (general) - energy- momentum tensors - conservation laws.

UNIT III: General Theory of Relativity: principle of covariance - principle of equivalence - derivation of Einstein's equation - Newtonian approximation of Einstein's equations.

UNIT IV: Solution of Einstein's equation and tests of general relativity: Schwarzschild solution - particle and photon orbits in Schwarzschild space-time - gravitational red shift - planetary motion - bending of light - radar echo delay.

UNIT V: Brans-Dicke theory: scalar tensor theory - higher derivative gravity - Kaluza-Klein theory.

- UNIT I : Chapter 1 (Sections 1.1 to 1.5)
- UNIT II : Chapter 2(Sections 2.1 to 2.4)
- UNIT III : Chapter 4(Sections 4.1 to 4.3)
- UNIT IV : Chapter 5(Sections 5.1 to 5.3)
- UNIT V : Chapter 6 (Sections 6.1 to 6.3)

TEXT BOOK :

[1] R.K. Pathria, Theory of Relativity, Hindustan Publishing co., Delhi, 1994.

REFERENCE BOOKS:

1. J.V. Narlikar, General Relativity and Cosmology, Macmillan co. of India Limited, 1988.
2. W. Rindler, Essential Relativity, Springer-Verlag, 1977.
3. R.M. Wald, General Relativity, University of Chicago Press, 1984.
4. R. Ader, M. Bazin, M. Schiffer, Introduction to General Relativity, McGraw Hill Company. A. S. Eddington, Mathematical Theory of Relativity, Cambridge University Press, 1965.

Course Outcomes : On completion of the course, students will be able to:	Level
CO1 Define and recall the special theory of relativity.	K1
CO2 Explain the energy-momentum tensors.	K2
CO3 Analyze the Newtonian approximation of Einstein's equations	K3
CO4 Solve the Einstein's equation and tests of general relativity	K4
CO5 Discuss the higher derivative gravity	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	2	2	2	4	3	2	4
CO3	3	3	3	2	3	4	4
CO4	4	2	3	3	3	3	4
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A	Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10) 5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Staff incharge
(Mrs. V. Sudaroli)

S. Rajkumari
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

EC – XIV- APPLIED CRYPTOGRAPHY

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Theory	5	-	-	3	25	75	100

Course Contents

Objectives:

1. Communications professionals can use cryptography.
2. To show how they can be used to solve security problems.

UNIT I : Data encryption standard (DES) – key schedule – Encipherment – Decipherment – S-Box Analysis and Design – Inter symbol dependencies.

UNIT II : Stream cipher System – Synchronous stream ciphers – Self – Synchronization ciphers – Error propagation – Non linear combination of LFSR sequences

UNIT III : Public key cryptosystem – Merkle – Hellman knapsack cryptosystem – RSA Cryptosystem – RSA authentication scheme – Merkle's Algebraic codes cryptosystem.

UNIT IV: Bose – Chaudhuri – Hocquenghem codes – Expression of Cyclic codes – BCH code Structure and encoding – Syndrome computation – BCH decoding – Direct solution Method by Peterson, Gorenstein and Zierer – Direct coding by Chien's method – BCH Decoding by Berlekamp Algorithm by symmetrical syndrome matrix – straight forward approach for BCH decoding .

UNIT V: Galois field adder – Combinational logic multipliers – Sequential logic multipliers – Cellular Array multiplier – Circuits for squares and square roots – Division circuits Over GF (2^m) arithmetic based on exponent representation – GF(2^m) – Arithmetic based on Normal basis.

UNIT I : Chapter 3

UNIT II : Chapter 4

UNIT III : Chapter 5

UNIT IV : Chapter 7

UNIT V : Chapter 6

TEXT BOOK :

[1] Man Young Rhee – Cryptography and secure communication – McGraw Hill , Book Co. Singapore (1994) Note: Latest edition of the books may be used

REFERENCE BOOKS:

1. Biham .E and A. Shamir Differential Cryptanalysis of DES – Like Cryptosystems., proc. Crypto 90. Page 17, Santa Barbara, CA, August 1990.
2. Beker .H and F.Piper Cipher systems, The protection of communications, wiley. New York, 1982.
3. Brickell, E.F and A.M Odlyzko, Cryptanalysis : A survey of Recent results Proc. IEEE, Vol.76, No.5, 1988.
4. Berlekamp, E.R, Algebraic Coding Theory, McGraw – Hill, New York, 1968.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Basic concepts of data encryption standard	K1
CO2	Illustrate non linear combination of LFSR sequences	K2
CO3	Identify the Public key cryptosystem	K3
CO4	Justify the Coding and decoding	K4
CO5	Design and discuss the Combinational logic multipliers and Sequential logic multipliers	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Good
Staff incharge
(Dr. R. Gowri)

S. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

IDSEC - I - GENERAL INTELLIGENCE

P23M3IDC

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	2	-	-	1	25	75	100

Course contents

Objectives:

- To gain quantitative aptitude required in the present scenario.
- To emphasize the right perceptive needed to crack such problems and understand the recurring pattern in those problems.

UNIT I

Problems on Numbers – Average – Problems on Ages.
Chapter - 1, 6, 16.

UNIT II

Percentage – Profit & Loss – Simple Interest – Compound Interest.
Chapter – 5, 9, 17, 18.

UNIT III

Ratio & Proportion – Partnership – Clock and Calender.
Chapter – 7, 8, 24.

UNIT IV

Time and work – Pipes & Cistern.
Chapter – 10, 11.

UNIT V

Time & Distance – Problems on Trains – Boats and Streams.
Chapter – 12, 13.

- UNIT I : Chapter 4 (sections 4.1, 4.2) and Chapter 5 (sections 5.1, 5.2)
UNIT II : Chapter 5 (sections 5.3, 5.4) and Chapter 6 (sections 6.1 to 6.4)
UNIT III : Chapter 9 (sections 9.1 to 9.4)
UNIT IV : Chapters 11 and 12
UNIT V : Chapter 13 and Chapter 14 (sections 14.1, 14.2)

TEXT BOOK:

[1] Dinesh Khattar, The Pearson Guide To Quantitative Aptitude For Competitive Examinations, Pearson Education, 3 edition, 2015.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	To face competitive examinations with confidence and to solve a lot of problems on numbers, averages and problems on ages	K1 & K2
CO2	Get a lot of training on percentage, profit and loss	K2
CO3	Work on a plenty of problems on time and work and get working knowledge on ratios and proportions	K3
CO4	To evaluate time, distance, speed given the other two and solve lot of problems.	K4
CO5	Acquire problem solving ideas on trains, boats and streams.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	2	3	3	4	2	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	2	4
CO4	4	4	3	3	3	4	3
CO5	4	3	3	2	3	3	2
Weightage							
Weighted % of Course contribution to Pos							

Very Strong -4 Strong -3 Medium -2 Low -1

Question pattern:

Section A	Section B	Section C
Eac Unit Carries Two Questions (10X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Staff incharge
(Mrs. V. Sudaroli)

G. Rajkumar
Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.

IDSEC -II- RESOURCE MANAGEMENT

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	2	-	-	1	25	75	100

Objectives:

1. To introduce operations research and study the techniques which offers enormous practical.
2. To have a basic working knowledge on Linear programming, Transportation problems, game theory and network scheduling.

UNIT I :

Linear programming problem – Mathematical formulation – Graphical solution and extension – Simplex method.

UNIT II :

Duality in Linear programming.

UNIT III :

Transportation problem – Assignment problem

UNIT IV :

Game theory

UNIT V :

Network Scheduling by PERT and CPM.

UNIT I : Chapter 2, 3 and 4

UNIT II : Chapter 5

UNIT III : Chapter 10 and 11

UNIT IV : Chapter 17

UNIT V : Chapter 25

TEXT BOOK :

[1] Kanti Swarup, P.K. Gupta, Man Mohan, Operation Research, Sultan Chand and Sons, 2010.

REFERNCES:

[1] Bazaara, Jarvis and Sherali, Linear Programming and Network Flows, 2th edition, John Wiley.

[2] Hamdy Taha, Operations Research, Pearson Education.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	To face competitive examinations with confidence and to solve a lot of problems on numbers, averages and problems on ages	K1 & K2
CO2	Get a lot of training on percentage, profit and loss	K2
CO3	Work on a plenty of problems on time and work and get working knowledge on ratios and proportions	K3
CO4	To evaluate time, distance, speed given the other two and solve lot of problems.	K4
CO5	Acquire problem solving ideas on trains, boats and streams.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	2	3	4
CO3	3	2	3	2	2	2	4
CO4	3	4	3	4	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Very Strong -4 Strong -3

Medium -2

Low -1

Question pattern:

Section A	Section B	Section C
Eac Unit Carries Two Questions (10X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

S. Rajkumari
 Staff Incharge
 (Mrs. V. Sudaroli)
 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001.

CORE COURSE –XI FUNCTIONAL ANALYSIS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	6	-	-	5	25	75	100

Course Contents

Objectives

- To introduce Banach spaces and Hilbert spaces– To study fundamental theorems of functional analysis that includes Hahn Banach theorem, Open mapping theorem and Uniform boundedness principle.
- To introduce operator theory and Banach algebras leading to the spectral theory of operators.

UNIT I :
Banach Spaces: The definition and some examples – Continuous Linear Transformations – The Hahn- Banach Theorem.

UNIT II :
 The Natural Imbedding of N in N^{**} – The open Mapping Theorem – The conjugate of an operator.

UNIT III :
Hilbert Spaces: The definition and some simple properties – Orthogonal Complements – Orthonormal sets – The Conjugate space H^* – The adjoint of an operator – Self - adjoint operators – Normal and Unitary operators – Projections.

UNIT IV :
Finite – Dimensional Spectral Theory: Matrices – Determinants and the spectrum of an operator – The Spectral Theorem – A survey of the situation.

UNIT V :
General Preliminaries on Banach Algebras: The definition and some examples – Regular and singular elements – Topological divisors of zero – The spectrum – The formula for the Spectral radius – The radical and semi – Simplicity. The structure of Commutative Banach Algebras: The Gelfand Mapping – Applications of the formula $r(x) = \lim \|x^n\|^{1/n}$

UNIT I : Chapter 9 (sections 46 to 48)
UNIT II : Chapter 9 (sections 49 to 51)
UNIT III : Chapter 10
UNIT IV : Chapter 11
UNIT V : Chapter 12 and chapter 13 (sections 70, 71)

TEXT BOOK :

[1] G.F. Simmons, Introduction to Topology and Modern Analysis, Tata McGraw Hill International Edition, 2005.

REFERENCE BOOKS:

- E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley & sons, 1978.
- G. Bachman and Lawrence Narici, Functional Analysis, Dover Publications, 2000.
- H. C. Goffman and G. Fedrick, First course in Functional Analysis, Prentice Hall of India, New Delhi, 1987.
- A. E. Taylor and D. C. Lay, Introduction to Functional Analysis, second edition, John Wiley & Sons, 1980.
- B. Bollabas, Linear Analysis - An introductory course, Cambridge University Press (Indian edition), 1999.
- B. V. Limaye, Functional Analysis, Revised Third Edition, New

- Age International, 2017.
- M. Thamban Nair, Functional Analysis - A First Course, Prentice Hall of India, 2010.
- S. Ponnusamy, Foundations of Functional Analysis, rosa Publishing House, 2002.
- S. Kesavan, Functional Analysis, TRIM series, Hindustan Book Agency, New Delhi, 2009. Rajendra Bhatia, Lectures on Functional Analysis, TRIM series, Hindustan Book Agency, New Delhi, 2009.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Understand functional analytic language required to study problems of practical interest and prove that norms on a finite dimensional space are equivalent	K1
CO2	Comprehend the important of four pillars of functional analysis namely Hahn Banach theorem, Open mapping theorem, closed graph theorem, Uniform Bounded theorem	K2
CO3	Gain mastery in basic Hilbert space theory, projection theorem	K3
CO4	Analyze the Finite – Dimensional Spectral Theory	K4
CO5	Get a working knowledge on algebra of bounded linear operator.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	3	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	2	2	3	4	4
CO4	4	3	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to Pos							

Strong - 4 Very Strong - 3 Medium - 2 Low - 1

Question pattern: Theory 40%; Problems: 60%

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

Staff incharge
(Dr. G. Amada)

S. Rajkumari
 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001

CORE COURSE -XII DIFFERENTIAL GEOMETRY

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	6	-	-	5	25	75	100

Course Contents

Objective:

This course gives students basic knowledge of classical differential geometry of curves and surfaces such as the catenary, the tractrix, the cycloid and the surfaces of constant Gaussian curvature and minimal surfaces. .

NIT I: SPACE CURVES

Definition of a space curve – Arc length – Tangent – Normal and binormal – Curvature and torsion – Contact between curves and surfaces – Tangent surface – Involutes and evolutes – Intrinsic equations – Fundamental existence theorem for space curves – Helices.

UNIT II: INTRINSIC PROPERTIES OF A SURFACE

Definition of a surface – Curves on a surface – Surface of revolution – Helicoids – Metric – Direction coefficients – Families of curves – Isometric correspondence – Intrinsic properties.

UNIT III: GEODESICS

Geodesics – Canonical geodesic equations – Normal property of geodesics Existence theorems – Geodesic parallels – Geodesics curvature- Gauss- Bonnet Theorem – Gaussian curvature – Surface of constant curvature.

UNIT IV: NON INTRINSIC PROPERTIES OF A SURFACE

The second fundamental form – Principal curvature – Lines of curvature Developable – Developable associated with space curves and with curves on surface – Minimal surfaces – Ruled surfaces.

UNIT V: DIFFERENTIAL GEOMETRY OF SURFACES

Compact surfaces whose points are umbilics – Hilbert's lemma – Compact surface of constant curvature – Complete surface and their Characterization – Hilbert's Theorem – Conjugate points on geodesics.

- UNIT I : Chapter 1 (sections 1 to 9)
 UNIT II : Chapter 2 (sections 1 to 9)
 UNIT III : Chapter 2 (sections 10 to 18)
 UNIT IV : Chapters 3 (sections 1 to 8)
 UNIT V : Chapters 4 (sections 1 to 8)

TEXT BOOK :

[1].T.J. Willmore, "An Introduction to Differential Geometry"; Oxford University press, (17th Impression), New Delhi, 2002.(Indian Print

REFERENCE BOOKS:

1. D.T. Struik, "Lectures on Classical Differential Geometry", Addition – Wesley, Mass, 1950.
2. S. Kobayashi and K. Nomizu, "Foundations of Differential
3. W. Klingenberg, "A Course in Differential Geometry", Graduate Texts in Mathematics, Springer – Verlag 1979.
4. C.E. Weatherburn, "Differential Geometry of Three Dimensions", University Press, Cambridge, 1930.

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Calculate the curvature and torsion of a curve	K1
CO2	find the osculating surface and osculating curve at any point of a given curve	K2
CO3	Calculate the first and the second fundamental forms of surface.	K3
CO4	calculate the Gaussian curvature, the mean curvature, the curvature lines, the asymptotic lines, the geodesics of a surface	K4
CO5	Discuss the Conjugate points on geodesics.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							

Strong - 4 Very Strong - 3

Medium - 2

Low - 1

Question pattern: Theory 40%; Problems:

Question pattern:

Section A		Section B	Section C
2 Multiple choice question from each unit (10X1=10)	1 question from each unit (5X2=10)	5 × 5 = 25 (Each Unit Carries Two Questions (Either or Type)	3 × 10 = 30 (Each Unit Carries One Questions)

(Signature)
 Staff incharge
 (Mrs. M. Devi)

(Signature)
 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001.

LIST OF ELECTIVE PRACTICALS

ECP- I PROGRAMMING IN C - Practical

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Practical	5	-	-	3	40	60	100

Course contents

Objectives:

1. The course is oriented to those who want to advanced structured procedural programming understanding and to improve C - programming skills.
2. The objects is to provide students with understanding of code organization and functional hierarchical decomposition with using complex data types.

List of Practicals :

1. Write a Program to convert temperature from degree Centigrade to Fahrenheit.
2. Write a Program to find whether given number is Even or Odd.
3. Write a Program to find greatest of Three numbers.
4. Write a Program to using switch statement to display Monday to Sunday.
5. Write a Program to display first Ten Natural Numbers and their sum.
6. Write a Program to find Multiplication of Two Matrices.
7. Write a Program to find the maximum number in Array using pointer.
8. Write a Program to reverse a number using pointer.
9. Write a Program to solve Quadratic Equation using functions.
10. Write a Program to find factorial of a number using Recursion.
11. Write a Program to show Call by Value and Call by Reference.
12. Write a Program to add two numbers using pointer.
13. Write a Program to create a file containing Student Details.
14. Write a Program to update the details of student's information using various file modes.

Question Paper Pattern: All the Programs are considered from the given list

Text Book:

1. Balagurusamy E., Programming in ANSI C , Sixth Edition, McGraw-Hill, 2012
- Internal – 40 External – 60**

Question Paper Pattern

ANSWER ALL THE QUESTIONS:

$2 \times 15 = 30$ Marks
 $1 \times 20 = 20$ Marks
 Record = 5 Marks
 Viva – voce = 5 Marks

Total = 60 Marks


 Staff incharge
 (Mrs. M. Devi)


 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001

ECP- II- PROGRAMMING IN C++- Practical

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	25	75	100

Course contents**Objectives:**

1. The course is oriented to those who want to advanced structured procedural programming understanding and to improve IN C++ programming skills.
2. The objects is to provide students with understanding of code organization and functional hierarchical decomposition with using complex data types.

List of Practicals :

1. Election Candidate problem.
2. Function overloading and default value to a parameter.
3. Write a C++ program using a class to represent a bank Account with data members – name of depositor, account number, type of account, balance and member functions – deposit amount, withdraw amount, show name and balance. Check the program with your own data.
4. Consider a shopping list of items for which orders are placed with a dealer. The list should include code number and price the item. Operations such as adding an item to the list, deleting an item from the list and printing the total value of the order are to be provided. Write a program to implement the above using a class with arrays as data members.
5. Create a 'time' class with integer data members hours, minutes, and seconds. Develop two constructors, one should initialize the data to zero and the other should initialize to fixed values. A member function should display it in hh:mm:ss format.
6. Design an abstract base class 'Shapes' and derive three classes "Rectangle", "Circle", and "Triangle". Develop Polymorphic Functions "Circumference" and "Computer Area", to calculate the circumference and area of these objects and display is. Develop a main program to create each of these objects and apply these polymorphic functions.
7. Develop a program using operator overloading
 - a) To add two complex numbers.
 - b) To find the difference between any given time and the system time.
 - c) To multiply two matrices.
8. Class inheritance for a publishing company.
9. Simulation of a calculator using function overloading.
10. Income Tax calculation using virtual function.

11. Write a program which reads a text from a file and the display the following information
Number of Lines Number of Words Number of Characters Strings should be left justified and numbers should be right justified in a suitable field width.
12. Write a C++ programs to illustrate the use of the following Default argument Reference Variable Copy Constructor Develop a "Employee" class having the data members Empno, Ename, Basic pay, Dept and Grade. Calculate the DA, HRA, LIC AND PF (Assume your own data and Percentage). Using these calculate Gross pay and Net Pay.

Question Paper Pattern: All the Programs are considered from the given list.

TEXT BOOK :

[1] E.Balagurusamy, Object Oriented Programming with C++, 4th Edition, The McGraw-Hill Company Ltd, New Delhi, 2008

Internal – 40 External – 60

Question Paper Pattern**ANSWER ALL THE QUESTIONS:**

2×15 = 30 Marks
 1× 20 = 20 Marks
 Record = 5 Marks
 Viva – voce = 5 Marks

 Total = 60 Marks


 Staff incharge
 (Mrs. M. Devi)


 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001.

ECP- III-MATHEMATICAL STATISTICS USING SPSS- Practical

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CIA	External	Total
Theory	5	-	-	3	40	60	100

Course contents

Objective: To give practice on different statistical techniques using SPSS.

List of Experiments:

1. Graphical display of data
2. Calculation of measure of central tendency.
3. Correlation.
4. Regression.
5. Multiple Regression.
6. Fitting of Binomial and Poisson distribution.
7. Fitting of Normal distribution.
8. Independent Sample test .
9. Chi-square distribution.
10. t and Z – test for two sample mean test
11. Students t-distribution.
12. Paired t-test for Mean.
13. One way ANNOVA of analysis.
14. Two way ANNOVA of analysis.
15. Multi factor ANNOVA of analysis

.Question Paper Pattern: All the Programs are considered from the given list.

TEXTBOOK: [1] S.C Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics–
Sultan Chand and Sons, Educational publishers, New Delhi,2

Internal – 40 External – 60

Question Paper Pattern

ANSWER ALL THE QUESTIONS:

$2 \times 15 = 30$ Marks
 $1 \times 20 = 20$ Marks
 Record = 5 Marks
 Viva – voce = 5 Marks

 Total = 60 Marks


 Staff incharge
 (Dr. G. Amuda)

 Head, Department of Mathematics
 Government College for Women (Autonomous)
 Kumbakonam - 612 001.

SEC – III: MATHEMATICAL SCIENCE FOR COMPETITIVE EXAMINATIONS

Category	Hours			Credits	Marks		
	Lecture	Tutorial	Practical		CI A	External	Total
Practical	2	-	-	2	25	75	100

Objectives:

- 1.To create an awareness of the NET/SET Examinations.
- 2.To make the students prepared for Competitive Examinations.

UNIT : IMATRICES AND VECTOR SPACE

Algebra of Matrices – Rank and Determinant of Matrices – Linear Equations – Eigen value and Eigen Vectors - Clayey - Hamilton Theorem -Vector Space – Subspaces- Linear Dependences – Basis – Dimensions.

UNIT : IISSET THEORY AND REAL NUMBER SYSTEM

Elementary Set Theory – Finite Countable and Uncountable Sets – Real Number System as a Complete Ordered Field – Archimedean Property – Supremum, Infimum.

UNIT : IIICOMPLEX INTEGRATION AND CALCULAS OF RESIDUES.

Contour Integral – Cauchy's theorem – Cauchy's Integral Formula Lioville's Theorem – Maximum Modulus Principle – Schwarz Lemma – Open Mapping Theorem – Taylor Series – Laurent's Theorem – Calculus of Residues.

UNIT : IV TOPOLOGY

Basis – Dense Set – Subspace – Product Topology – Separation Axioms – Connectedness – Compactness.

UNIT : V THEORY OF PROBABILITY

Sample Space – Discrete Probability – Independent events – Baye's Theorem.

UNIT I : (Pages : 247- 304).

UNIT II : (Pages : 1 – 24.)

UNIT III : (Pages : 418 – 455.)

UNIT IV : (Pages : 631 – 666.)

UNIT V : (Pages: 921 – 928 & 963 – 970.)

TEXT BOOK :

[1] UGC CSIR NET / SET (JRF & LS), MATHEMATICAL SCIENCES, by Pawan Sharma, Neha Sharma and Suraj Singh, Arihant publications Limited .

REFERENCES :

- [1] INHerstein, Topics in Algebra, Second Edition John Wiley and Sons, 1975.
- [2] WalterRudin, Principles of Mathematical Analysis, Third Edition, McGraw Hill, 1976.
- [3] Lars.V.Ahlfors, Complex Analysis, Third Edition McGraw-Hill book Company,Tokyo, 1979.
- [4] James R. Munkres, Topology, Second Edition, Prentice – Hall of India private Limited, New Delhi, 2013.

[5] S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical statistics – Sultan chand and Sons, Educational publishers, Reprint – 2005.

Course Outcomes

Course Outcomes : On completion of the course, students will be able to:		Level
CO1	Discuss in detail the basic concept of linear system of equations, Vector spaces, Bases and Dimension.	K1
CO2	Learn Elementary set Theory and Real Number System	K2
CO3	Understand the Contour Integral and Maximum Modulus Principal, Open Mapping Theorem	K3
CO4	Evaluate Product Topology and Connectedness, Compactness	K4
CO5	Capture the idea of Sample Space and Baye's Theorem.	K5 & K6

Mapping of Course Outcomes with Pos

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	4	3	3	3	4	4	3
CO2	3	4	2	4	3	3	4
CO3	3	3	3	2	3	4	4
CO4	4	4	3	3	4	4	3
CO5	4	3	3	2	3	3	3
Weightage							
Weighted % of Course contribution to POs							
Very Strong – 4	Strong - 3	Medium – 2		Low – 1			

Question Paper Pattern

Objective type questions (75 x1 =75).


Staff incharge
(Dr. G. Amudai)


Head, Department of Mathematics
Government College for Women (Autonomous)
Kumbakonam - 612 001.