Sri Kaliswari College (Autonomous), Sivakasi

(Affliated to Madurai Kamaraj University,

Re-Accredited with 'A' grade (CGPA 3.30) by NAAC)

Programme Scheme, Scheme of Examinations and Syllabi

(For those who join from June 2018 and afterwards)

Department of Mathematics

PG Programme – M.Sc (Mathematics)

Curriculum Design and Development Cell

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
M.Sc. Mathematics (Semester) – (2018-2020)
Objectives, Outcomes, Regulations

Programme Objectives:

- To impart rigorous mathematical training.
- To provide the student with a thorough mastery both of the fundamentals and of significant contemporary research developments.
- To develop clear thinking and analyzing capacity for research.

Programme Outcomes (PO):

Knowledge

PO 1 : Acquisition of advanced knowledge for higher studies and research.
PO 2: Synthesis of knowledge and critical thinking

Skills

PO 1 : Life Skills and Skills for contribution to nation building.
PO 2: Acquisition of specialized skills for entrepreneurship/employability.

Attitude

PO 1: Acquisition of professional ethics and human values.
PO 2 : National Integration and Social Commitment to Society.

Programme Specific Outcomes:

- Centres on the study and development of techniques to tackle pure and applied mathematical questions.
- The ability to assess and interpret complex situations, choose among several potentially appropriate mathematical methods of solution, persist in the face of difficulty, and present full and cogent solutions that include appropriate justification for their reasoning.
- Engage in life-long learning and professional development through self-study, continuing education or professional studies.
- To impart qualitative inputs to the readers prepaing for the CSIR–JRF examinations.

Duration of the Programme: Two years (Equivalent to four semesters)

Eligibility:

Candidate should have passed B.Sc., Mathematics or any other degree accepted by the Syndicate of the Madurai Kamaraj University as its equivalent.

Medium of Instruction : English

Age Limit : No age limit

Transitory Permission:

Students joined from 2018 to 2020 may be permitted to write their examinations in this pattern up to April 2023.

Sri Kaliswari College (Autonomous), Sivakasi
Choice Based Credit System
Department of Mathematics
PG Programme – M.Sc.
2018 - 2020
Scheme of Examination/ Question Paper Pattern

Theory Examination

The Internal and External marks should be allotted in the ratio 25:75.

Internal Marks:

i. Test : 15 Marks (Average of the best two tests out of three)
ii. Assignment : 5 Marks (Average of two)
iii. Seminar / Group Discussion/ Peer-Team Teaching : 5 Marks
Total : 25 Marks

External Question Paper Pattern:

Time: 3 Hours Max .Marks:75

The question paper for external exam will have three parts.

Part – A (10 x 1 = 10)

Question No.1 to 10 – All are Multiple choices - Two Questions from each unit.

Part – B (5 x 7 = 35)

(Choosing either (a) or (b) pattern – Alternative Choice - One Question from each unit.)

Question No. 11. (a) or 11. (b) – From Unit I
12. (a) or 12. (b) – From Unit II
13. (a) or 13. (b) – From Unit III
14. (a) or 14. (b) – From Unit IV
15. (a) or 15. (b) – From Unit V

Part – C (3 x 10 = 30)

Answer any three out of five. (One Question from each unit)
Question No.16 – 20.
16 - From Unit I
17 - From Unit II
18 – From Unit III
19 – From Unit IV
20 – From Unit V

Blue Print of the Question Paper:

Component / Unit	**Knowledge**			**Understanding**			**Higher Objective**			**Total Marks**
	PART A	PART B	PART C	PART A	PART B	PART C	PART A	PART B	PART C	
UNIT I	**1**(1) **2**(1)				**11a**(7)	**16**(10)		**11b**(7)		26
UNIT II	**3**(1) **4**(1)	**12a**(7)				**17**(10)		**12b**(7)		26
UNIT III	**6**(1)	**13a**(7)			**13b**(7)		**5**(1)		**18**(10)	26
UNIT IV	**8**(1)		**19**(10)		**14a**(7) **14b**(7)		**7**(1)			26
UNIT V	**9**(1) **10**(1)	**15a**(7)			**15b**(7)	**20**(10)				26
Total	8	21	10		35	30	2	14	10	130

- Knowledge based - 30 %
- Understanding - 50 %
- Higher Objective (Applications and Skill based) - 20 %

Project

Internal - 40 Marks
External - 40 Marks
Viva – Voce - 20 Marks
Total - 100 Marks

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
Choice Base Credit System- Curriculum Structure
PG Programme – M.Sc Mathematics
2018-2020

Courses	Sem I	Sem II	Sem III	Sem IV	Total Credits
Core Courses	24(18)	24(18)	24(18)	24(18)	72
Elective Courses	6(4)	-	6(4)	-	8
Non Major Elective Courses	-	6(4)	-	-	4
Project	-	-	-	6(6)	6
Total hours(per week)	30	30	30	30	90 120

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
Choice Base Credit System- Curriculum Pattern
PG Programme – M.Sc Mathematics
2018 - 2020

Semester	Course Code	Course Name	Hours	Credits
I	18PMAC11	**Core Course – I** : Algebra I	6	5
	18PMAC12	**Core Course – II :** Real Analysis	6	5
	18PMAC13	**Core Course – III :** Graph Theory I	6	4
	18PMAC14	**Core Course – IV** : Statistics	6	4
	Major Elective Course - I		6	4
	18PMAO11	1. Combinatorial Mathematics		
	18PMAO12	2. Automata and Formal Languages		
	18PMAO13	3. Modern Applied Algebra		
		Total	**30**	**22**
II	18PMAC21	**Core Course – V :** Algebra II	6	5
	18PMAC22	**Core Course – VI :** Measure Theory	6	5
	18PMAC23	**Core Course – VII :** Differential Equations	6	4
	18PMAC24	**Core Course – VIII :** Classical Mechanics	6	4
	Non - Major Elective Course		6	4
	18PMAN21	Fundamentals of Statistics		
		Total	**30**	**22**
III	18PMAC31	**Core Course – IX** : Functional Analysis	6	5
	18PMAC32	**Core Course – X :** Operations Research	6	5
	18PMAC33	**Core Course – XI:** . Fuzzy Analysis	6	4
	18PMAC34	**Core Course – XII :** Topology	6	4
	Major Elective Course - II		6	4
	18PMAO31	1. Advanced Numerical Analysis		
	18PMAO32	2. Graph Theory II		
	18PMAO33	3. Differential Geometry		
		Total	**30**	**22**
IV	18PMAC41	**Core Course – XIII :** Complex Analysis	6	5
	18PMAC42	**Core Course – XIV :** Number Theory	6	5

		and Cryptography		
	18PMAC43	**Core Course – XV :** Stochastic Processes	6	4
	18PMAC44	**Core Course – XV I:** Advanced Topology	6	4
	18PMAJ41	**Core Course – XVII :** Project	6	6
		Total	**30**	**24**

Semester	**I**	**II**	**III**	**IV**	**Total**
Credits	**22**	**22**	**22**	**24**	**90**

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester I
(2018 - 2020)
Core Course – I : Algebra I (18PMAC11)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int.Marks : 25**
Hours/Week: 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To recognize the abstract approach of mathematics.
- To introduce the important current research areas in algebra.
- To see the development of some important algebraic systems like groups, rings, vector spaces.

Course Outcomes:

1. Learn the concepts and develop the working knowledge on Groups, Normal Subgroups, Automorphism groups, Finite groups and Rings.
2. Understand the concepts and develop the working knowledge on class equation, solvability of groups and finite abelian groups.
3. Gain knowledge about Group Theory and Ring Theory mainly, the Sylow's theorems and polynomial rings.
4. Understand the concepts of homomorphism, isomorphism, and quotient structure, and to apply some of these concepts to real world problems.
5. Acquire knowledge about direct product of groups, Structure of finite abelian groups.
6. Gain knowledge about ring of polynomials, prime, irreducible elements and their properties, UFD, PID and Euclidean domains, prime ideals, maximal ideals.
7. Demonstrate the vector spaces and the concept of linearity.

UNIT I **(18 hrs)**

Group Theory: A Counting Principle – Normal Subgroups and Quotient Groups - Another Counting Principle - Sylow's Theorem - Direct Products – Finite Abelian Groups.

UNIT II **(18 hrs)**

Ring Theory: Ideals and Quotient Rings – More Ideals and Quotient Rings – The Field of Quotients of an Integral Domain.

UNIT III **(18 hrs)**

Euclidean Rings – A particular Euclidean Ring.

UNIT IV **(18 hrs)**

Polynomial Rings – Polynomials over the Rational Field – Polynomial Rings over Commutative Rings.

UNIT V **(18 hrs)**

Vector Spaces and Modules: Elementary Basic Concepts in Vector Spaces – Linear Independence and Bases -Dual Spaces - Inner product Spaces.

Text Book:

I.N. Herstein ,"Topics in Algebra", John Wiley and Sons, Singapore, Second Edition,2008.

Unit	Chapter	Section	Page No.
I	2	2.5,2.6,2.11 – 2.14	44 – 53, 82 – 115
II	3	3.4 – 3.6	133 – 142
III	3	3.7,3.8	143 – 152
IV	3	3.9 – 3.11	153 - 166
V	4	4.1 – 4.4	170 – 199

Reference Books:

1. N.S. Gopalakrishnan ," University Algebra", New Age International (P) Limited, Publishers, New Delhi, Revised Second Edition , 2012.
2. John B. Fraleigh , " A First Course in Abstract Algebra" , Narosa Publishing House , New Delhi.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester I
(2018 - 2020)
Core Course – II: Real Analysis (18PMAC12)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To develop the real number system as an ordered fields.
- To study the applications of least upper bound and greatest lower bound property.
- To study about some special functions.

Course Outcomes :

1. Learn the basic ingredients of reals and study the properties of functions defined on the Real line.
2. Develop a sound knowledge and appreciation of the ideas and concepts related to metric spaces.
3. Get the analytical skill about continuity and derivability.
4. Inculcate the basic knowledge of differentiation, expansion of functions and their applications.
5. Inculcate an insight into Riemann integration.
6. Demonstrate the main results on integration and an ability to apply these in examples.
7. Identify uniformly and non-uniformly convergent sequences of functions, and apply results related to uniform convergence.

UNIT I **(18 hrs)**

The Real Number System: The Existence Theorem of the Real Field – Archimedean Property of R – The Existence of nth Roots of Positive Reals – Decimals – The Extended Real Number System – Euclidean Spaces – Finite, Countable and Uncountable Sets – Metric Spaces - Compact Sets –Perfect Sets.

UNIT II **(18 hrs)**

Continuity: Limits of Functions – Continuous Functions – Continuity and Compactness – Continuity and Connectedness – Discontinuities – Monotonic Functions –Infinite Limits and Limits at Infinity.

UNIT III **(18 hrs)**

Differentiation: The Derivative of a Real Function –Mean Value Theorems – The Continuity of Derivatives – L'Hospital's Rule –Derivatives of Higher Order – Taylor's Theorem – Differentiation of Vector Valued Functions.

UNIT IV **(18 hrs)**

The Riemann-Stieltjes Integral: Definition and Existence of the Integral – Properties of the Integral – Integration and Differentiation – The Fundamental Theorem of Calculus – Integration by Parts – Integration of Vector Valued functions – Rectifiable curves.

UNIT V **(18 hrs)**

Sequences and Series of Functions: Discussion of Main Problem – Uniform Convergence – The Cauchy Criterion for Uniform Convergence – Uniform Convergence and Continuity – Uniform Convergence and Integration – Uniform Convergence and Differentiation – Equicontinuous Families of Functions – The Stone-Weiertrass Theorem.

Text Book:

Walter Rudin, "Principles of Mathematical Analysis", Mcgraw Hill Book Company, Singapore , Third Edition.

Unit	Chapter	Section	Page No.
I	1	1.19 – 1.23, 1.36 – 1.38	8 – 12, 16 - 17
	2	2.1 – 2.47	24 - 43
II	4	4.1 – 4.34	83 – 98
III	5	5.1 – 5.19	103 – 113
IV	6	6.1 – 6.27	120 – 137
V	7	7.1 – 7.33	143 - 165

.**Reference Books:**

1. Tom.M.Apostol, "Mathematical Analysis", Narosa Publishing House, New Delhi, Second Edition, 2002.
2. S.C.Malik, "Principles of Real Analysis", New Age International (P) Limited, New Delhi, 2004.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme - M.Sc
Semester I
(2018-2020)
Core Course – III : Graph Theory – I (18PMAC13)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/ Week : 6 **Ext. Marks : 75**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To study the application of graph theory to real world.
- To study the theoretical treatment of graph theory.
- To strengthen the ideas and point the way to independent applications in science.

Course Outcomes:

1. Write precise and accurate mathematical definitions of objects in graph theory.
2. Able to formulate problems in terms of graphs, solve graph theoretic problems and apply algorithms taught in the course.
3. Explain basic terminology of a graph.
4. Represent graphs using adjacency matrices.
5. Identify Euler and Hamiltonian cycle.
6. Able to formulate Dual graphs.
7. Know about many different coloring problems for graphs.
8. Able to study the graph concepts in directed graphs.

UNIT I **(18 hrs)**

Graphs and Subgraphs: Graphs and Simple Graphs – Graph Isomorphism – The Incidence and Adjacency Matrices – Sub Graphs – Vertex Degrees – Paths and Connection – Cycles. **Trees**: Trees – Cut Edges and Bonds – Cut Vertices – Cayley's Formula.

UNIT II **(18 hrs)**

Connectivity: Connectivity – Blocks. **Euler Tours and Hamilton Cycles**: Euler Tours – Hamilton Cycles.

UNIT III **(18 hrs)**

Matchings: Matchings – Matchings and Coverings in Bipartite Graphs – Perfect Matchings. **Edge Colourings:** Edge Chromatic Number – Vizing's Theorem.

UNIT IV **(18 hrs)**

Independent Sets and Cliques: Independent sets. **Vertex Colourings:** Chromatic Number – Brooks' Theorem – Chromatic polynomials – Girth and Chromatic Number.

UNIT V **(18 hrs)**

Planar Graphs: Plane and Planar Graphs - Dual Graphs – Euler's Formula. **Directed Graphs:** Directed Graphs – Directed Paths – Directed Cycles.

Text Book:

J.A.Bondy and U.S.R.Murty, "Graph theory with Applications", The Macmillan press Ltd, Great Britain.

Unit	Chapter	Section	Page No.
I	1, 2	1.1 - 1.7, 2.1 - 2.4	1 - 5, 7 - 15, 25 - 35
II	3, 4	3.1, 3.2, 4.1, 4.2	42 - 47, 51 - 60
III	5, 6	5.1 - 5.3, 6.1, 6.2	70 - 79, 91 - 95
IV	7, 8	7.1, 8.1, 8.2, 8.4, 8.5	101,102, 119 - 122, 125 - 130
V	9, 10	9.1 - 9.3, 10.1 - 10.3	135 - 145, 171 - 179

Reference Books:

1. John Clark and Derek Allan Holton, "A First Look at Graph Theory", Allied Publishers Limited, Mumbai.
2. Prof. S. Kumaravelu and Prof. Susheela Kumaravelu, "Graph Theory", Janaki Calendar Corporation, Sivakasi.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester I
(2018 – 2020)
Core Course – IV: Statistics (18PMAC14)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week : 6 **Ext. Marks : 75**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To know about sampling theory and convergence of distributions.
- To know about Chi-square Test.
- To know about the properties of a point estimate and to study the exponential class of Probability density function.

Course Outcomes:

1. Introduce the concept of sampling theory.
2. Present the ideas about the Beta, t, and F distributions.
3. Formulate and analyze mathematical and statistical problems, precisely define the key terms, and draw clear and reasonable conclusions using various discrete distributions and estimation theory techniques.
4. Use statistical techniques to solve well-defined problems and present their mathematical work, both in oral and written format.
5. Identify the appropriate hypothesis testing procedure based on the model fitted to the data.
6. Identify the expression of the point estimator to estimate parameters.

UNIT I **(18 hrs)**

Distributions of Functions of Random Variables: Sampling Theory –Transformations of Variables of the Discrete Type – Transformations of Variables of the Continuous Type – The Beta, t, and F Distributions – Extensions of the Change of Variable Technique – Distributions of Order Statistics – The Moment Generating Function Technique – The Distributions of $\bar{\bar{X}}$ and $\frac{ns^2}{\sigma^2}$ –Expectations of Functions of Random Variables.

UNIT II **(18 hrs)**

Limiting Distribution: Convergence in Distribution – Convergence in Probability – Limiting Moment Generating Functions – The Central Limit Theorem – Some Theorems on Limiting Distributions.

UNIT III **(18 hrs)**

Introduction to Statistical Inference: Point Estimation – Confidence Intervals for Means – Confidence Intervals for Differences of Means – Tests of Statistical Hypotheses – Additional Comments about Statistical Tests – Chi-Square Tests.

UNIT IV **(18 hrs)**

Sufficient Statistics: Measures of Quality of Estimators – A Sufficient Statistic for a Parameter – Properties of a Sufficient Statistic – Completeness and Uniqueness.

UNIT V **(18 hrs)**

The Exponential Class of Probability Density Functions – Functions of a Parameter – The Case of Several Parameters – Minimal Sufficient and Ancillary Statistics – Sufficiency, Completeness and Independence.

Text Book:

Robert V. Hoff and Allen T. Craig, "Introduction to Mathematical Statistics", Pearson Education Pvt. Ltd, New Delhi, 2002.

Unit	Chapter	Section	Page No.
I	4	4.1 – 4.9	155 – 220
II	5	5.1 – 5.5	233 – 255
III	6	6.1 – 6.6	259 – 301
IV	7	7.1 – 7.4	307 – 332
V	7	7.5 – 7.9	333 – 358

Reference Books:

1. K.Kadarkarai Thangam, A.Subas Chandra Bose, "Probability and Statistics", Jeyalakshmi Publishers, Tuticorin.
2. Irwin Miller, Marylees Miller, "Mathematical Statistics", Pearson Education Inc., Singapore, 2014.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester I
(2018 – 2020)
Major Elective Course – I: Combinatorial Mathematics (18PMAO11)
(For those who join from June 2018 and afterwards)

Credits	**: 4**	**Int. Marks**	**: 25**
Hours/Week	**: 6**	**Ext. Marks**	**: 75**
Duration	**: 90 hrs**	**Max. Marks**	**: 100**

Course Objectives:

- To use combinatorial mathematics for solving problems which occur in engineering and operations research.
- To learn more about permutations, combinations and recurrence relations.

Course Outcomes:

1. Learn about the use of generating functions for enumeration of combinatorial structures, including partitions of numbers, permutations with restricted conditions.
2. Study the solution of recurrence relations; methods of enumeration with restricted conditions.
3. Comprehend the features characterizing problems in combinatorial mathematics.
4. Develop skills required to analyze and solve problems in combinatorial mathematics.
5. Appreciate the overlap between mathematics and other areas of applied and pure mathematics.
6. An improved ability to communicate mathematical ideas.
7. Describe and explain theories, design principles and empirical results in the area of specialization.

UNIT I **(18 hrs)**

Permutations and Combinations : Introduction – The Rules of Sum and Product – Permutations – Combinations – Distributions of Distinct Objects – Distributions of Nondistinct Objects.

UNIT II **(18 hrs)**

Generating Functions : Introduction – Generating Functions for Combinations – Enumerators for Permutations – Distributions of Distinct Objects into Nondistinct Cells – Partitions of Integers – Elementary Relations.

UNIT III **(18 hrs)**

Recurrence Relations: Introduction – Linear Recurrence Relations with Constant Coefficients – Solution by the Technique of Generating Functions – Recurrence Relations with Two Indices.

UNIT IV **(18 hrs)**

The Principle of Inclusion and Exclusion : Introduction – The Principle of Inclusion and Exclusion – The General Formula – Derangements – Permutations with Restrictions on Relative Positions.

UNIT V **(18 hrs)**

Polya's Theory of Counting : Introduction – Equivalence Classes under a Permutation Group – Equivalence Classes of Functions – Weights and Inventories of Functions – Polya's Fundamental Theorem – Generalization of Polya's Theorem.

Text Book :

C.L.Liu , "Introduction to Combinatorial Mathematics", Mc-Graw Hill Book Company, New York.

Unit	Chapter	Section	Page No.
I	1	1.1 – 1.6	1 – 15
II	2	2.1 – 2.5, 2.7	24 – 45, 46 – 50
III	3	3.1 – 3.3, 3.5	58 – 73, 80 – 86
IV	4	4.1 – 4.5	96 –111
V	5	5.1, 5.3 – 5.7	126 – 127, 132 – 160

Reference Books :

1. David Guichard, "An Introduction to Combinatorics and Graph Theory", Creative Commons Attribution, California, 2017.
2. John M. Harris, Jeffry L. Hirst and Michael J. Mossinghoff, "Combinatorics and Graph Theory", Science + Business Media New York, Second Edition, 2008.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester I
(2018-2020)

Major Elective Course -I : Automata and Formal Languages (18PMAO12)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int.Marks : 25**
Hours/Week :6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks : 100**

Course Objectives:

- To know about the concept of Automata theory.
- To study about the applications of context-free grammar.

Course Outcomes:

1. Prove properties of languages, grammars and automata with rigorously formal mathematical methods.
2. Design automata, regular expressions and context-free grammars accepting or generating a certain language.
3. Describe the language accepted by automata or generated by a regular expression or a context-free grammar.
4. An ability to design grammars and automata (recognizers) for different language classes.
5. An ability to identify formal language classes and prove language membership properties.
6. An ability to prove and disprove theorems establishing key properties of formal languages and automata.
7. Design grammars and recognizers for different formal languages.

UNIT I **(18 hrs)**

Preliminaries: Strings, Alphabets, and Languages – Graphs and Trees – Inductive Proofs – Set Notation –Relations.

UNIT II **(18 hrs)**

Finite Automata and Regular Expressions: Finite State Systems–Basic Definitions–Nondeterministic Finite Automata–Finite Automata with ε–moves–Regular Expressions.

UNIT III **(18 hrs)**

Properties of Regular Sets : The Pumping Lemma for Regular Sets–Closure Properties of Regular Sets–Decision Algorithms for Regular Sets–The Myhill–Nerode Theorem and Minimization of Finite Automata.

UNIT IV **(18 hrs)**

Context–Free Grammars: Motivation and Introduction–Context–Free Grammars – Derivation Trees–Simplification of Context-Free Grammars.

UNIT V **(18 hrs)**

Pushdown Automata: Informal Description – Definitions - Pushdown Automata and Context-Free Languages.

Text Book:

John E.Hopcroft, Jeffery D.Ullman, "Introduction to Automata Theory, Languages, and Computation", Narosa Publishing House, New Delhi, Nineteenth Edition, 2001.

Unit	Chapter	Section	Page No.
I	1	1.1 - 1.5	1-8
II	2	2.1 - 2.5	13-35
III	3	3.1 - 3.4	55-71
IV	4	4.1 - 4.4	77-92
V	8	5.1 - 5.3	107-120

Reference Books:

1. Peter Linz," An Introduction to Formal Languages and Automata", Jones and Bartlett Learning, Burlington, 2012.
2. J.P. Tremblay, R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science", Tata McGraw – Hill Publishing Company Ltd., New Delhi, 2008.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester I
(2018-2020)
Major Elective Course - I: Modern Applied Algebra (18PMAO13)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks :75**
Duration : 90 hrs **Max.Marks : 100**

Course Objectives:

- To study the concept of coding techniques.
- To know about the structure of ALGOL and logic designs.

Course Outcomes:

1. Demonstrate accurate and efficient use of advanced algebraic techniques.
2. Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from advanced algebra.
3. Apply problem-solving using advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematical contexts.
4. Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from advanced algebra.
5. Analyze an application using a function developed from data.
6. Use the outputs of a Johnson shift counter to generate specialized waveforms utilizing various combinations of the five basic gates.
7. Develop a comparison of the Boolean equations and truth tables for the five basic gates.

UNIT I **(18 hrs)**

Finite State Machines : Introduction – Binary Devices and States – Finite-State Machines– Covering and Equivalence – Equivalent States – A Minimization Procedure – Turing Machines– Incompletely Specified Machines.

UNIT II **(18 hrs)**

Programming Languages: Introduction– Arithmetic Expressions– Identifiers:- Assignment Statements– Arrays– For Statements– Block Structures in ALGOL–The ALGOL Grammar–Evaluating Arithmetic Statements– Compiling Arithmetic Expressions.

UNIT III **(18 hrs)**

Boolean Algebras : Introduction – Order – Boolean Polynomials – Block Diagrams for Gating Networks–Connections with Logic– Logical Capabilities of ALGOL– Boolean Applications– Boolean Sub Algebras- Disjunctive Normal Form – Direct Products – Morphisms.

UNIT IV **(18 hrs)**

Optimization and Computer Design: Introduction– Optimization – Computerizing Optimization – Logic Design – NAND Gates and NOR Gates –The Minimization Problem– Procedure for Deriving Prime Implicants–Consensus Taking– Flip-Flops–Sequential Machine Design.

UNIT V **(18 hrs)**

Binary Group Codes: Introduction – Encoding and Decoding– Block Codes – Matrix Encoding Techniques – Group Codes – Decoding Tables – Hamming Codes.

Text Book:

Garrett Birkhoff and Thomas C.Bartee, "Modern Applied Algebra", CBS publishers and Distributors, New Delhi, First Edition .

Unit	Chapter	Section	Page No.
I	3	3.1- 3.8	63-95
II	4	4.1 - 4.9	99-127
III	5	5.1 - 5.10	129-159
IV	6	6.1- 6.10	161-194
V	8	8.1 - 8.7	231-254

Reference Books:

1. V.K.Bhat , "Modern Algebra and Applications", Narosa Publishing House, New Delhi, 2014.
2. J.R. Tremblay , R.Manohar , "Discrete Mathematical structures with Applications to Computer Science" , Tata McGraw – Hill publishing Company Ltd, New Delhi, Eighteenth Reprint , 2002.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester II
(2018 - 2020)
Core Course – V: Algebra II (18PMAC21)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To recognize the abstract approach of mathematics.
- To introduce the important current research areas in algebra.
- To see the development of algebraic system field.

Course Outcomes:

1. Inculcate an insight into algebraic structure field.
2. Develop an analytic thinking in the concept of linear transformation.
3. Provide an introduction to the concept of matrices.
4. Learn the Canonical form and Jordan form.
5. Give a thorough knowledge of the various aspects of Trace and Transposes.
6. Provide the concept of determinants using the operation of matrices.
7. Inculcate the basic knowledge of Hermitian and Unitary transformations.

UNIT I **(18 hrs)**

Fields: Extension Fields - The Transcendence of e – Roots of Polynomials - Construction with Straightedge and Compass.

UNIT II **(18 hrs)**

More About Roots – The Elements of Galois Theory - Solvability by Radicals – Galois Groups over the Rationals.

UNIT III **(18 hrs)**

Linear Transformations: The Algebra of Linear Transformations - Characteristic Roots – Matrices.

UNIT IV **(18 hrs)**

Canonical Forms: Triangular Form - Canonical Forms: Nilpotent Transformations - Canonical Forms: A Decomposition of V: Jordan Form - Canonical Forms: Rational Canonical Form.

UNIT V **(18 hrs)**

Trace and Transpose - Determinants - Hermitian, Unitary and Normal Transformations.

Text Book:

I.N. Herstein, "Topics in Algebra", John Wiley and Sons, Singapore, Second Edition , 2008.

Unit	Chapter	Section	Page No.
I	5	5.1 – 5.4	207 – 231
II	5	5.5 – 5.8	232 – 258
III	6	6.1 – 6.3	260 – 281
IV	6	6.4 – 6.7	285 – 312
V	6	6.8 – 6.10	313 - 348

Reference Books:

1. N.S. Gopalakrishnan ," University Algebra", New Age International (P) Limited, Publishers, New Delhi, Revised Second Edition , 2012.
2. Kenneth Hoffman, Ray Kanze, " Linear Algebra", Pearson Education, Inc., New Delhi, Second Edition, 2006.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester II
(2018 - 2020)
Core Course – VI: Measure Theory (18PMAC22)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int.Marks : 25**
Hours/Week: 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To enrich the students with the knowledge of basic results in measure and an ability to apply them.
- To introduce measure in abstract spaces.

Course Outcomes:

1. Learn the concept and properties of measure starting with outer measure and then the Lebesgue measure.
2. Study measurable sets and measurable functions and their properties.
3. Understand the basic concepts underlying the definition of the general Lebesgue integral.
4. Study spaces of measurable Lebesgue integrable functions.
5. Understand Lebesgue integral and its relation with Riemann integral.
6. Apply the theory of the course to solve a variety of problems at an appropriate level of difficulty.

UNIT I **(18 hrs)**

Lebesgue Measure: Introduction - Outer Measure – Measurable Sets and Lebesgue Measure – Measurable Functions – Littlewood's Three Principles.

UNIT II **(18 hrs)**

The Lebesgue Integral: The Riemann Integral – The Lebesgue Integral of a Bounded Function over a Set of Finite Measure – The Integral of Non-negative Function – The General Lebesgue Integral.

Unit III **(18 hrs)**

Differentiation and Integration: Differentiation of Monotone Functions – Functions of Bounded Variation – Differentiation of an Integral – Absolute Continuity – Convex Functions.

Unit IV **(18 hrs)**

Measure and Integration: Measure Spaces **–** Measurable Functions – Integration – General Convergence Theorems – Signed Measures – The Radon-Nikodym Theorem.

Unit V **(18 hrs)**

Measure and Outer Measure: Outer Measure and Measurability – The Extension Theorem – The Lebesgue-Stieltjes Integral – Product Measures – Integral Operators.

Text Book:

H.L.Royden, “Real Analysis”, Prentice-Hall of India Private Limted, New Delhi, Third Edition, 2005.

Unit	Chapter	Section	Page No.
I	3	1- 3, 5 - 6	54 – 63, 66 – 73
II	4	1 - 4	75 – 93
III	5	1 - 5	97 – 116
IV	11	1 – 6	253 – 279
V	12	1 - 5	288 - 317

Reference Books:

1. G.de Barra, ”Measure Theory and Integration”, New Age International (P) Limited, Publishers, New Delhi, First Edition.
2. P.K.Jain, V.P.Gupta, Pankaj Jain “ Lebesgue Measure and Integration” New Age International Publishers, New Delhi, Second Edition, 2014.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester II
(2018 – 2020)
Core Course – VII: Differential Equations (18PMAC23)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week : 6 **Ext. Marks : 75**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To study about ordinary and partial differential equations.
- To know the method of solving the differential equations.

Course Outcomes:

1. Appreciate ODE and system of ODEs concepts that are encountered in the real world.
2. Work with Differential Equations and systems of Differential Equations in various situations and use correct mathematical terminology, Notation, and symbolic processes in order to engage in work, study, and conversation on topics involving differential equations.
3. Determine whether a system of functions is linearly independent using the Wronskian.
4. Learn the concepts of series solution of differential equation and solution of Bessel's, Legendre's equations and their properties.
5. Solve exact differential equations, linear differential equations and understand the basics of non - linear differential equations.
6. Formulate and solve partial differential equations arising in a number of practical problems.
7. Determine the general solution of higher order linear equations with constant coefficients.

UNIT I **(18 hrs)**

Linear Equations with Variable Coefficients: Introduction – Initial Value Problems for the Homogeneous Equation – Solutions of the Homogeneous Equation – The Wronskian and Linear Independence – Reduction of the Order of a Homogeneous Equation – The Non - Homogeneous Equation – Homogeneous Equations with Analytic Coefficients – The Legendre Equation.

UNIT II **(18 hrs)**

Linear Equations with Regular Singular Points: Introduction – The Euler Equation – Second Order Equations with Regular Singular Points - an Example – Second Order Equations with Regular Singular Points - The General Case – A Convergence Proof – The Exceptional Cases – The Bessel Equation – The Bessel Equation (Continued).

UNIT III **(18 hrs)**

Existence and Uniqueness of Solutions to First Order Equations: Introduction – Equations with Variables Separated – Exact Equations – The Method of Successive Approximations – The Lipschitz Condition – Convergence of the Successive Approximations – Non - Local Existence of Solutions – Approximations to, and Uniqueness of, Solutions.

UNIT IV **(18 hrs)**

Partial Differential Equations of the First Order: Partial Differential Equations – Origins of First Order Partial Differential Equations – Cauchy's Problem for First Order Equations – Linear Equations of the First Order – Integral Surfaces passing Through a Given Curve.

UNIT V **(18 hrs)**

Surfaces Orthogonal to a Given System of Surfaces – Non Linear Partial Differential Equations of the First Order – Cauchy's Method of Characteristics – Compatible Systems of First Order Equations – Charpit's Method – Special types of First Order Equations.

Text Books:

1. Earl.A.Coddington, "An Introduction to Ordinary Differential Equations", Prentice Hall of India Private Ltd., New Delhi, 2006.
2. IAN N.Sneddon, "Elements of Partial Differential Equations", McGraw Hill Book Company, New Delhi, First Edition.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	3	1 – 8	103 – 136
II	1	4	1 – 8	143 – 178
III	1	5	1 – 8	185 – 225
IV	2	2	1 – 5	44 – 56
V	2	2	6 – 11	57 – 73

Reference Books:

1. M.D.Raisinghania, "Advanced Differential Equations", – S.Chand Company, New Delhi, 2001.

2. Dr.D.Somasundaram, "Ordinary Differential Equations", – Narosa Publishing House, New Delhi, 2001.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester II
(2018-2020)
Core Course - VIII : Classical Mechanics (18PMAC24)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks :75**
Duration : 90 hrs **Max.Marks : 100**

Course Objectives:

- To introduce the study of variational principle formulation of continuous systems and fields.
- To enrich their knowledge in Kepler's Law of motion.

Course Outcomes:

1. Analyze mechanical behavior of particle.
2. Obtain simple mathematical and physical relationships between mechanics and materials.
3. Achieve mastery in moments and products of Inertia, Equimomental systems.
4. Ability to study generalized coordinates, Scleronomic and Rheonomic systems.
5. Able to study Lagrange's equations for various systems.
6. Solve orbit problems using the conservation of angular momentum and total energy.
7. Able to work out the center of gravity and moment of inertia of various plane areas.

UNIT I **(18 hrs)**

Survey of the Elementary Principles : Mechanics of a Particle – Mechanics of a System of Particles – Constraints.

UNIT II **(18 hrs)**

D'Alembert's Principle and Lagrange's Equations–Velocity – Dependent Potentials and the Dissipation Function. **Variational principles and Lagrange's Equations:** Hamilton's Principle – Some Techniques of the Calculus of Variations.

UNIT III **(18 hrs)**

Derivation of Lagrange's Equations from Hamilton's Principle – Extension of Hamilton's Principle to Non-holonomic Systems – Advantages of a Variational Principle Formulation– Conservation Theorems and Symmetry Properties.

UNIT IV **(18 hrs)**

The Two – Body Central Force Problem : Reduction to the Equivalent one- Body Problem – The Equations of Motion and First Integrals – The Equivalent one- Dimensional Problem and Classification of Orbits – The Virial Theorem.

UNIT V **(18 hrs)**

The Differential Equation for the Orbit and Integrable Power – law Potentials– Conditions for Closed Orbits (Bernard's theorem) – The Kepler Problem:- Inverse Square Law of Force – The Motion in Time in the Kepler Problem – The Laplace-Runge–Lenz Vector.

Text Book:

Herbert Goldstein, "Classical Mechanics", Narosa Publishing House, New Delhi, Second Edition, 2001.

Unit	Chapter	Section	Page No.
I	1	1.1 – 1.3	1-16
II	1	1.4, 1.5	16-24
	2	2.1, 2.2	35-43
III	2	2.3 – 2.6	43-63
IV	3	3.1 – 3.4	70-85
V	3	3.5 – 3.9	85-105

Reference Books:

1. P. DuraiPandian, LaxmiDuraipandian, MuthamizhJayapragasam, "Mechanics", S. Chand and Company Ltd., NewDelhi, First Edition.

2. A.B. Gupta, "Fundamentals of Classical Mechanics", Book and Allied Pvt. Ltd., First Edition, 2015.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme
Semester II
(2018 – 2020)

Non - Major Elective Course: Fundamentals of Statistics (18PMAN21)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week : 6 **Ext. Marks : 75**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To introduce the basic concepts of Statistics.
- To study about Measures of Central Tendency, Dispersion and Skewness.
- To know about Index Numbers.

Course Outcomes:

1. Enhance the knowledge of statistics in business management.
2. Develop analytical skills in both private and public business organics in the country.
3. Build a culture of informed decision making using statistical models.
4. Describe data with descriptive statistics.
5. Perform statistical analyses and interpret the results of statistical analyses.
6. Calculate and apply measures of location and measures of dispersion - grouped and ungrouped data cases.
7. Apply discrete and continuous probability distributions to various business problems.

UNIT I **(18 hrs)**

Measures of Central Value: Introduction – Objectives of Averaging – Requisites of a Good Average – Types of Averages – Arithmetic Mean – Weighted Arithmetic Mean – Median – Related Positional Measures – Computation of Quartiles, Percentiles, etc – Determination of Median, Quartiles, etc., Graphically – Mode – Relationship among Mean, Median and Mode – Geometric Mean – Weighted Geometric Mean – Harmonic Mean – Weighted Harmonic Mean – Relationship among the Averages.

UNIT II **(18 hrs)**

Measures of Dispersion: Introduction – Significance of Measuring Variation – Properties of a Good Measure of Variation – Methods of Studying Variation – Absolute and Relative Measures of Variation – Range – The Interquartile Range or the Quartile Deviation – Percentile Range – The Mean Deviation – The Standard Deviation – Difference between Mean Deviation and Standard Deviation – Calculation of Standard Deviation - Relation between Measures of Dispersion – Coefficient of Variation – Variance and Standard Deviation Compared – Correcting Incorrect Values of Mean and Standard Deviation – Chebyshev's Theorem – Lorenz Curve. **Skewness:** Introduction – Difference between Dispersion and Skewness –Tests of Skewness – Measures of Skewness – Absolute Measures of Skewness – Relative Measures of

Skewness – Karl Pearson's Coefficient of Skewness – Bowley's Coefficient of Skewness – Kelly's Coefficient of Skewness – Measure of Skewness Based on the Third Moment.

UNIT III **(18 hrs)**

Correlation Analysis: Introduction – Significance of the Study of Correlation – Correlation and Causation – Types of Correlation – Methods of Studying Correlation – Scatter Diagram Method – Graphic Method – Karl Pearson's Coefficient of Correlation – Direct Method of Finding out Correlation Coefficient – Calculation of Correlation Coefficient when Change of Scale and Origin is made – Calculation of Correlation Coefficient when Deviations are taken from an Assumed Mean – Correlation of Grouped Data – Assumption of the Pearsonian Coefficient – Merits and Limitations of the Pearsonian Coefficient – Interpreting Coefficient of Correlation – Coefficient of Correlation and Probable Error – Conditions for the Use of Probable Error – Coefficient of Determination – Properties of the Coefficient of Correlation – Rank Correlation Coefficient – Features of Spearman's Correlation Coefficient – Concurrent Deviation Method – Calculation of Correlation in Time Series – Correlation of Long - term Changes – Calculation of Correlation in Short - term Changes or Oscillation.

UNIT IV **(18 hrs)**

Index Numbers: Introduction – Uses of Index Numbers – Classification of Index Numbers – Problems in the Construction of Index Numbers – Methods of Constructing Index Numbers – Unweighted Index Numbers – Weighted Index Numbers – Merits of Weighted Average of Relative Indices – Quantity or Volume Index Numbers – Value Index Numbers – Tests of Adequacy of Index Number Formulae – The Chain Index Numbers – Steps in Constructing a Chain Index – Conversion of Chain Index to Fixed Index – Base Shifting, Splicing and Deflating the Index Numbers – Consumer Price Index Numbers – Method of Constructing the Consumer Price Index – Index Number of Industrial Production.

UNIT V **(18 hrs)**

Analysis of Time Series: Introduction – Utility of Time Series Analysis – Components of Time Series – Preliminary Adjustments Before Analyzing Time Series – Measurement of Trend – Freehand or Graphic Method - Method of Semi - averages – Method of Moving Averages – The Method of Least Squares – Measuring Trends by Logarithms – Shifting the Trend Origin – Conversion of Annual Trend Values to Monthly Values – Measurement of Seasonal Variations – Method of Simple Averages – Ratio- to - Trend Method – Ratio- to - Moving Average Method – Link Relative Method – Uses and Limitations of Seasonal Index.

Text Book:

S.P.Gupta, "Statistical Methods", Sultan Chand and Sons, New Delhi, Forty First Revised Edition, 2011.

Unit	Chapter	Page No.
I	7	178 – 239
II	8	272 – 309
	9	338 – 349
III	10	390 – 430
IV	13	536 – 582
V	14	612 – 665

Reference Books:

1. S.C.Gupta, V.K.Kapoor, "Elements of Mathematical Statistics", Sultan Chand and Sons, New Delhi, 2006.
2. Irwin Miller, Marylees Miller, "Mathematical Statistics", Pearson Education Inc., Singapore, 2014.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester III
(2018 - 2020)
Core Course – IX: Functional Analysis (18PMAC31)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To know about the fundamentals of normed spaces.
- To study about bounded linear maps on Banach spaces.
- To study about spaces of bounded linear functional.

Course Outcomes:

1. Gain an insight into normed space.
2. Understand the concept of continuity and boundedness of linear maps.
3. Study the characterization of Hahn – Banach Theorem.
4. Gain knowledge of central concepts of the open mapping and closed graph theorems.
5. Demonstrate the Bounded Linear maps and the uniform boundedness principle on Banach spaces.
6. Learn about Spectrum of a bounded operator and evaluate the spectral radius formula.
7. Demonstrate the concept of weak and weak* convergence.
8. Able to get idea of reflexivity using Helly's theorem and Milman theorem.

UNIT I **(18 hrs)**

Fundamentals of Normed Spaces: Normed Spaces – Continuity of Linear Maps.

UNIT II **(18 hrs)**

Hahn-Banach Theorems – Banach Spaces.

UNIT III **(18 hrs)**

Bounded Linear Maps on Banach Spaces: Uniform Boundedness Principle - Closed Graph and Open Mapping Theorems.

UNIT IV **(18 hrs)**

Bounded Inverse Theorem – Spectrum of a Bounded Operator. **Spaces of Bounded Linear Functionals:** Duals and Transposes.

UNIT V **(18 hrs)**

Duals of L^p ([a,b]) and C ([a,b]) – Weak and weak* Convergence – Reflexivity.

Text Book:

Balmohan V.Limaye, "Functional Analysis",- New Age International (P) Limited, Publishers, New Delhi , Third Edition, 2017.

Unit	Chapter	Section	Page No.
I	II	5 – 6	62 – 87, 93 – 95, 98 - 99
II	II	7 – 8	104 – 118, 124 - 134
III	III	9 -10	138 – 143, 166 - 175
IV	III	11 – 12	182 – 189, 192 – 203, 209 - 211
	IV	13	216 – 222, 224 - 233
V	IV	14 – 16	235 – 248 , 260 – 263, 268 – 276, 280 – 286

Reference Books:

1. S.Ponnusamy, "Foundations of Functional Analysis", Narosa Publishing House, New Delhi, 2002.
2. K.Chandrasekhara Rao, "Foundations of Functional Analysis", Narosa Publishing House, New Delhi, 2002.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester III
(2018-2020)
Core Course - X: Operations Research (18PMAC32)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks :75**
Duration : 90 hrs **Max.Marks : 100**

Course Objectives:

- To study about network optimization algorithms.
- To know about the measures of performance for some queuing models.
- To study about nonlinear programming algorithms.

Course Outcomes:

1. Learn the applications of shortest route algorithm.
2. Gain knowledge of Queuing model.
3. Relate the exponential and Poisson distribution.
4. Present the idea of servicing models.
5. Learn the necessary and Sufficient Conditions of Unconstrained problems.
6. Understand the concept of Direct Search Method of Quadratic Programming.
7. Able to know Linear Combinations method and SUMT Algorithm.

UNIT I **(18 hrs)**

Network Models: Network Definitions – Minimal Spanning Tree Algorithm – Shortest Route Problem - Maximal Flow Model - Minimum-Cost Capacitated Flow Problem – CPM and PERT.

UNIT II **(18 hrs)**

Queuing Systems: Why Study Queues? – Elements of a Queuing Model – Role of Exponential Distribution – Pure Birth and Death Models (Relationship between the Exponential and Poisson Distributions) – Generalized Poisson Queuing Model.

UNIT III **(18 hrs)**

Specialized Poisson Queues - (M/G/1): $(GD/\infty/\infty)$- Pollaczek-Khintchine (P-K) Formula – Other Queuing Models – Queuing Decision Models.

UNIT IV **(18 hrs)**

Classical Optimization Theory: Unconstrained Problems - Constrained Problems.

UNIT V **(18 hrs)**

Non- Linear Programming Algorithms: Unconstrained Algorithms - Constrained Algorithms.

Text Book:

HamdyA.Taha, "Operations Research An Introduction", Prentice Hall of India Private Limited, New Delhi, Seventh Edition, 2004.

Unit	Chapter	Section	Page No.
I	6	6.1-6.6	213-286
II	17	17.1-17.5	579-595
III	17	17.6-17.9	597-633
IV	20	20.1-20.2	701-729
V	21	21.1-21.2	731-764

Reference Books:

1. KantiSwarup, P.K.Gupta, Man Mohan, "Operations Research", Sultan Chand and Sons, New Delhi, Sixteenth Edition 2012.
2. Er. Premkumar Gupta and D.S.Kira, "Problems in Operations Research", S.Chand and Company Ltd, New Delhi, 2012.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester III
(2018-2020)
Core Course - XI: Fuzzy Analysis (18PMAC33)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks : 100**

Course Objectives:

- To study about the concept of information under new mathematical formulation.
- To enrich the knowledge in measures of fuzziness.

Course Outcomes :

1. Gain knowledge about constructing the appropriate fuzzy numbers corresponding to uncertain and imprecise collected data.
2. Gain knowledge about finding the optimal solution of mathematical programming problems having uncertain and imprecise data.
3. Knowledge about fuzzy cluster analysis and how to solve basic problems using fuzzy cluster analysis.
4. Distinguish between the crisp set and fuzzy set concepts through the learned differences between the crisp set characteristic function and the fuzzy set membership function.
5. Draw a parallelism between crisp set operations and fuzzy set operations through the use of characteristic and membership functions respectively.
6. Able to define fuzzy sets using linguistic words and represent these sets by membership functions.
7. Know fuzzy-set-related notions; such as α-level sets, convexity, normality, support, etc.

UNIT I **(18 hrs)**

Crisp Sets and Fuzzy Sets: Introduction–Crisp Sets:- An Overview–The Notion of Fuzzy Sets–Basic Concepts of Fuzzy Sets.

UNIT II **(18 hrs)**

Classical Logic: An Overview – Fuzzy Logic – Crisp and Fuzzy Relations –Binary Relations –Binary Relations on a Single Set.

UNIT III **(18 hrs)**

Equivalence and Similarity Relations–Compatibility or Tolerance Relations–Orderings.

UNIT IV **(18 hrs)**

Morphisms–Fuzzy Relation Equations–Fuzzy Measures–General Discussion–Belief and Plausibility Measures.

UNIT V **(18 hrs)**

Probability Measures–Possibility and Necessity Measures–Relationship among Classes of Fuzzy Measures–Types of Uncertainty–Measures of Fuzziness.

Text Book:

George J.Klir and Tina A.Folger, "Fuzzy sets, Uncertainty and information", PHI Learning Private Limited, New Delhi, 2013.

Unit	Chapter	Section	Page No.
I	1	1.1 - 1.4	1-21
II	1	1.5 - 1.6	21-33
	3	3.1 - 3.3	65-82
III	3	3.4 - 3.6	82-91
IV	3	3.7 - 3.8	91-103
	4	4.1 -4.2	107-118
V	4	4.3 - 4.5	118-135
	5	5.1- 5.2	138-148

Reference Books:

1. HungT.Nguyen and Elbert A.Walker, "A First Course in Fuzzy Logic", Chapman and Hall/CRC, Taylor and Francis Group, New York, Third Edition, 2006.
2. A.R.Meenakshi, " Fuzzy matrix Theory and Applications", MJP Publishers, Chennai, 2008.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme - M.Sc
Semester III
(2018-2020)
Core Course - XII : Topology (18PMAC34)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/ Week : 6 **Ext. Marks : 75**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To introduce the concept of topological spaces.
- To study about connectedness and compactness in topological spaces.
- To know about countability and separation axioms.

Course Outcomes:

1. Construct various topologies on a general set and compare them if it is possible
2. Construct the product topology on product spaces.
3. Be able to give an account of various set theoretic and topological constructions such as products of topological properties.
4. Be able to describe the heredity of various topological properties under continuous maps.
5. Express the notion of metric space, construct the topology by using the metric.
6. Express regularity and normality separation axiom and use them to prove various properties.
7. Able to apply Tychonoff's theorem, fundamental metrization theorems to construct several mathematical objects.

UNIT I **(12 hrs)**

Topological spaces and Continuous Functions: Topological Spaces – Basis for a Topology – The Order Topology – The Product Topology on $X \times Y$ – The Subspace Topology – Closed Sets and Limit Points – Continuous Functions.

UNIT II **(12 hrs)**

The Product Topology – The Metric Topology – The Metric Topology (Continued). **Connectedness and Compactness:** Connected Spaces – Connected Subspaces of the Real Line – Components and Local Connectedness.

UNIT III **(12 hrs)**

Compact Spaces – Compact Subspaces of the Real Line – Limit Point Compactness – Local Compactness.

UNIT IV **(12 hrs)**

Countability and Separation Axioms: The Countability Axioms – The Separation Axioms – Normal Spaces – The Urysohn Lemma.

UNIT V **(12 hrs)**

The Urysohn Metrization Theorem – The Tietze Extension Theorem – The Tychonoff Theorem.

Text Book:

James R. Munkres, "Topology", Prentice Hall of India Private Limited, New Delhi, Second Edition.

Unit	Chapter	Section	Page No.
I	2	12 - 18	75 - 111
II	2, 3	19 - 21, 23 - 25	112 - 133, 147 - 162
III	3	26 - 29	163 - 185
IV	4	30 - 33	189 - 212
V	4, 5	34 - 35, 37	214 - 222, 230 - 235

Reference Books:

1. Theodore W. Gamelin and Robert Everist Greene, "Introduction to Topology", General Publishing Company Limited, Canada.
2. George F. Simmons, "Introduction to Topology and Modern Analysis", Tata MC Graw - Hill Publishing Company Limited, New Delhi, 2006.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme - M. Sc
Semester III
(2018 – 2020)

Major Elective Course – II: Advanced Numerical Analysis (18PMAO31)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int.Marks : 25**
Hours / Week: 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To apply numerical methods to solve problems in physical and technical applications.
- To use numerical methods for solving first and second degree equation and polynomial equations.
- To know about numerical differentiations and integrations.

Course Outcomes:

1. Understand basics of finite precision arithmetic, conditioning of problems and stability of numerical algorithms.
2. Examine approximate solutions to mathematical problems.
3. Solve dense systems of linear equations and least squares problems and have a working knowledge of LU and QR factorizations for these problems.
4. Compute eigen values and eigen vectors of matrices numerically.
5. Apply various mathematical operations and tasks, such as interpolation, differentiation, integration, the solutions of linear equations and the solutions of differential equations and partial differential equations.
6. Increase the accuracy of numerical approximations by extrapolation.

UNIT I **(18 hrs)**

Transcendental and Polynomial Equations: Introduction – Bisection method – Iteration Methods Based on First Degree Equation – Iteration Methods Based on Second Degree Equation – Rate of Convergence – General Iteration Methods –Methods for Complex Roots – Polynomial Equations.

UNIT II **(18 hrs)**

System of Linear Algebraic Equations and Eigenvalue Problems: Introduction – Direct Methods – Error Analysis for Direct Methods – Iteration Methods.

UNIT III **(18 hrs)**

Eigenvalues and Eigenvectors – Bounds on Eigenvalues – Jacobi Method for Symmetric Matrices – Givens Method for Symmetric Matrices – Householder's Method for Symmetric

Matrices – Rutishauser Method for Arbitrary Matrices – Power Method - Inverse Power Method.

UNIT IV **(18 hrs)**

Interpolation: Introduction – Lagrange and Newton Interpolations – Finite Difference Operators – Interpolating Polynomials Using Finite Differences – Hermite Interpolation – Piecewise and Spline Interpolation.

UNIT V **(18 hrs)**

Differentiation and Integration: Introduction – Numerical Differentiation – Extrapolation Methods – Partial Differentiation – Numerical Integration – Methods based on Interpolation – Composite Integration Methods – Romberg Integration.

Text Book:

M.K.Jain, S.R.K.Iyengar and R.K.Jain, "Numerical Methods for Scientific and Engineering Computation", New Age International (P) Limited, Publishers, New Delhi, Sixth Edition, 2012.

Unit	Chapter	Section	Page No.
I	2	2.1 – 2.6 , 2.8 , 2.9	17 – 63, 72 – 73, 83 - 99
II	3	3.1 - 3.4	104 - 165
III	3	3.5 – 3.12	170 - 201
IV	4	4.1 – 4.6	210 - 273
V	5	5.1, 5.2, 5.4 – 5.7, 5.9 ,5.10	320 – 335, 339 – 356, 386 - 393

Reference Books:

1. Devi Prasad, "An Introduction to Numerical Analysis", Narosa Publishing House, New Delhi, Third Edition, 2006.
2. S.S.Sastry, "Introductory Methods of Numerical Analysis", Prentice Hall of India Private Limited, New Delhi.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme - M.Sc
Semester III
(2018-2020)
Major Elective Course - II: Graph Theory - II (18PMAO32)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/ Week : 6 **Ext. Marks : 75**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To study the application of graph theory to real world.
- To study the theoretical treatment of graph theory.
- To strengthen the ideas and point the way to independent applications in science.

Course Outcomes:

1. Have increased ability in graph theoretic problem solving.
2. Calculate the chromatic number and chromatic index of a given graph.
3. Calculate the chromatic polynomial of a graph using the algorithm.
4. Able to solve Turan's problem.
5. Apply the Planarity Algorithm for testing planarity of graphs.
6. Be able to implement standard algorithms of graph theory.

UNIT I **(18 hrs)**

Graphs and Subgraphs: The Shortest Path Problem – Sperner`s Lemma. **Trees:** The Connector Problem.

UNIT II **(18 hrs)**

Connectivity: Construction of Reliable Communication Networks. **Euler Tours and Hamilton Cycles:** The Chinese Postman Problem – The Travelling Salesman Problem.

UNIT III **(18 hrs)**

Matchings: The Personnel Assignment Problem – The Optimal Assignment Problem. **Edge Colourings:** The Timetabling Problem.

UNIT IV **(18 hrs)**

Independent Sets and Cliques: Ramsey`s Theorem – Turan`s Theorem – Schur`s Theorem.

UNIT V **(18 hrs)**

Vertex Colourings: A Storage Problem. **Planar graphs:** A Planarity Algorithm. **Directed Graphs:** A Job Sequencing Problem.

Text Book:

J.A.Bondy and U.S.R.Murty, "Graph theory with Applications", The Macmillan

press Ltd, Great Britain.

Unit	Chapter	Section	Page No.
I	1	1.8, 1.9	15 - 23
	2	2.5	36 - 40
II	3	3.3	47 - 49
	4	4.3, 4.4	62 - 68
III	5	5.4, 5.5	80 - 90
	6	6.3	96 - 100
IV	7	7.2 - 7.4	103 - 112
V	8	8.6	131 - 133
	9	9.8	163 - 169
	10	10.4	179,180

Reference Books:

1. Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", Prentice-Hall of India Private limited, New Delhi, 2006.
2. Dr.M.Murugan, "Applications of Graph Theory", Muthali Publishing House, Chennai, 2005.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester III
(2018-2020)

Major Elective Course – II : Differential Geometry (18PMAO33)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks: 100**

Course Objectives:

- To discuss the classical theory of curves and surfaces using vector methods.
- To introduce the essential ideas and methods of differential geometry.

Course Outcomes:

1. Explain the concepts and language of differential geometry and its role in modern mathematics.
2. Demonstrate the contact between curves and surfaces.
3. Parametrize a plane and a space curve and to calculate its curvatures and Frenet-Serret apparatus and arc-length.
4. Gain knowledge of families of curves.
5. Present the concept of Geodesic and their properties.
6. Identify the principle of curvature of a curve.
7. Able to know the minimal and ruled surfaces.

UNIT I **(18 hrs)**

The Theory of Space Curves : Introductory Remarks about Space Curves – Definitions– Arc Length – Tangent, Normal and Binormal– Curvature and Torsion of a Curve Given as the Intersection of Two Surfaces –Contact between Curves and Surfaces– Tangent Surface, Involutes and Evolutes.

UNIT II **(18 hrs)**

Intrinsic Equations, Fundamental Existence Theorem for Space Curves–Helices.**The Metric: Local Intrinsic Properties of a Surface:** Definition of a Surface – Curves on a Surface– Surfaces of Revolution – Helicoids.

UNIT III **(18 hrs)**

Metric– Direction Coefficients– Families of Curves – Isometric Correspondence – Intrinsic Properties – Geodesics –Canonical Geodesic Equations– Normal Property of Geodesics.

UNIT IV **(18 hrs)**

The Second Fundamental Form: Local Non-intrinsic Properties of a Surface: The Second Fundamental Form– Principal Curvature – Lines of Curvature–Developables– Developables Associated with Space Curves–Developables Associated with Curves on Surfaces.

UNIT V **(18 hrs)**

Minimal Surfaces – Ruled Surfaces– The Fundamental Equations of Surface Theory – Parallel Surfaces– Fundamental Existence Theorem for Surfaces.

Text Book:

T.J.Willmore,"An Introduction to Differential Geometry", Oxford University Press, New Delhi, 2006.

(Note: In all the chapters omit the appendix)

Unit	Chapter	Section	Page No.
I	I	1 - 7	1 - 23
II	I	8, 9	23 - 28
	II	1 - 4	31 - 39
III	II	5 – 12	39 - 65
IV	III	1 – 6	95 - 106
V	III	7 - 11	106 -124

Reference Books:

1 .J.N.Sharma, A.R.Vasishtha, "Differential Geometry", Kedar Nath , Ram Nath, Delhi, 2006.

2. B.C.Mittal, D.C. Agarwal, "Differential Geometry", Krishna Prakashan Media Pvt. Ltd, Delhi, Thirty Second Edition, 2016.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester IV
(2018 - 2020)
Core Course – XIII: Complex Analysis (18PMAC41)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To assist the students in learning fundamental ideas and theorems about complex plane.
- To enrich their knowledge in complex integration.

Course Outcomes:

1. Introduce the concept of analytic function, rational function, reflection principle etc.,
2. Inculcate an insight into the characterization of some special series.
3. Describe and parameterize curves and regions in two-dimensional space.
4. Study about the families of circles.
5. Evaluate fundamental theorem of calculus and Cauchy's integral formula.
6. Find the Taylor series of a function and determine its circle or annulus of convergence.
7. Compute the residue of a function and use the residue theory to evaluate a integral over the real line.

UNIT I **(18 hrs)**

Complex Functions: Introduction to the Concept of Analytic Function**:** Limits and Continuity – Analytic Functions – Polynomials – Rational Functions – Elementary Theory of Power Series –Sequences – Series – Uniform Convergence – Power series – Abel`s Limit Theorem – The Exponential and Trigonometric Functions – The Exponential – The Trigonometric Functions – The Periodicity –The Logarithm.

UNIT II **(18 hrs)**

Analytic Functions as Mappings: Conformality – Arcs and Closed Curves – Analytic Functions in Regions – Conformal Mapping – Length and Area– Linear Transformations –The Linear Group –The Cross Ratio – Symmetry – Oriented Circles – Families of Circles.

UNIT III **(18 hrs)**

Complex Integration: Fundamentals Theorems – Line Integrals– Rectifiable Arcs– Line Integrals as Functions of Arcs – Cauchy`s Theorem for a Rectangle – Cauchy`s Theorem in a Disk – Cauchy's Integral Formula –The Index of a Point with Respect to a Closed Curve – The Integral Formula – Higher Derivatives – Local Properties of Analytic Functions - Removable Singularities. Taylor`s Theorem – Zeros and Poles–The Local Mapping –The Maximum Principle.

UNIT IV **(18 hrs)**

The General Form of Cauchy's Theorem – Chains and Cycles –Simple Connectivity – Homology –The General Statement of Cauchy's Theorem – Proof of Cauchy's Theorem – The Calculus of Residues –The Residue Theorem –The Argument Principle – Evaluation of Definite Integrals – Harmonic Functions – Definition and Basic Properties – The Mean Value Property – Poisson`s Formula – Schwarz`s Theorem –The Reflection Principle.

UNIT V **(18 hrs)**

Series and Product Developments: Power Series Expansions –Weierstrass`s Theorem – The Taylor Series – The Laurent Series – Partial Fractions and Factorization – Partial Fractions-Infinite Products – Canonical Products– The Gamma Function.

Text Book:

Lars V.Ahlfors ,"Complex Analysis", McGraw Hill Book Company, New Delhi, Third Edition.

Unit	Chapter	Section	Page No.
I	2	1 - 3	21 – 47
II	3	2-3	67 – 88
III	4	1-3	101 – 136
IV	4	4 - 6	137 - 144, 148 - 173
V	5	1 – 2(2.1 – 2.4)	175 – 200

Reference Books:

1. S. Ponnusamy, "Foundations of Complex Analysis", Narosa Publishing House, New Delhi, 2000.
2. V. Karunakaran, "Complex Analysis", Narosa Publishing House, New Delhi, Second Edition, 2006.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester IV
(2018 - 2020)

Core Course – XIV: Number Theory and Cryptography (18PMAC42)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int.Marks : 25**
Hours/Week : 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To see the variety of topics in Number Theory.
- To solve problems which has fascinated to professional and amateur mathematicians.
- To learn about Sigma and Tau functions.
- To study cryptology as an application of Number Theory.

Course Outcomes:

1. Solve problems in elementary Number Theory.
2. Able to effectively express the concepts and results of Number Theory.
3. Able to understand the logic and methods behind the major proofs in Number Theory.
4. Apply properties of Congruence to solve practical problems.
5. Able to understand the principles and theory of error-correcting codes, and the various methods for constructing them.
6. Apply elementary number theory to cryptography.
7. Understand the mathematical ideas underlying the theory of cryptography.

UNIT I **(18 hrs)**

Preliminaries: Introduction – Conjectures, Theorems, and Proofs – Well-ordering and Induction – Sigma Notation and Product Notation – Binomial Coefficients– Greatest Integer Function. **Divisibility:** Introduction – Divisibility, Greatest Common Divisor, Euclid's Algorithm – Least Common Multiple – Representations of Integers. **Primes:** Introduction – Primes, Prime Counting Function- Prime Number Theorem – Sieve of Eratosthenes, Canonical Factorization, Fundamental Theorem of Arithmetic.

UNIT II **(18 hrs)**

Congruences: Introduction – Congruences and Equivalence Relations – Linear Congruences - Linear Diophantine Equations and Chinese Remainder Theorem – Polynomial Congruences– Modular Arithmetic: Fermat's Theorem – Wilson's Theorem and Fermat Numbers – Pythagorean Equation.

UNIT III **(18 hrs)**

Arithmetic Functions: Introduction – Sigma Function, Tau Function, Dirichlet Product-Dirichlet Inverse, Moebius Function, Euler`s Function, Euler`s Theorem.

UNIT IV **(18 hrs)**

Primitive Roots and Indices: Introduction – Primitive Roots: Definition and Properties – Primitive Roots: Existence – Indices. **Quadratic Congruences:** Introduction – Quadratic Residues and the Legendre Symbol – Gauss' Lemma and the Law of Quadratic Reciprocity.

UNIT V **(18 hrs)**

Cryptology: Introduction- Character Ciphers - Block Ciphers – One-Time Pads: Exponential Ciphers – Public-Key Cryptography.

Text Book:

Neville Robbins, "Beginning Number Theory", Jones and Bartlett Publishers, Sudbury, Second Edition, 2006.

Unit	Chapter	Section	Page No.
I	1	1.1 – 1.6	1 - 25
	2	2.1 – 2.4	27 - 48
	3	3.1 – 3.3	53 - 67
II	4	4.1 – 4.8	71 - 115
III	5	5.1 -5.3	119 – 144
IV	6	6.1 – 6.4	147 – 166
	7	7.1 -7.3	169 – 185
V	12	12.1 – 12.5	303 - 313

Reference Books:

1. Tom M. Apostol , " Introduction to Analytic Number Theory", Narosa Publishing House, New Delhi.
2. Ivan Niven, Herbert S. Zuckerman, Hugh L. Montgomery, "An Introduction to the Theory of Numbers", John Wiley and Sons, Inc., Singapore, Fifth Edition, 2006.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme - M. Sc
Semester IV
(2018 – 2020)
Core Course – XV: Stochastic Processes (18PMAC43)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int.Marks : 25**
Hours / Week: 6 **Ext.Marks : 75**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To enrich the knowledge of applied probability and applied stochastic processes.
- To introduce non negative integral valued random variables and generating functions.
- To know about Markov chain.

Course Outcomes:

1. Apply the specialised knowledge in probability theory and random processes to solve practical problems.
2. Gain advanced and integrated understanding of the fundamentals of and interrelationship between discrete and continuous random variables and between deterministic and stochastic processes.
3. Analyse the performance in terms of probabilities and distributions achieved by the determined solutions.
4. Demonstrate essential stochastic modeling tools like Markov chains.
5. Evaluate the n-step transition probability.
6. Learn about renewal theory, the Birth – Death and Yule process.
7. Understanding of the relationship between the purpose of a model and the appropriate level of complexity and accuracy.

UNIT I **(18 hrs)**

Probability Distributions: Generating Functions – Laplace Transforms – Laplace (Stieltjes) Transform of a Probability Distribution or of a Random Variable – Classification of Distributions.

UNIT II **(18 hrs)**

Stochastic Processes: Some Notions – Introduction - Specification of Stochastic Processes – Stationary Processes - Matingales. **Markov Chains:** Definition and Examples – Higher Transition Probabilities.

UNIT III **(18 hrs)**

Classification of States and Chains – Determination of Higher Transition Probabilities – Stability of a Markov System – Statistical Inference for Markov Chains - Markov Chains with Continuous State Space – Non- homogeneous Chains.

UNIT IV **(18 hrs)**

Markow Processes with Discrete State Space: Poisson Process and its Extensions: Poisson Process – Poisson Process and Related Distributions – Generalizations of Poisson Process – Birth and Death Process – Markov Processes with Discrete State Space (Continuous Time Markov Chains) – Randomization : Derived Markov Chains - Erlang process.

UNIT V **(18 hrs)**

Markov Processes with Continuous State Space: Introduction: Brownian Motion - Wiener Process –Differential Equations for a Wiener Process - Kolmogorov Equations – First Passage Time Distribution for Wiener Process.

Text Book:

J.Medhi , "Stochastic Processes", New age international (P) Limited, Publishers, New Delhi, Second Edition, 2004.

Unit	Chapter	Section	Page No.
I	1	1.1 – 1.4	1 - 47
II	2	2.1 – 2.4	56 - 66
	3	3.1 – 3.2	69 – 82
III	3	3.4 - 3.6, 3.10 – 3.12	88 - 112, 132 - 147
IV	4	4.1 – 4.7	157 - 213
V	5	5.1 – 5.5	221- 233

Reference Books:

1. A.K.Vasu, "Introduction to Stochastic Process", Narosa Publishing House, New Delhi, 2007.
2. S.K. Srinivasan, K.M. Mehata, "Stochastic Processes", Tata McGraw-Hill Publishing Company Limited, New Delhi.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme - M.Sc
Semester IV
(2018-2020)
Core Course – XVI : Advanced Topology (18PMAC44)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/ Week : 6 **Ext. Marks : 75**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To introduce the concept of Paracompactness.
- To study about Baire spaces.

Course Outcomes:

1. Able to apply the topological concepts and constructions to real world problems.
2. Gain knowledge about the handling of several topological techniques.
3. Use ideas and methods of coverings to prove fundamental results related with metrisabilty and characterizations of Paracompactness.
4. Know the importance of paracompactness and can give equivalent characterizations.
5. Demonstrate knowledge and understanding of concepts such as connectedness and compactness.
6. Able to use and adapt relevant theorems to check whether a subset of a topological space is compact or not.

UNIT I **(18 hrs)**

The Tychonoff Theorem: The Stone - Cech Compactification. **Metrization Theorems and Paracompactness:** Local Finiteness – The Nagata - Smirnov Metrization Theorem.

UNIT II **(18 hrs)**

Paracompactness – The Smirnov Metrization Theorem.

UNIT III **(18 hrs)**

Complete Metric Spaces and Function Spaces: Complete Metric Spaces – A Space - Filling Curve.

UNIT IV **(18 hrs)**

Compactness in Metric Spaces – Pointwise and Compact Convergence – Ascoli's Theorem.

UNIT V **(18 hrs)**

Baire Spaces and Dimension Theory: Baire Spaces – A Nowhere - Differentiable Function.

Text Book :

James R. Munkres, "Topology", Prentice Hall of India Private Limited, New Delhi, Second Edition.

Unit	Chapter	Section	Page No.
I	5	38	237 - 241
	6	39, 40	243 - 252
II	6	41, 42	252 - 262
III	7	43, 44	263 - 274
IV	7	45 - 47	275 - 292
V	8	48, 49	294 - 304

Reference Books:

1. Sheldon and W. Davis, "Topology", Tata McGraw - Hill Publishing Company Limited, New Delhi, 2006.
2. K.D. Joshi, "Introduction to General Topology", New Age International Private Limited, New Delhi, 2003.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Mathematics
PG Programme – M.Sc
Semester IV
(2018 - 2020)
Core Course – XVII: Project (18PMAJ41)
(For those who join from June 2018 and afterwards)

Credits : 6 **Int.Marks : 40**
Hours/Week : 6 **Ext.Marks : 60**
Duration : 90 hrs **Max.Marks:100**

Course Objectives:

- To enable students understand the purpose and importance of research in Mathematics.
- To plan and carry out research work by conducting review, collecting materials, and find the results by applying different critical theories.

Course Outcomes:

1. Get familiarized with basic concepts of research.
2. Identify and state the research topic.
3. Design and conduct a research study accordance with the identified research need.
4. Develop skill to search online and offline sources to carryout research.
5. Assess ways to collect, compile and conduct a data analysis
6. Appropriately document the data collected
7. Apply academic skills to present the research study findings in a formal academic oral presentations and a written research paper

---

Project work:

- Each learner can select for his/her research project any one of the areas of Mathematics in consultation with his/her guide and the Head of the Department.
- The project report should be submitted to the Principal through the Head of the Department of Mathematics one week prior to the commencement of the summative examination. If a candidate fails to submit his/her project report on the date presented above, he/she may be permitted to submit the same 4 days prior to the date of viva-voce examination with a fine as prescribed by the college.
- Each learner shall submit 2 copies of his/her project report for valuation.
- The project report shall contain at least 25 pages excluding bibliography and appendices.
- The project report shall be valued for a total of 80 marks out of which 40 is internal mark and 40 is external mark. Out of the external mark 40, the external examiner and guide share 30 and 10 marks respectively. The sum of marks awarded by both the examiners shall be considered to be the final mark. For the pass in the project report the learner shall

secure a minimum of 25 marks. If the learner fails to get the minimum pass mark in the project report he/she shall be permitted to submit his/her project report once again within a period of 6 months after the publication of the result.

- For those candidates who have passed in the evaluation of the project report there will a viva-voce examination of the above. The viva-voce carries a minimum of 20 marks and it will be conducted jointly by the guide and the external examiner. The learner should secure a minimum of 10 marks for a pass in the viva-voce examination failing which he/she would be required to reappear for the same after a month but within a period of 3 months for which he/she will have to pay a fee as prescribed by the college.
- Further for a pass in this paper as a whole, a learner should secure at least 50 marks in project report and viva-voce put together.