SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI

(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY, MADURAI.
RE-ACCREDITED WITH 'A' GRADE (THIRD CYCLE) BY NAAC WITH CGPA 3.11)

Programme Scheme, Scheme of Examination and Syllabi

(From 2023-2024 Batch onwards)

Department of Mathematics

PG Programme

Curriculum Design and Development Cell
Annexure J

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI

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Programme Scheme, Scheme of Examination and Syllabi

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Department of Mathematics

PG Programme

Curriculum Design and Development Cell

HOD	Dean of Pure Science	Dean of Academic Affairs	Principal

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
MEMBERS OF BOARD OF STUDIES

S.No.	Board Members	Name and Designation
1.	Chairman of the Board	**Ms.K.Lalithambigai** Head & Assistant Professor of Mathematics Sri Kaliswari College (Autonomous), Sivakasi.
2.	University Nominee	**Dr.A.Shophia Lawrence** Assistant Professor Department of Mathematics School of Mathematics Madurai Kamaraj University, Madurai.
3.	Academic Expert 1.	**Dr. C.Parameswaran** Associate Professor and Head Centre for Research and Post Graduate Studies in Mathematics, Ayya Nadar Janaki Ammal College Sivakasi.
4.	Academic Expert 2.	**Dr. M.Jeyaraman** Assistant Professor Department of Mathematics R.D. Government Arts College Sivagangai
5.	Industrialist	**MAPR.Krishnamoorthy** Partner, Palani Industries Virudhunagar.
6.	Alumnus	**Dr.G.Ramkumar** Assistant Professor Department of Mathematics Arul Anandar College Karumathur.
Members		
7.	Mr.T.Gurunathan	Assistant Professor of Mathematics
8.	Dr.S.Anubala	Assistant Professor of Mathematics
9.	Ms.S.Eswari	Assistant Professor of Mathematics
10.	Ms.C.Arunthathi	Assistant Professor of Mathematics
11.	Ms. S.Ashwini Priya	Assistant Professor of Mathematics
11.	Ms.R.Vanthana	Assistant Professor of Mathematics
12.	Mrs.R.Vanalakshmi	Assistant Professor of Mathematics
13.	Ms.R.Karthika	Assistant Professor of Mathematics

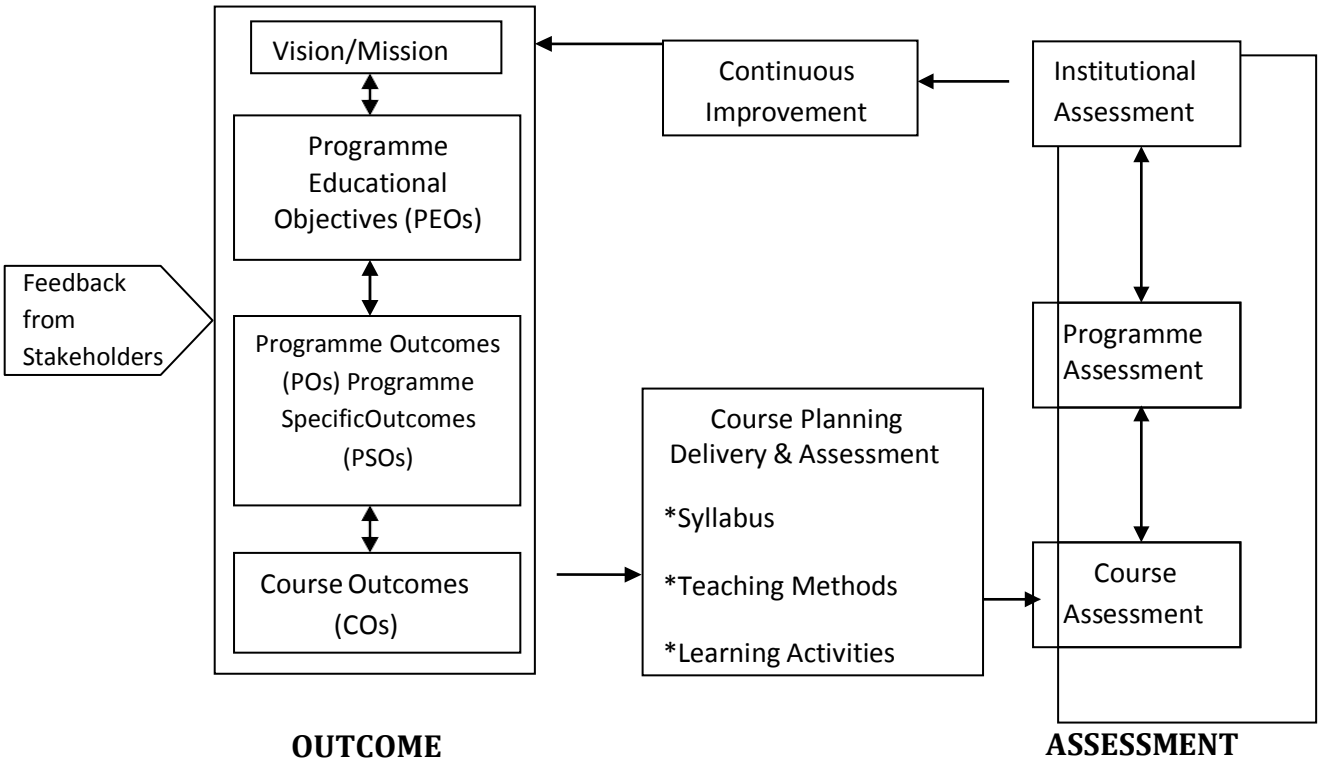
SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY, MADURAI
RE-ACCREDITED WITH 'A' GRADE (THIRD CYCLE) BY NAAC WITH CGPA 3.11)
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
GUIDELINES FOR OUTCOME-BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM
(From 2023-2024 Batch onwards)

INTRODUCTION

Sri Kaliswari College in its pursuit of imparting quality education has marked a remarkable growth in terms of academic excellence, infrastructure, student strength, ICT facilities, library and placement records since its establishment in 2000-2001.This institution constitutes an academic community that is committed to encourage the student community to experience and share knowledge, identify their potential, enhance the employability skills and enable them to pursue their goals. After the conferment of autonomous status in the year 2012, the college has so far gone for revision of the syllabi three times and is continually updating the syllabi to meet the needs and demands of the student community.

The institution in its success journey of imparting quality education has been Re-Accredited with A grade (CGPA 3.11) in its third cycle of Accreditation by NAAC. As an added feather to its cap, the institution has taken a giant leap to embrace the Outcome-Based Education system to enable the student community to develop their knowledge, skill and attitude simultaneously through a focussed learning and help the graduates to compete with their global counterparts and prepare them for life.

I. OUTCOME-BASED EDUCATION (OBE) FRAMEWORK



II. VISION OF THE INSTITUTION

- To impart quality higher education to produce highly talented youth capable of developing the nation

III. MISSION OF THE INSTITUTION

- Ensuring quality in all aspects of the activities
- Developing the latent skills of the rural youth
- Providing value - based education to instill courage and confidence
- Nurturing the entrepreneurial skills of the rural youth
- Creating competency to meet global challenges
- Imbibing social awareness and social responsibilities

IV. VISION OF THE DEPARTMENT

- To create a sound academic ambience to produce competent youth to excel in research and teaching in Mathematics along with concern for society

V. MISSION OF THE DEPARTMENT

- To impart quality education and inculcate the spirit of research through innovative teaching and research methodologies in Mathematics.
- To empower students with required skills to succeed in the ever-changing world.
- To provide innovative training to apply mathematical and computational skills to model, formulate and solve real life problems.

VI. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Graduates will

PEO1: demonstrate fundamental and systematic knowledge of mathematics and its applications relevant to job trends and employment opportunities.

PEO2: apply knowledge, understanding and skills to identify the difficult and unsolved problems in mathematics and to collect the required information in possible range of sources and try to analyse and evaluate these problems using appropriate methodologies.

PEO3: communicate the fundamental and advanced mathematical concepts in written and oral form and use suitable tools of mathematical analysis to handle issues and problems in mathematics and related sciences.

PEO4: exhibit codes of conduct and social responsibility in order to behave consistently with personal respect and respect the ethical values, social responsibilities and diversity.

PEO5: identify knowledge and skills in mathematics through independent and life-long learning in the broadest context of technological change.

VII. PROGRAMME OUTCOMES (POs)

PO1: Disciplinary Knowledge

Acquire specialized and Scientific knowledge in the field of Science.

PO2: Critical Thinking, Problem Solving and Analytical Reasoning

Engage in critical investigations through principle approaches or methods and draw realistic conclusions of problems by employing highly developed analytical and quantitative skills.

PO3: Scientific Reasoning and Research Related Skills

Ability to analyze, draw conclusions from qualitative/quantitative data and critically evaluate ideas and also acquire necessary research skills to carry out an experiment or investigation.

PO4: Communication Skills and Digital Literacy

Communicate effectively on scientific achievements, basic concepts and recent developments with society at large and make use of appropriate software to prepare project report.

PO5: Ethics, Values and Multicultural Competence

Embrace ethical principles in all their activities, commit to professional and research ethics and practice tolerance and respect differences.

PO6: Team Work, Leadership and Employability Skills

Recognize the opportunities and contribute positively in collaborative scientific research and acquire the pre - requisite skills required for placements and higher education.

PO7: Self-directed and Life-long Learning

Recognize the need for engaging in independent and lifelong learning in the emerging areas of the field of specialization.

VIII. PROGRAMME SPECIFIC OUTCOMES (PSOs) – M.Sc. MATHEMATICS

On successful completion of M.Sc. Mathematics, the students will

PSO1: acquire in-depth knowledge of algebra, analysis, geometry, differential equations and several other branches of mathematics.

PSO2: develop critical observations, identify challenging problems in mathematics and obtain well-defined solutions for the problems using the principles of mathematics.

PSO3: analyse specific theoretical and applied problems in mathematics and draw conclusion from a range of contemporary research works and their applications in diverse areas of mathematical sciences.

PSO4: obtain ability to communicate various concepts of mathematics effectively using examples and their geometrical visualizations and apply ICT to mathematical investigations and problem solving.

PSO5: apply ethical principles and commit to professional ethics, responsibilities and norms of the scientific and sustainable development and practice tolerance and respect differences in the work place and society.

PSO6: work effectively in government jobs, banking, insurance and investment sectors, various other public and private enterprises by acquiring technical, communicative and leadership skills.

PSO7: acquire knowledge and skills through logical reasoning and to inculcate the habit of self-directed and life-long learning in the broadest context of technological change.

IX. PO-PSO Mapping Matrix – M.Sc. Mathematics

PO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
PO1	✓						
PO2		✓					
PO3			✓				
PO4				✓			
PO5					✓		
PO6						✓	
PO7							✓

X. PO-PEO Mapping Matrix – M.Sc. Mathematics

PO \ PEO	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	✓				
PO2		✓			
PO3		✓			
PO4			✓		
PO5				✓	
PO6	✓				
PO7					✓

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics

REGULATIONS

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, Madurai as its equivalent.

Medium of Instruction : English

Age Limit

Maximum age limit : No Age limit

Transitory Permission

Students joined from June 2023 to June 2025 may be permitted to write their examinations in this pattern up to April 2028.

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics

SCHEME OF EXAMINATION

For all the PG Programmes, the internal and external marks are distributed as follows:

For all Theory Courses (exclude Skill Enhancement Course) : Internal Marks: 25; External Marks: 75

For Courses with both Theory and Practical, assessment will be for both Theory and Practical.

For Skill Enhancement Course: Professional Competency Course: Internal Assessment for 100 Marks in Online Mode will be conducted (Objective Type Questions)

For Extension Activity : Performance Based Assessment (100 Marks)

For all Practical Courses, Project and

Internship : Internal Marks: 25; External Marks: 75

Internal Mark Distribution for Theory Courses

Assessment Type	**Marks**	**Scheme of Assessment**
Internal Test	10 marks	Two Internal Tests and 1 Model Exam will be conducted and average of the best two will be considered
Written Assignment E-Assignment/ Case Studies/ Reviews/ Field Assignments/ Poster Presentations/ Portfolios	5 marks	Any two of the Assignments will be given and the average of the two will be considered
Seminar	5 marks	One Seminar for each course
Viva/ Oral Exam/ Group Discussion/ Role Play	5 marks	Test will be conducted in any one of the Oral Mode

Internal Mark Distribution for Practical Courses

Assessment Type	**Marks**	**Scheme of Assessment**
Lab work /Program Execution	15 marks	Two Internal Tests will be conducted and the average of the two will be considered
Observation/Record Notebook	5 marks	Assessment will be done during every practical class
Viva –Voce / Lab Quiz	5 marks	Two Lab Quiz Tests/viva-voce will be conducted and the average of the two will be considered

External Mark Distribution for Practical Courses

Assessment Type	Marks	Scheme of Assessment
Lab work/Program Execution	65 marks	End result of the Practical
Viva –Voce	10 marks	Oral Mode Test

Internal Mark Distribution for Courses with both Theory and Practical

Assessment Type	Marks	Scheme of Assessment
Internal Test	10 marks	Two Internal Tests and 1 Model Exam will be conducted and average of the best two will be considered
Written Assignment E-Assignment/ Case Studies/ Reviews/ Field Assignments/ Poster Presentations/ Portfolios	5 marks	Any two of the Assignments will be given and the average of the two will be considered
Lab work /Program Execution	10 marks	Two Internal Tests will be conducted and the average of the two will be considered

External Mark Distribution for Courses with both Theory and Practical

Assessment Type	Marks	Scheme of Assessment
External Written Test	50 marks	Two hours External Exam will be conducted for 50 marks
Lab work /Program Execution	20 marks	End result of the Practical
Viva –Voce	05 marks	Oral Mode Test

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
UG Programme - M.Sc. Mathematics
QUESTION PAPER PATTERN

Internal Test – 40 Marks – 1 hr 45 mins Duration

S.No	Type of Questions	Marks
1.	Objective type Questions: Multiple Choice – 5 questions Answer in a Word/Sentence – 4 questions	 05 04
2.	Short Answer–2 questions –either or type	3x7=21
3.	Long Answer–1 question – either or type	1x10=10

Summative Examinations - 75 Marks -3 hrs Duration

S.No	Type of Questions	Marks
1.	Objective type Questions: Multiple Choice – 5 questions Answer in a Word/Sentence – 5 questions	 05 05
2.	Short Answer - 5 questions – either or type	5x7=35
3.	Long Answer - 3 questions – either or type	3x10=30

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics

Attainment of Course outcomes

Attainment of Course outcomes is computed using Direct and Indirect assessment methods. Direct Method of Assessment is based on performance of the students in the Continuous Internal Assessment Tests, Summative Examinations and supporting activities such as Seminar, Assignment, Case study, Group Discussion, Quiz, etc and Indirect Method of Assessment is based on periodical feedback from the students at the end of each course.

Weightage of Direct and Indirect Assessment in computation of attainment of each course is 70% for Direct Assessment and 30% for Indirect Assessment.

Direct Assessment of Course outcome attainment

i) **Rubrics**:

Internal Assessment contributes 60% and Summative Examinations Assessment contributes 40% to the Direct Assessment of a course outcome for Theory Courses. For the Practical Courses, Internal Assessment contributes 70% and Summative Examinations Assessment contributes 30% to the Direct Assessment of a course outcome.

ii) Setting of Target:

50% of the maximum mark is set as target of Internal Assessment tools and the average mark of the class is set as target of Summative Examinations Assessment.

Formula for calculating percentage attainment of each course outcome

Based on the result of Summative Examinations and Internal Assessment tools, the number of students scoring more than the target is found out.

For each Internal Assessment Tools,

$$\text{Percentage attainment of each course outcome} = \frac{\text{No. of. Students who scored more than the target in the concerned course outcome}}{\text{Total Number of Students}} \times 100$$

$$\text{Percentage attainment of each Course outcome for Internal Assessment tools} = \text{Average of percentage attainment of all Internal Assessment tools}$$

For Summative Examinations,

$$\text{Percentage attainment of each Course outcome} = \frac{\text{No. of. Students who scored more than the target in the concerned CO}}{\text{Total Number of Students}} \times 100$$

Formula for calculating Attainment Percentage of Course outcome of a course

Percentage Attainment of Course outcome for Internal Assessment tools	=	Average of percentage attainment of all COs
Percentage Attainment of Course outcome for Summative Examinations	=	Average of percentage attainment of all COs

Final Direct Assessment of Course outcome Attainment

For Theory Courses

Percentage Attainment of Course outcome through Direct Assessment	=	(0.6 x percentage attainment of CO for internal assessment tool) + (0.4 x percentage attainment of CO for summative examinations)

For Practical Courses

Percentage Attainment of Course outcome through Direct Assessment	=	0.7 x percentage attainment of CO for Internal Assessment tools + 0.3 x percentage attainment of CO for Summative Examinations

Indirect Assessment of CO Attainment

The course outcome feedback is conducted at the end of every semester by distributing structured feedback questionnaire to the students. The analysis of this feedback questionnaire is done on the following score. The feedback forms will be sorted with various scores and feedbacks with a score more than 5.5 are considered as satisfactory level for calculations for indirect attainment.

A : 10-8.5 **B :** 8.4-7.0 **C :** 6.9-5.5 **D :** 5.4-4.0 **E :** 3.9-0

$$\text{Percentage attainment for each CO} = \frac{\text{Satisfaction Number}}{\text{Response Received}} \times 100$$

Percentage Attainment of CO of a course = Average of percentage attainment of all COs

Final Assessment of CO attainment

Average course attainment = 0.7 x Direct assessment of CO attainment + 0.3 x Indirect assessment of CO attainment

Expected Level of Attainment for each of the Course Outcomes

Percentage of CO Attainment	Level of Attainment
= 70% and above	Excellent
= 60% - <70 %	Very good
= 50% -< 60 %	Good
= 40% - < 50 %	Satisfactory
Below 40%	Not Satisfactory

Assessment of PO Attainment

At the end of the each programme, the Direct PO Assessment is done from the CO Attainment of all courses. The Direct PO Attainment for a particular course is determined from the attainment values obtained for each course outcome related to that PO and the CO-PO mapping values.

$$\text{Weighted contribution of the course in attainment of each PO} = \frac{\text{Weighted Percentage of contribution of the course in attainment of each PO x average course attainment}}{100}$$

$$\text{Percentage attainment for each PO} = \frac{\text{Total weightage of all courses contributed to each PO}}{\text{Total weightage of all courses contributed to all PO s}} \times 100 \text{ x weighted contribution of the course in the attainment of each PO}$$

Percentage Attainment of PO = Average of Percentage attainment of all POs

Expected Level of Attainment for each of the Programme Outcomes

Percentage of PO Attainment	Level of Attainment
= 70% and above	Excellent
= 60% - <70 %	Very good
= 50% -< 60 %	Good
= 40% - < 50 %	Satisfactory
Below 40%	Not Satisfactory

Attainment of Programme Educational Objectives (PEO)

PEOs are assessed after 3 to 4 years of graduation. Attainment is measured based on the Feedback from Stakeholders

1. Alumni
2. Parents
3. Employer

The analysis of this feedback questionnaire is done on the following score. The feedback forms will be sorted with various scores and feedbacks with a score more than 5.5 are considered as satisfactory level for calculations for Indirect Attainment.

A : 10-8.5 **B :** 8.4-7.0 **C :** 6.9-5.5 **D :** 5.4-4.0 **E :** 3.9-0

$$\text{Percentage attainment of PEOs} = \frac{\text{Satisfaction number}}{\text{Response Received}} \times 100$$

Expected Level of Attainment for each of the Programme Educational Objectives

Percentage of PEO Attainment	**Level of Attainment**
= 70% and above	Excellent
= 60% - <70 %	Very good
= 50% -< 60 %	Good
= 40% - < 50 %	Satisfactory
Below 40%	Not Satisfactory

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DEPARTMENT OF MATHEMATICS

PG Programme - M.Sc. Mathematics

CURRICULUM STRUCTURE

OUTCOME-BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM

(From 2023-2024 Batch onwards)

Courses	**Sem I**	**Sem II**	**Sem III**	**Sem IV**	**Credits**
Core Courses	7 (5) 7 (5) 6 (4)	6 (5) 6 (5) 6 (4)	6 (5) 6 (5) 6 (5) 6 (4)	6 (5) 6 (5)	57
Project with Viva Voce	-	-	-	10(7)	7
Elective Courses	5(3) 5(3)	4(3) 4(3) 4(2)(NME)	3(3) 3(2)(NME)	4(3)	22
Skill Enhancement Course/ Professional Competency Course	-	-	-	4(2)	2
Internship/ Industrial Training	-	-	(2)	-	2
Extension Activity	-	-	-	(1)	1
Total Hours(Per week)/Credits	30(20)	30(22)	30(26)	30(23)	91 120

Self-paced Learning (Swayam Course)	-	-	2 Credits	-	2 Credits

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DEPARTMENT OF MATHEMATICS

PG Programme - M.Sc. Mathematics

CURRICULUM PATTERN

OUTCOME-BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM

(From 2023-2024 Batch onwards)

PROGRAMME CODE – PMA

Semester	Course Code	Course Name	Hours	Credits	Internal Marks	External Marks
I	23PMAC11	**Core Course –I:** Algebraic Structures	7	5	25	75
	23PMAC12	**Core Course –II:** Real Analysis I	7	5	25	75
	23PMAC13	**Core Course –III:** Ordinary Differential Equations	6	4	25	75
	23PMAO11 23PMAO12	**Elective Courses Generic/ Discipline Specific - I:** 1. Machine Learning and Artificial Intelligence 2. Graph Theory and Applications	5	3	25	75
	23PMAO13 23PMAO14	**Elective Courses Generic/ Discipline Specific - II:** 1. Fuzzy Sets and their Applications 2. Discrete Mathematics	5	3	25	75
		Total	**30**	**20**		
II	23PMAC21	**Core Course –IV:** Advanced Algebra	6	5	25	75
	23PMAC22	**Core Course –V:** Real Analysis II	6	5	25	75
	23PMAC23	**Core Course – VI:** Partial Differential Equations	6	4	25	75
	23PMAO21 23PMAO22	**Elective Courses Generic/ Discipline Specific - III:** 1. Mathematical Statistics 2. Financial Mathematics	4	3	25	75
	23PMAO23 23PMAO24	**Elective Courses Generic/ Discipline Specific - IV:** 1. Number Theory and Cryptography 2. Neural Networks	4	3	25	75
	23PMAN21	**Non-Major Elective Course I:** Statistics for Life Sciences	4	2	25	75
		Total	**30**	**22**		
	23PMAC31	**Core Course–VII:** Complex Analysis	6	5	25	75
	23PMAC32	**Core Course –VIII:** Probability Theory	6	5	25	75
	23PMAC33	**Core Course–IX:** Topology	6	5	25	75
	23PMAC34	**Core Course–X :** Mechanics	6	4	25	75
		Elective Courses Generic/ Discipline	3	3	25	75

III	23PMAO31 23PMAO32	**Specific - V:** 1. Algebraic Number Theory 2. Stochastic Processes				
	23PMAN31	**Non-Major Elective Course II:** Statistics for Social Sciences	3	2	25	75
	23PMAJ31	Internship/Industrial Activity	-	2	25	75
		Total	**30**	**26**		
IV	23PMAC41	**Core Course –XI:** Functional Analysis	6	5	25	75
	23PMAC42	**Core Course –XII:** Differential Geometry	6	5	25	75
	23PMAJ41	**Core Course –XIII:** Project with Viva Voce	10	7	25	75
	23PMAO41 23PMAO42	**Elective Courses Generic/ Discipline Specific - VI:** 1. Algebraic Topology 2. Resource Management Techniques	4	3	25	75
	23PMAS41	**Skill Enhancement Course**: **Professional Competency Course:** Training for Competitive Examinations	4	2	100	-
		Extension Activity	-	1	100	-
		Total	**30**	**23**		

SRI KALISWARI COLLEGE (AUTONOMOUS), Sivakasi
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
(From 2023-2024 Batch onwards)

PROGRAMME ARTICULATION MATRIX (PAM)

Semester	Course Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7
I	23PMAC11	**Core Course –I:** Algebraic Structures	15	13	9	8	1	5	3
	23PMAC12	**Core Course –II:** Real Analysis I	15	13	9	8	1	5	2
	23PMAC13	**Core Course –III:** Ordinary Differential Equations	15	14	8	5	1	5	4
	23PMAO11 23PMAO12	**Elective Courses Generic/ Discipline Specific - I:** 1. Machine Learning and Artificial Intelligence 2. Graph Theory and Applications	14	12	11	8	1	6	3
	23PMAO13 23PMAO14	**Elective Courses Generic/ Discipline Specific - II:** 1. Fuzzy Sets and their Applications 2. Discrete Mathematics	15	9	8	8	2	3	3
II	23PMAC21	**Core Course –IV:** Advanced Algebra	15	13	10	9	1	5	5
	23PMAC22	**Core Course –V:** Real Analysis II	15	10	8	5	1	3	3
	23PMAC23	**Core Course – VI:** Partial Differential Equations	15	14	10	7	2	5	4
	23PMAO21 23PMAO22	**Elective Courses Generic/ Discipline Specific - III:** 1. Mathematical Statistics 2. Financial Mathematics	15	13	8	7	3	5	3
	23PMAO23 23PMAO24	**Elective Courses Generic/ Discipline Specific - IV:** 1. Number Theory and Cryptography 2. Neural Networks	14	12	11	8	2	7	3
	23PMAN21	**Non-Major Elective Course I:** Statistics for Life Sciences	12	8	2	10	0	7	5
	23PMAC31	**Core Course–VII:** Complex Analysis	15	10	8	12	1	3	3

III	23PMAC32	**Core Course –VIII:** Probability Theory	15	9	7	5	2	4	5
	23PMAC33	**Core Course–IX:** Topology	15	13	8	8	1	3	3
	23PMAC34	**Core Course–X :** Mechanics	15	11	8	7	1	4	3
	23PMAO31 23PMAO32	**Elective Courses Generic/ Discipline Specific - V:** 1. Algebraic Number Theory 2. Stochastic Processes	15	9	8	8	1	3	3
	23PMAN31	**Non-Major Elective Course II:** Statistics for Social Sciences	12	8	2	10	0	7	5
	23PMAJ31	Internship/Industrial Activity	8	12	4	7	1	5	8
IV	23PMAC41	**Core Course –XI:** Functional Analysis	15	9	8	8	1	3	3
	23PMAC42	**Core Course –XII:** Differential Geometry	15	13	8	9	1	3	2
	23PMAJ41	**Core Course –XIII:** Project with Viva Voce	14	10	11	12	6	5	5
	23PMAO41 23PMAO42	**Elective Courses Generic/ Discipline Specific - VI:** 1. Algebraic Topology 2. Resource Management Techniques	14	11	10	9	3	4	4
	23PMAS41	**Skill Enhancement Course**: **Professional Competency Course:** Training for Competitive Examinations	10	14	5	5	0	10	7
		Extension Activity	8	2	1	7	9	8	5
Total Weightage of all courses contributing to PO			**331**	**262**	**182**	**190**	**42**	**118**	**94**

SRI KALISWARI COLLEGE (AUTONOMOUS), Sivakasi
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
(From 2023-2024 Batch onwards)

PROGRAMME ARTICULATION MATRIX – WEIGHTED PERCENTAGE

Semester	Course Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7
I	23PMAC11	**Core Course –I:** Algebraic Structures	4.53	4.96	4.95	4.21	2.38	4.24	3.19
	23PMAC12	**Core Course –II:** Real Analysis I	4.53	4.96	4.95	4.21	2.38	4.24	2.13
	23PMAC13	**Core Course –III:** Ordinary Differential Equations	4.53	5.34	4.4	2.63	2.38	4.24	4.26
	23PMAO11 23PMAO12	**Elective Courses Generic/ Discipline Specific - I:** 1. Machine Learning and Artificial Intelligence 2. Graph Theory and Applications	4.23	4.58	6.04	4.21	2.38	5.08	3.19
	23PMAO13 23PMAO14	**Elective Courses Generic/ Discipline Specific - II:** 1. Fuzzy Sets and their Applications 2. Discrete Mathematics	4.53	3.44	4.4	4.21	4.76	2.54	3.19
II	23PMAC21	**Core Course –IV:** Advanced Algebra	4.53	4.96	5.49	4.74	2.38	4.24	5.32
	23PMAC22	**Core Course –V:** Real Analysis II	4.53	3.82	4.4	2.63	2.38	2.54	3.19
	23PMAC23	**Core Course – VI:** Partial Differential Equations	4.53	5.34	5.49	3.68	4.76	4.24	4.26
	23PMAO21 23PMAO22	**Elective Courses Generic/ Discipline Specific - III:** 1. Mathematical Statistics 2. Financial Mathematics	4.53	4.96	4.4	3.68	7.14	4.24	3.19
	23PMAO23 23PMAO24	**Elective Courses Generic/ Discipline Specific - IV:** 1. Number Theory and Cryptography 2. Neural Networks	4.23	4.58	6.04	4.21	4.76	5.93	3.19
	23PMAN21	**Non-Major Elective Course I:** Statistics for Life Sciences	3.63	3.05	1.1	5.26	0	5.93	5.32
	23PMAC31	**Core Course–VII:** Complex Analysis	4.53	3.82	4.4	6.32	2.38	2.54	3.19

III	23PMAC32	**Core Course –VIII:** Probability Theory	4.53	3.44	3.85	2.63	4.76	3.39	5.32
	23PMAC33	**Core Course–IX:** Topology	4.53	4.96	4.4	4.21	2.38	2.54	3.19
	23PMAC34	**Core Course–X :** Mechanics	4.53	4.2	4.4	3.68	2.38	3.39	3.19
	23PMAO31 23PMAO32	**Elective Courses Generic/ Discipline Specific - V:** 1. Algebraic Number Theory 2. Stochastic Processes	4.53	3.44	4.4	4.21	2.38	2.54	3.19
	23PMAN31	**Non-Major Elective Course II:** Statistics for Social Sciences	3.63	3.05	1.1	5.26	0	5.93	5.32
	23PMAJ31	Internship/Industrial Activity	2.42	4.58	2.2	3.68	2.38	4.24	8.51
IV	23PMAC41	**Core Course –XI:** Functional Analysis	4.53	3.44	4.4	4.21	2.38	2.54	3.19
	23PMAC42	**Core Course –XII:** Differential Geometry	4.53	4.96	4.4	4.74	2.38	2.54	2.13
	23PMAJ41	**Core Course –XIII:** Project with Viva Voce	4.23	3.82	6.04	6.32	14.29	4.24	5.32
	23PMAO41 23PMAO42	**Elective Courses Generic/ Discipline Specific - VI:** 1. Algebraic Topology 2. Resource Management Techniques	4.23	4.2	5.49	4.74	7.14	3.39	4.26
	23PMAS41	**Skill Enhancement Course**: **Professional Competency Course:** Training for Competitive Examinations	3.02	5.34	2.75	2.63	0	8.47	7.45
		Extension Activity	2.42	0.76	0.55	3.68	21.43	6.78	5.32
Total Weighted Percentage of Course Contribution to Pos			**100**	**100**	**100**	**100**	**100**	**100**	**100**

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme- M.Sc. Mathematics
SEMESTER- I
CORE COURSE –I: ALGEBRAIC STRUCTURES (23PMAC11)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 7 (L-6, T-1) **INT. MARKS : 25**
CREDITS : 5 **EXT. MARKS : 75**
DURATION : 105 hrs **MAX. MARKS: 100**

Course Objective

- To develop working knowledge on class equation, solvability of groups, finite abelian groups, linear transformations, real quadratic forms.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the fundamental theorems related to counting principles, solvable groups, modules and linear transformation

CO2[K2]: explain the basic concepts of Sylow's theorem, solvable groups, canonical forms of linear transformations

CO3[K3]: apply the abstract concepts to produce proofs of results that arise in the context of algebraic structures

CO4[K4]: investigate the counting principle, structure of module, various canonical forms and types of linear transformations

CO5[K5]: determine the class equation for finite groups, solvability of groups, similarity of linear transformations by reducing them to canonical forms, trace and transpose, real quadratic forms of linear transformations

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	1	-	1	-
CO2[K2]	3	2	2	1	-	1	-
CO3[K3]	3	3	2	2	1	1	-
CO4[K4]	3	3	2	2	-	1	1
CO5[K5]	3	3	2	2	-	1	2
Weightage of the course	15	13	09	08	01	05	03
Weighted percentage	4.53	4.96	4.95	4.21	2.38	4.24	3.19

of Course contribution to Pos							

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(21 hrs)**

Another Counting Principle - Class equation for finite groups and its applications - Sylow'stheorems (For theorem 2.12.1 first proof only).

Chapter 2: Sections 2.11, 2.12 (Omit Lemma 2.12.5)

UNIT II **(21hrs)**

Solvable groups - Direct products - Finite abelian groups - Modules.

Chapter 5: Section 5.7 (Lemma 5.7.1, 5.7.2; Theorem 5.7.1)
Chapter 2: Sections 2.13 and 2.14(Theorem 2.14.1 only);
Chapter 4: Section 4.5

UNIT III **(21hrs)**

Linear Transformations: Canonical forms – Triangular form – Nilpotent transformations.

Chapter 6: Sections 6.4, 6.5

UNIT IV **(21hrs)**

Jordan form - Rational Canonical form.

Chapter 6: Sections 6.6 and 6.7

UNIT V **(21 hrs)**

Trace and transpose - Hermitian, Unitary, Normal Transformations, Real Quadratic form.

Chapter 6: Sections 6.8, 6.10 and 6.11 (Omit 6.9)

TEXTBOOK

1. I. N. Herstein. *Topics in Algebra*, Second edition, New Delhi: Wiley Eastern Limited, 1975.

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1. M. Artin. *Algebra.* Prentice Hall of India, 1991.
2. P. B. Bhattacharya, S.K. Jain and S.R. Nagpaul. *Basic Abstract Algebra.* Cambridge University Press, 1997.
3. I. S. Luther, I.B.S. Passi. *Algebra,* Vol. I –Groups (1996); Vol. II Rings. New Delhi: Narosa Publishing House, 1999.
4. D.S. Malik, J.N. Mordeson and M.K. Sen. *Fundamental of Abstract Algebra*. New York: McGraw Hill (International Edition), 1997.

5. N. Jacobson. *Basic Algebra,* Vol. I & II. W.H. Freeman. New Delhi: Hindustan Publishing Company, 1980.

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2. http://ocw.mit.edu/ocwweb/Mathematics
3. http://www.opensource.org
4. www.algebra.com

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER- I
CORE COURSE –II: REAL ANALYSIS I (23PMAC12)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 7 (L-6, T-1) **INT. MARKS : 25**
CREDITS : 5 **EXT. MARKS : 75**
DURATION : 105 hrs **MAX. MARKS: 100**

Course Objective

- To study functions of bounded variation, Riemann-Stieltjes Integration, convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the basic terminologies of real number system

CO2[K2]: explain the concept of total variation, Riemann- Steiltjes integral, infinite series, infinite functions and sequence of functions

CO3[K3]: apply the abstract concepts to produce proofs of results that arise in the context of real analysis

CO4[K4]: examine the criterion for the existence of Riemann integrals, convergence of infinite series and sequence of functions

CO5[K5]: determine the total variation and Riemann integrals of bounded variation functions, sum of infinite series and limit of sequence functions

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	1	-	1	-
CO2[K2]	3	2	2	1	-	1	-
CO3[K3]	3	3	2	2	1	1	-
CO4[K4]	3	3	2	2	-	1	1
CO5[K5]	3	3	2	2	-	1	1
Weightage of the course	15	13	09	08	01	05	02
Weighted percentage of Course contribution	4.53	4.96	4.95	4.21	2.38	4.24	2.13

to Pos							

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(21hrs)**

Functions of bounded variation: Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on [a, x] as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation.

Chapter 6: Sections 6.1 – 6.8.

UNIT II **(21 hrs)**

The Riemann - Stieltjes Integral: Introduction - Notation - The definition of the Riemann - Stieltjes integral - Linear Properties - Integration by parts- Change of variable in a Riemann - Stieltjes integral - Reduction to a Riemann Integral – Euler's summation formula - Monotonically increasing integrators, Upper and lower integrals - Additive and linearity properties of upper, lower integrals - Riemann's condition - Comparison theorems.

Chapter 7: sections 7.1 – 7.7, 7.10 – 7.14

UNIT III **(21 hrs)**

The Riemann-Stieltjes Integral - Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes integrals-Necessary conditions for the existence of Riemann-Stieltjes integrals- Mean value theorems -Integrals as a function of the interval – Second fundamental theorem of integral calculus-Change of variable -Second Mean Value Theorem for Riemann integral- Riemann-Stieltjes integrals depending on a parameter- Differentiation under integral sign-Lebesgue criterion for existence of Riemann integrals.

Chapter 7: sections 7.15 – 7.24; 7.26

UNIT IV **(21 hrs)**

Infinite Series and infinite Products: Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series.- Double sequences - Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series – Cesarosummability - Infinite products.

Chapter 8: sections 8.8, 8.15, 8.17, 8.18, 8.20 – 8.26

UNIT V **(21 hrs)**

Sequences of Functions: Pointwise convergence of sequences of functions - Examples of sequences of real - valued functions - Uniform convergence and continuity - Cauchy condition for uniform convergence - Uniform convergence of infinite series of functions - Uniform convergence and Riemann - Stieltjes integration – Non-uniform

Convergence and Term-by-term Integration - Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series - Mean convergence - Power series - Multiplication of power series - The Taylor's series generated by a function - Bernstein's theorem - Abel's limit theorem - Tauber's theorem.

Chapter 9: sections 9.1 - 9.23, (Omit 9.7, 9.12, 9.16 -9.18, 9.21)

TEXTBOOK

1. Tom M. Apostol. *Mathematical Analysis. New York:* Addison-Wesley Publishing Company Inc, 1974.

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1. R.G. Bartle.*Real Analysis*. John Wiley and Sons Inc., 1976.
2. W. Rudin. *Principles of Mathematical Analysis*. NewYork: McGraw Hill Company, 1976.
3. S,C. Malik and Savita Arora. *Mathematical Analysis.* New Delhi: Wiley Eastern Limited, 1991.
4. Sanjay Arora and BansiLal. *Introduction to Real Analysis.* New Delhi: Satya Prakashan, 1991.
5. B.R. Gelbaum and J. Olmsted. *Counter Examples in Analysis.*San Francisco: Holdenday, 1964.
6. A.L. Gupta and N.R. Gupta. *Principles of Real Analysis.* Pearson Education, 2003.

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3. http://www.opensource.org
4. www.mathpages.com

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER- I
CORE COURSE –III: ORDINARY DIFFERENTIAL EQUATIONS (23PMAC13)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6 (L-5, T-1) **INT. MARKS : 25**
CREDITS : 4 **EXT. MARKS : 75**
DURATION : 90 hrs **MAX. MARKS: 100**

Course Objectives

- To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points.
- To study existence and uniqueness of the solutions of first order differential equations

.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: state the general form of linear ordinary differential equations of first order, second order and the method of finding solutions

CO2[K2]: find the solution of initial value problem

CO3[K3]: solve linear ordinary differential equations with constant coefficients, variable coefficients and with regular singular points

CO4[K4]: examine the existence and uniqueness of solutions of linear ordinary differential equations

CO5[K5]: determine an appropriate method to solve, linear ordinary differential equations

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	1	-	1	-
CO2[K2]	3	3	1	1	-	1	1
CO3[K3]	3	3	2	1	-	1	1
CO4[K4]	3	3	2	1	-	1	1
CO5[K5]	3	3	2	1	1	1	1
Weightage of the course	15	14	08	01	01	05	04

Weighted percentage of Course contribution to POs	4.53	5.34	4.4	2.63	2.38	4.24	4.26

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(18hrs)**

Linear Equations with Constant Coefficients: Second order Homogeneous Equations - Initial Value Problems - Linear Dependence and Independence - Wronskian and a Formula for Wronskian - Non-homogeneous Equation of Order Two.

Chapter 2: Sections 1 - 6

UNIT II **(18hrs)**

Linear Equations with Constant Coefficients: Homogeneous and Non-Homogeneous Equation of Order n – Initial Value Problems - Annihilator Method to Solve Non-homogeneous Equation - Algebra of Constant Coefficient Operators.

Chapter 2: Sections 7 - 12.

UNIT III **(18hrs)**

Linear Equation with Variable Coefficients: Initial Value Problems - Existence and Uniqueness Theorems – Solutions to Solve a Non-homogeneous Equation – Wronskian and Linear Dependence – Reduction of the Order of a Homogeneous Equation – Homogeneous Equation with Analytic Coefficients - The Legendre Equation.

Chapter 3: Sections 1 - 8 (Omit section 9)

UNIT IV **(18hrs)**

Linear Equation with Regular Singular Points: Euler Equation – Second Order Equations with Regular Singular Points – Exceptional Cases – Bessel Function.

Chapter 4: Sections 1 - 4 and 6 - 8 (Omit section 5 and 9)

UNIT V **(18hrs)**

Existence and Uniqueness of Solutions to First Order Equations: Equation with Variable Separated – Exact Equation – Method of Successive Approximations – The Lipschitz Condition – Convergence of the Successive Approximations and the Existence Theorem.

Chapter 5: Sections 1 - 6 (Omit Sections 7 - 9)

TEXTBOOK

1. Coddington E. A. *A Introduction to Ordinary Differential Equations*, New Delhi: Prentice-Hall of India Ltd, 1987.

REFERENCES

Books

1. Williams E. Boyce and Richard C. DI Prima. *Elementary Differential Equations and Boundary Value Problems*. New York: John Wiley and sons, 1967.
2. George F Simmons. *Differential equations with applications and historical notes.* New York: Tata McGraw Hill, 1974.
3. N.N. Lebedev. *Special functions and their applications*. New Delhi: Prentice Hall of India, 1965.
4. W.T. Reid. *Ordinary Differential Equations*, New York: John Wiley and Sons, 1971.
5. M.D. Raisinghania. *Advanced Differential Equations*. New Delhi: S. Chand & Company Ltd, 2001.
6. B. Rai, D.P. Choudary and H.I. Freedman. *A Course in Ordinary Differential Equations,* New Delhi: Narosa Publishing House, 2002.

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2. http://ocw.mit.edu/ocwweb/Mathematics

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - I
ELECTIVE COURSE GENERIC /DISCIPLINE SPECIFIC -I: MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE (23PMAO11)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 5(L-4, T-1) **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 75 hrs **MAX. MARKS: 100**

Course Objective

- To introduce the preliminary concepts of machine learning and artificial intelligence

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the fundamental understanding of the history of artificial intelligence and its foundations

CO2[K2]: explain various techniques and algorithms of artificial intelligence used in general problem solving

CO3[K3]: apply basic principles of artificial intelligence in finding solution of business problem

CO4[K4]: demonstrate proficiency in applying scientific method to models of machine learning

CO5[K5]: choose a model that best fits the available data

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	2	2	1	-	-	-
CO2[K2]	3	2	2	2	-	-	-
CO3[K3]	3	2	2	1	1	2	1
CO4[K4]	3	3	2	2	-	2	1
CO5[K5]	3	3	3	2	-	2	1
Weightage of the course	14	12	11	08	01	06	03

Weighted percentage of Course contribution to POs	4.23	4.58	6.04	4.21	2.38	5.08	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(15 hrs)**

AI Foundations, Alan Turing and the Turing Test, Strong AI, Weak AI, Golden Age of AI, Technological Drivers of Modern AI, Structure of AI.

UNIT II **(15 hrs)**

Data - The Fuel for AI, Data Basics, Types of Data, Big Data, Volume, Variety and Velocity of Data, Databases and Other Tools, Data Process, Business Understanding, Data Understanding, Data Preparation, Ethics and Governance, How Much Data Do You Need for AI?, More Data Terms and Concepts.

UNIT III **(15 hrs)**

Machine Learning - Mining Insights from Data, What Can You Do with Machine Learning?, The Machine Learning Process - Data Order, Choose a Model, Train the Model, Evaluate the Model, Fine-Tune the Model, Applying Algorithms, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Semi-supervised Learning.

UNIT IV **(15 hrs)**

Common Types of Machine Learning Algorithms, General Framework for Machine Learning Algorithms, Naïve Bayes Classifier, K-Nearest Neighbour, Linear Regression, Decision Tree, Ensemble Modelling, K-Means Clustering.

UNIT V **(15 hrs)**

Deep Learning - Difference Between Deep Learning and Machine Learning, What is Deep Learning, The Brain and Deep Learning, Artificial Neural Networks, Back Propagation, The Various Neural Networks - RNN, CNN, GANs, Deep Learning Applications.

TEXTBOOK

1. Tom Taulli, Artificial Intelligence Basics: A Non-Technical Introduction, Apress

REFERENCES

Books

1. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Pearson Education, 2007.
2. Kevin Night, Elaine Rich, and Nair B., Artificial Intelligence, McGraw Hill, 2008.
3. Tom Mitchell, Machine Learning, McGraw Hill, 3rd Edition,1997.

4. Charu C. Aggarwal, Data Classification Algorithms and Applications, CRC Press, 2014.

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2. https://monkeylearn.com/machinelearning/#:~:text=Machine%20learning%20(ML)%20is%20a,to%20make%20their%20own%20predictions.

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - I
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC –I: GRAPH THEORY AND APPLICATIONS (23PMAO12)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 5 (L-4, T-1) **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 75 hrs **MAX. MARKS: 100**

Course Objectives

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

Course Outcomes (CO)

On successful completion of the course, the learners willbe able to
CO1[K1]: describe the basic definitions and concepts of graph theory
CO2[K2]: find the solution of graph theoretical model using the given algorithm
CO3[K3]: apply the abstract concepts to produce proofs of results that arise in the context of graph theory
CO4[K4]: investigate the characteristic features of various types of graphs
CO5[K5]: determine the efficient algorithm to solve graph optimisation problems

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	2	2	1	-	-	-
CO2[K2]	3	2	2	2	-	-	-
CO3[K3]	3	2	2	1	1	2	1
CO4[K4]	3	3	2	2	-	2	1
CO5[K5]	3	3	3	2	-	2	1
Weightage of the course	14	12	11	08	01	06	03
Weighted percentage of Course contribution to POs	4.23	4.58	6.04	4.21	2.38	5.08	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(15 hrs)**

Trees: Trees – Cut Edges and Bonds – Cut Vertices – Cayley's Formula – Applications: The Connector Problem. **Connectivity:** Connectivity – Blocks – Applications: Construction of Reliable Communication Networks.

Chapter 2: Sections 2.1 - 2.5

Chapter 3: Sections 3.1 - 3.3

UNIT II **(15 hrs)**

Euler Tours and Hamiltonian Cycles: Euler Tours – Hamiltonian Cycles – Applications: The Chinese Postman Problem – The Travelling Salesman Problem.

Chapter 4: Sections 4.1- 4.4

UNIT III **(15 hrs)**

Matchings: Matchings – Matchings and Coverings in Bipartite Graphs – Perfect Matchings – Applications: The Personnel Assignment Problem – The Optimal Assignment Problem.

Chapter 5: Sections 5.1 - 5.5

UNIT IV **(15 hrs)**

Vertex Colourings: Chromatic Number – Brook's Theorem – Hajos' Conjecture – Chromatic Polynomials – Girth and Chromatic Number – Applications: A Storage Problem.

Chapter 8: Sections 8.1- 8.6

UNIT V **(15 hrs)**

Planar Graphs: Plane and Planar Graphs – Dual Graphs – Euler's Formula – Applications: A Planarity Algorithm. **Directed Graphs:** Directed Graphs – Directed Paths – Directed Cycles – Applications: A Job Sequencing Problem.

Chapter 9: Sections 9.1- 9.3, 9.8

Chapter 10: Sections 10.1 – 10.4

TEXTBOOK

1. Bondy, J.A. and Murty, U.S.R. *Graph theory with Applications.* Great Britain: The Macmillan press Ltd, 1982.

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1. John Clark and Derek Allan Holton. *A First Look at Graph Theory.* Bombay: Allied Publishers Limited, 1995.
2. NarsinghDeo. *Graph Theory with Applications to Engineering and Computer Science.* Printice-Hall, Inc.
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SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - I
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC –II: FUZZY SETS AND THEIR APPLICATIONS (23PMAO13)
(From 2023-2024 Batch onwards)

HOURS/WEEK : 5 (L-4, T-1) **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 75 hrs **MAX. MARKS: 100**

Course Objectives

- To introduce the concept of uncertainty and fuzziness in logic.
- To study fuzzy arithmetic, fuzzy relations and construction of fuzzy sets.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to
CO1[K1]: state the basic definitions and terminologies of fuzzy set theory
CO2[K2]: explain the fundamental concepts in fuzzy set theory
CO3[K3]: apply the abstract concepts to produce proofs of results that arise in the context of fuzzy set theory
CO4[K4]: investigate the different classes of fuzzy relations, operations on fuzzy sets and fuzzy numbers
CO5[K5]: validate the axioms, assumptions, beliefs, arguments, deductions, hypothesis concerning fuzzy sets, fuzzy relations, fuzzy arithmetic

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	1	1	1	1	-	-
CO2[K2]	3	2	1	1	1	-	-
CO3[K3]	3	2	2	2	-	1	1
CO4[K4]	3	2	2	2	-	1	1
CO5[K5]	3	2	2	2	-	1	1
Weightage of the course	15	09	08	08	02	03	03
Weighted percentage of Course contribution to POs	4.53	3.44	4.4	4.21	4.76	2.54	3.19

Based on the level of contribution('3'-High, '2'-Medium, '1'-Low ,'-' No Correlation)

UNIT I **(15 hrs)**

From Ordinary (Crisp) Sets to Fuzzy Sets: A Grand Paradigm Shift: Introduction – Crisp Sets: An Overview – Fuzzy Sets: Basic Types – Fuzzy Sets: Basic Concepts. **Fuzzy Sets Versus Crisp Sets:** Additional Properties of α-Cuts.

Chapter 1: Sections 1.1 – 1.4
Chapter 2: Section 2.1

UNIT II **(15 hrs)**

Representations of Fuzzy Sets – Extension Principle for Fuzzy Sets. **Operations on Fuzzy Sets:** Types of Operations – Fuzzy Complements – Fuzzy Intersections: t-Norms – Fuzzy Unions: t-Conorms.

Chapter 2: Sections 2.2, 2.3
Chapter 3: Sections 3.1 – 3.4

UNIT III **(15 hrs)**

Combinations of Operations. **Fuzzy Arithmetic:** Fuzzy Numbers – Linguistic Variables – Arithmetic Operations on Intervals – Arithmetic Operations on Fuzzy Numbers.

Chapter 3: Section 3.5
Chapter 4: Sections 4.1 – 4.4

UNIT IV **(15 hrs)**

Lattice of Fuzzy Numbers – Fuzzy Equations. **Fuzzy Relations:** Crisp and Fuzzy Relations – Projections and Cylindric Extensions.

Chapter 4: Sections 4.5, 4.6
Chapter 5: Sections 5.1, 5.2

UNIT V **(15 hrs)**

Binary Fuzzy Relations – Binary Relations on a Single Set – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Ordering Relations – Fuzzy Morphisms.

Chapter 5: Sections 5.3 - 5.8

TEXTBOOK

1. Klir, George J. and Bo Yuan. *Fuzzy Sets & Fuzzy Logic*. Chennai: Pearson India Education Services Private Limited, 2016.

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

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2. https://www.google.com/url?sa=t&source=web&rct=j&url=http://osp.mans.edu.eg/elbeltagi/AI%2520FuzzyRelations.pdf&ved=2ahUKEwjM15Tn4q_vAhVZOSsKHSurD18QFjABegQIGBAC&usg=AOvVaw17H5aSGE4I_b502gp14X6T
3. https://www.google.com/url?sa=t&source=web&rct=j&url=https://link.springer.com/content/pdf/10.1007/978-3-540-76290-4_10.pdf&ved=2ahUKEwjxnfGs46_vAhVNlEsFHSF9ApgQFjACegQIBxAC&usg=AOvVaw024xB7Nde1gWbgXiw-wkSO
4. https://youtu.be/H9SikB7HbSU
5. https://youtu.be/n9eNXs76VVM

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - I
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC –II: DISCRETE MATHEMATICS
(23PMAO14)
(From 2023-2024 Batch onwards)

HOURS/WEEK : 5 (L-4, T-1) **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 75 hrs **MAX. MARKS: 100**

Course Objectives

- To understand the mathematical concepts like inference theory, predictive calculus, switching circuits and computability theory.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the basic terminologies in inference theory, predictive calculus, precedence grammar, switching circuits and computability theory

CO2[K2]: explain the rules, procedures, algorithms related to inference theory, predictive calculus, precedence grammar, switching circuits and computability theory

CO3[K3]: solve problems related to inference theory, predictive calculus, switching circuits and computability theory

CO4[K4]: investigate the properties of logical statements, precedence relations, acceptors and grammars

CO5[K5]: validate the rules of inference, formulas involving quantifiers, algorithm for simple precedence grammars and fault detection

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	1	1	1	1	-	-
CO2[K2]	3	2	1	1	1	-	-
CO3[K3]	3	2	2	2	-	1	1
CO4[K4]	3	2	2	2	-	1	1
CO5[K5]	3	2	2	2	-	1	1
Weightage of the course	15	09	08	08	02	03	03

Weighted percentage of Course contribution to POs	4.53	3.44	4.4	4.21	4.76	2.54	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low ,'-' No Correlation)

UNIT I **(15 hrs)**

The Theory of Inference for Statement Calculus: Validity using Truth Tables – Rules of Inference – Consistency of Premises and Indirect Method of Proof – Automatic Theorem Proving. The Predictive Calculus: Predicates – The Statement Function, Variables and Quantifiers – Predicate Formulas – Free and Bounded Variables – The Universe of Discourse.

Chapter 1: Sections 1.4 – 1.5

UNIT II **(15 hrs)**

Inference Theory of the Predicate Calculus: Valid Formulas and Equivalences – Some Valid Formulas over Finite Universes – Special Valid Formulas Involving Quantifiers – Theory of Inference for the Predicate Calculus – Formulas Involving More than One Quantifier.

Chapter 1: Section 1.6

UNIT III **(15 hrs)**

Simple Precedence Grammars: Syntax Terminology – A View of Parsing – Notation and Use of Precedence Relations – Formal Definition of Precedence Relations – Parsing Algorithm for Simple Precedence Grammars.

Chapter 5: Section 5.3

UNIT IV **(15 hrs)**

Fault Detection in Combinatorial Switching Circuits: Faults in Combinatorial Circuits – Notation of Fault Detection – Algorithm for Generating a Fault Matrix – Procedure for the Detection of Faults - PERT and related Techniques.

Chapter 5: Sections 5.4, 5.5

UNIT V **(15 hrs)**

Introduction to Computability Theory: Introduction – Finite-state Acceptors and Regular Grammars – Turning Machines and Partial Recursive Functions.

Chapter 6: Sections 6.1, 6.2

TEXTBOOK

1. Trumbly, J.P. and Monohar, R. *Discrete Mathematical Structure and its Application to Computer Science*. New Delhi: Tata McGraw Hills Publishing Company Private Limited, 2008.

REFERENCES

Books

1. Kenneth H Rosan. *Discrete Mathematics and its Applications*. New York: WCB/McGraw Hill Educations, 7th Edition, 2008.
2. Liu, C.L. *Elements of Discrete Mathematics*. Tata McGraw-Hill Publishing Company Limited.

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2. https://nptel.ac.in/courses/106/106/106106094
3. https://doc.lagout.org/science/0_Computer%20Science/3_Theory/Mathema tics/Handbook%20Of%20Discrete%20And%20Combinatorial%20Mathemat ics.pdf

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER- II
CORE COURSE –IV: ADVANCED ALGEBRA (23PMAC21)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6 (L-5, T-1) **INT. MARKS : 25**
CREDITS : 5 **EXT. MARKS: 75**
DURATION : 90hrs **MAX. MARKS: 100**

Course Objectives

- To study field extension, roots of polynomials, Galois Theory, finite fields, solvability by radicals
- To develop computational skill in abstract algebra.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the fundamental elements of extension fields and finite fields
CO2[K2]: explain the basic concepts of extension fields and finite fields
CO3[K3]: apply mathematical/ logical argument for proving criterions and characterizations of field theory and Galois Theory
CO4[K4]: examine the characterizations of extension fields, finite fields, roots of polynomials and Galois group
CO5[K5]: determine the extension of fields, solvability of groups, irreducibility of polynomials and Galois group of polynomials

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	1	-	-	-
CO2[K2]	3	2	1	2	-	-	-
CO3[K3]	3	3	2	2	1	1	1
CO4[K4]	3	3	3	2	-	2	2
CO5[K5]	3	3	3	2	-	2	2
Weightage of the course	15	13	10	09	01	05	05
Weighted percentage of Course contribution to POs	4.53	4.96	5.49	4.74	2.38	4.24	5.32

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(18hrs)**

Extension fields – Transcendence of e.

Chapter 5: Sections 5.1 and 5.2

UNIT II **(18hrs)**

Roots or Polynomials.- More about roots.

Chapter 5: Sections 5.3 and 5.5

UNIT III **(18hrs)**

Elements of Galois theory - Solvability by radicals.

Chapter 5 : Section 5.6

Chapter 5: Section 5.7 (omit Lemma 5.7.1, Lemma 5.7.2 and Theorem 5.7.1)

UNIT IV **(18hrs)**

Finite fields - Wedderburn's theorem on finite division rings.

Chapter 7: Sections 7.1 and 7.2 (Theorem 7.2.1 only)

UNIT V **(18 hrs)**

A theorem of Frobenius - Integral Quaternions and the Four - Square theorem.

Chapter 7: Sections 7.3 and 7.4

TEXTBOOK

1. HersteinI. N, *Topics in Algebra*, *second edition*. New Delhi: Wiley Eastern Limited, 1975.

REFERENCES

Books

1. M. Artin. *Algebra.* Prentice Hall of India, 1991.
2. P.B. Bhattacharya,S.K. Jain and S.R. Nagpaul.*Basic Abstract Algebra*. Cambridge University Press, 1997.
3. I.S. Luther and I.B.S. Passi. *Algebra,* Vol. I –Groups(1996); Vol. II Rings, Narosa Publishing House , New Delhi, 1999.
4. D.S. Malik, J.N. Mordeson and M.K. Sen.*Fundamental of Abstract Algebra*. New York: McGraw Hill (International Edition), 1997.
5. N. Jacobson. *Basic Algebra,* Vol. I & II. W.H. Freeman. New Delhi: Hindustan Publishing Company, 1980.

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1. http://mathforum.org
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3. http://www.opensource.org
4. www.algebra.com

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER- II
CORE COURSE -V: REAL ANALYSIS II (23PMAC22)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6 (L-5, T-1) **INT. MARKS : 25**
CREDITS : 5 **EXT. MARKS: 75**
DURATION : 90hrs **MAX. MARKS: 100**

Course Objectives

- To introduce measure on the real line, Lebesgue measurability and integrability, Fourier Series and Integrals.
- To provide in-depth study in multivariable calculus.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the basic terminologies in measure theory, integration of functions of a real variable, Fourier integrals, Multivariable differential calculus, extremum problems

CO2[K2]: explain the fundamental concepts of measure on the real line, integration of functions of a real variable, Fourier integrals, multivariable differential calculus, extremum problems

CO3[K3]: apply the abstract concepts to produce proofs of results that arise in the context of measure theory, integration and differentiation of functions of a real valued functions

CO4[K4]: characterize measures on real line, Riemann and Lebesgue integrals, Fourier series and Fourier integrals, derivative of multivariable functions, implicit functions

CO5[K5]: determine the measurability and integrability of functions, the convergence of Fourier series, Differentiability of multivariable functions, extrema of real valued functions of severable variables

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	1	1	1	-	-	-
CO2[K2]	3	1	1	1	-	-	-
CO3[K3]	3	2	2	1	1	1	1
CO4[K4]	3	3	2	1	-	1	1
CO5[K5]	3	3	2	1	-	1	1

Weightage of the course	15	10	08	05	01	03	04
Weighted percentage of Course contribution to POs	4.53	3.82	4.4	2.63	2.38	2.54	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(18hrs)**

Measure on the Real line - Lebesgue Outer Measure - Measurable sets - Regularity - Measurable Functions - Borel and Lebesgue Measurability.

Text Book 1: Chapter - 2 Sections 2.1 - 2.5

UNIT II **(18 hrs)**

Integration of Functions of a Real variable - Integration of Non- negative functions - The General Integral - Riemann and Lebesgue Integrals.

Text Book 1: Chapter - 3 Sections 3.1,3.2 and 3.4

UNIT III **(18 hrs)**

Fourier Series and Fourier Integrals - Introduction - Orthogonal system of functions - The theorem on best approximation - The Fourier series of a function relative to an orthonormal system - Properties of Fourier Coefficients - The Riesz-Fischer Thorem - The convergence and representation problems in for trigonometric series - The Riemann - Lebesgue Lemma - The Dirichlet Integrals - An integral representation for the partial sums of Fourier series - Riemann's localization theorem - Sufficient conditions for convergence of a Fourier series at a particular point –Cesarosummability of Fourier series- Consequences of Fejes's theorem - The Weierstrass approximation theorem

Text Book 2: Chapter 11: Sections 11.1 - 11.11

UNIT IV **(18 hrs)**

Multivariable Differential Calculus - Introduction - The Directional derivative - Directional derivative and continuity - The total derivative - The total derivative expressed in terms of partial derivatives - The matrix of linear function - The Jacobian matrix - The chain rule - Matrix form of chain rule - The mean - value theorem for differentiable functions - A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives - Taylor's theorem for functions of R^n to R^1.

Text Book 2: Chapter 12: Sections 12.1 - 12.12

UNIT V **(18 hrs)**

Implicit Functions and ExtremumProblems : Functions with non-zero Jacobian determinants – The inverse function theorem - The Implicit function theorem - Extrema of real valued functions of severable variables - Extremum problems with side conditions.

Text Book 2: Chapter 13: Sections 13.1 - 13.7

TEXTBOOKS

1. G. De Barra. *Measure Theory and Integration.*New Delhi: Wiley Eastern Ltd, 1981. **(Units I and II)**
2. Tom M.Apostol.*MathematicalAnalysis.*New York: Addison-Wesley Publishing Company Inc, 1974. **(Units III, IV and V)**

REFERENCES

Books

1. J.C. Burkill.*The Lebesgue Integral*. Cambridge University Press, 1951.
2. M.E. Munroe.*Measure and Integration*. Addison-Wesley, Mass, 1971.
3. H.L. Roydon.*Real Analysis*, New York: Macmillan Pub. Company, 1988.
4. W. Rudin.*Principles of Mathematical Analysis.*New York: McGraw Hill Company,1979.
5. S.C. Malik and Savita Arora. *Mathematical Analysis,*New Delhi: Wiley Eastern Limited, 1991.
6. Sanjay Arora and BansiLal.*Introduction to Real Analysis*. New Delhi: SatyaPrakashan, 1991.

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SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER- II
CORE COURSE –VI: PARTIAL DIFFERENTIAL EQUATIONS (23PMAC23)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6 (L-5, T-1) **INT. MARKS : 25**
CREDITS : 4 **EXT. MARKS : 75**
DURATION : 90hrs **MAX. MARKS: 100**

Course Objectives

- To classify the second order partial differential equations
- To study Cauchy problem, method of separation of variables, boundary value problems.

Course Outcomes (CO)

On successful completion of the course, the learners willbe able to
CO1[K1]: identify the general form of partial differential equation
CO2[K2]: explain the methods of solving partial differential equations
CO3[K3]: apply the methods to solve Cauchy problem, initial value problem, boundary value problems, Neumann problem, Dirichlet problem, wave equations
CO4[K4]: examine the existence and uniqueness of the solution of partial differential equations
CO5[K5]: determine the appropriate method to solve problems related to partial differential equations

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	1	1	1	-
CO2[K2]	3	3	1	1	-	1	1
CO3[K3]	3	3	2	1	1	1	1
CO4[K4]	3	3	3	2	-	1	1
CO5[K5]	3	3	3	2	-	1	1
Weightage of the course	15	14	10	07	02	05	04
Weighted percentage of Course contribution	4.53	5.34	5.49	3.68	4.76	4.24	4.26

to POs							

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(18 hrs)**

Mathematical Models and Classification of second order equation: Classical equations-Vibrating string – Vibrating membrane – waves in elastic medium – Conduction of heat in solids – Gravitational potential – Second order equations in two independent variables – Canonical forms – Equations with constant coefficients – General solution.

Chapter 2: Sections 2.1 - 2.6

Chapter 3: Sections 3.1 - 3.4 (Omit 3.5)

UNIT II **(18 hrs)**

Cauchy Problem: The Cauchy problem – Cauchy-Kowalewsky theorem – Homogeneous wave equation – Initial Boundary value problem- Non-homogeneous boundary conditions – Finite string with fixed ends – Non-homogeneous wave equation – Riemann method – Goursat problem – Spherical wave equation – Cylindrical wave equation.

Chapter 4: Sections 4.1 - 4.11

UNIT III **(18 hrs)**

Method of separation of variables: Separation of variable- Vibrating string problem – Existence and uniqueness of solution of vibrating string problem - Heat conduction problem – Existence and uniqueness of solution of heat conduction problem – Laplace and beam equations.

Chapter 6: Sections 6.1 - 6.6 (Omit section 6.7)

UNIT IV **(18 hrs)**

Boundary Value Problems: Boundary value problems – Maximum and minimum principles – Uniqueness and continuity theorem – Dirichlet Problem for a circle, a circular annulus, a rectangle – Dirichlet problem involving Poisson equation – Neumann problem for a circle and a rectangle.

Chapter 8: Sections 8.1 - 8.9

UNIT V **(18 hrs)**

Green's Function: The Delta function – Green's function – Method of Green's function – Dirichlet Problem for the Laplace and Helmholtz operators – Method of images and eigen functions – Higher dimensional problem – Neumann Problem.

Chapter 10: Sections 10.1 - 10.9

TEXTBOOK

1. TynMyint-U and LokenathDebnath. *Partial Differential Equations for Scientists and Engineers* (Third Edition).New York: North Hollan, 1987.

REFERENCES

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1. M.M. Smirnov. *Second Order partial Differential Equations*. Leningrad, 1964.
2. I.N. Sneddon. *Elements of Partial Differential Equations.*New Delhi: McGraw Hill, 1983.
3. R. Dennemeyer. *Introduction to Partial Differential Equations and Boundary Value Problems.*New York: McGraw Hill, 1968.
4. M.D. Raisinghania. *Advanced Differential Equations.*New Delhi: S.Chand& Company Ltd, 2001.
5. S. Sankar Rao. *Partial Differential Equations*, 2nd Edition. New Delhi: Prentice Hall of India, 2004

Web Sources

1. http://mathforum.org
2. http://ocw.mit.edu/ocwweb/Mathematics
3. http://www.opensource.org
4. www.mathpages.com

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - II
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC –III: MATHEMATICAL STATISTICS
(23PMAO21)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 4 **INT. MARKS :25**
CREDITS : 3 **EXT. MARKS :75**
DURATION : 60hrs **MAX. MARKS: 100**

Course Objectives

- To demonstrate knowledge of, and properties of statistical models in common use
- To understand the basic principles underlying statistical inference.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: state the basic concepts and techniques in sampling theory and theory of statistical inference

CO2[K2]: explain the method of finding distribution function of random variables and the testing process of hypothesis

CO3[K3]: apply the common test statistics to test statistical hypothesis and the maximum likelihood methods to find estimator of parameters

CO4[K4]: examine a particular hypothesis by the statistical inference of the given data

CO5[K5]: assess the strength of the conclusion of the statistical inference

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	1	-	-	-
CO2[K2]	3	2	1	1	-	1	-
CO3[K3]	3	3	2	1	1	1	1
CO4[K4]	3	3	2	2	1	1	1
CO5[K5]	3	3	2	2	1	2	1
Weightage of the course	15	13	08	07	03	05	03
Weighted percentage of Course contribution	4.53	4.96	4.4	3.68	7.14	4.24	3.19

to Pos							

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low, '-' No Correlation)

UNIT I **(12 hrs)**

Some Elementary Statistical Inferences: Sampling and statistics - Order Statistics – More on confidence limits.

Sections 5.1 – 5.4

UNIT II **(12 hrs)**

Introduction to Hypothesis Testing – Additional comments about statistical tests – Chi – Square Tests - Maximum Likelihood Methods: Maximum Likelihood Estimation – Rao-Cramer Lower bound and Efficiency

Sections 5.5 - 5.7 and 6.1- 6.3

UNIT III **(12 hrs)**

Sufficiency: Measures of Quality of Estimators – A Sufficient Statistics for a Parameter – Properties of a Sufficient Statistic – Completeness and Uniqueness – The Exponential Class of Distribution.

Sections 7.1-7.5

UNIT IV **(12 hrs)**

Functions of a parameter – The case of several parameters – Minimal Sufficiency and Ancillary statistics – Sufficiency, Completeness and Independence.

Sections 7.6 -7.9

UNIT V **(12 hrs)**

Optimal Tests of Hypotheses: Most powerful Tests – Uniformly most powerful Tests – Likelihood Ratio Tests – The Sequential Probability Ratio test.

Sections 8.1 - 8.4

TEXTBOOK

1. Hogg R. V., McKean J. W., Craig A. T. *Introduction to Mathematical Statistics*, New Delhi, Sixth Edition, Dorling Kindersley (India) Pvt.Ltd., 1989.

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1. Gupta. S.C. &Kapoor,V.K. *Fundamentals of Mathematical Statistics*, New Delhi, Sultan Chand & Sons Pvt. Ltd., 2002.
2. Mood A. M &Graybill F. A &Boes D. *Introduction to theory of Statistics*, Mcgraw Hill,1974.
3. Fisz M., *Probability Theory and Mathematical Statistics*, New york, John Wiley and Sons, 1963.

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4. https://www.dcpehvpm.org/EContent/Stat/FUNDAMENTAL%20OF%20MATHEMATICAL%20STATISTICSS%20C%20GUPTA%20&%20V%20K%20KAPOOR.pdf
5. https://nptel.ac.in/courses/111/105/111105043/

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - II
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC –III: FINANCIAL MATHEMATICS
(23PMAO22)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 4 **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 60 hrs **MAX. MARKS: 100**

Course Objective

- To introduce the students the mathematical and numerical models used to price financial securities and to make risk estimates

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the application of mathematics and mathematical modeling to solve financial problems
CO2[K2]: explain the basic mathematical concepts
CO3[K3]: solve financial problems using mathematical models
CO4[K4]: analyze the mathematical models of financial problems
CO5[K5]: evaluate the solution of the mathematical models of financial problems

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	1	-	-	-
CO2[K2]	3	2	1	1	-	1	-
CO3[K3]	3	3	2	1	1	1	1
CO4[K4]	3	3	2	2	1	1	1
CO5[K5]	3	3	2	2	1	2	1
Weightage of the course	15	13	08	07	03	05	03
Weighted percentage of Course contribution to POs	4.53	4.96	4.4	3.68	7.14	4.24	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(12 hrs)**

Brownian Motion - Stochastic Integrals - Ito Process - Ito Formula - Grisanov Transformation and Martingale Representation Theorem.

UNIT II **(12 hrs)**

Financial Markets-derivatives - Binomial Models - Pricing European and American Contingent claim.

UNIT III **(12 hrs)**

Definition of the Finite Market Model - First and Second Fundamental Theorems of Asset Pricing - Pricing European Contingent Claims - Incomplete Markets - Separating Hyperplane Theorems

UNIT IV **(12 hrs)**

Black-Scholes Models - Equivalent Martingale Measure- European Contingent Claims- Pricing European Contingent Claims - European Call Options - Black Scholes Formula - American Contingent Claims - American Call and Put Options

UNIT V **(12 hrs)**

Multi-dimensional Black-Scholes Model - First and Second Fundamental Theorems of Asset Pricing - Form of Equivalent Local Martingale Measures - Pricing European Contingent Claims and Incomplete Markets.

TEXTBOOK

1. R. J. Williams. *Introduction to Mathematics of Finance.* American Mathematical Society, 2006.

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1. Steaphen Garrett. *An introduction of Mathematics of Finance: A Deterministic approach.* Butterworth-Heinemann Ltd. 2nd Revised edition, 2013.
2. S. M. Ross. *An elementary introduction to Mathematical Finance*. Cambridge University Press. 3rd edition, 2011.
3. MarekCapinski and Tomasz Zastawniak. *Mathematics for Finance: An Introduction to Financial Engineering*. Springer. 2nd edition, 2011.
4. M. Ross. *Applied Probability Models with Optimization Applications*. Holdenday, 1980.

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3. https://www.srcc.edu/sites/default/files/BCom(H)_IIyear_4.2_Business_Maths_Week3_section_H_AshaRani.pdf
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SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - II
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC –IV: NUMBER THEORY AND CRYPTOGRAPHY (23PMAO23)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 4 **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 60hrs **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 arithmetic functions.
- To study cryptology as an application of Number Theory.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the fundamental theories in arithmetic and cryptography
CO2[K2]: explain the basic concepts in number theory and the various ciphers in cryptography
CO3[K3]: apply the abstract concepts to produce proofs of results that arise in the context of number theory
CO4[K4]: analyze the theory of quadratic residues and primitive roots, types of congruences
CO5[K5]: determine the existence and non-existence of primitive roots mod p, quadratic residues mod m, solutions of congruences, averages of arithmetic functions

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	2	2	1	1	1	-
CO2[K2]	3	2	2	2	1	1	-
CO3[K3]	3	2	2	1	-	1	1
CO4[K4]	3	3	2	2	-	2	1
CO5[K5]	3	3	3	2	-	2	1
Weightage of the course	14	12	11	08	02	07	03

Weighted percentage of Course contribution to POs	4.23	4.58	6.04	4.21	4.76	5.93	3.19

Based on the level of contribution('3'-High, '2'-Medium, '1'-Low, '-' No Correlation)

UNIT I **(12hrs)**

Arithmetical Functions and Dirichlet Multiplication: Introduction – The Mobius Function $\mu(n)$ – The Euler Totient Function $\varphi(n)$ – A Relation Connecting φ and μ – A Product Formula for $\varphi(n)$ – The Dirichlet Product of Arithmetical Functions – Dirichlet Inverses and the Mobius Inversion Formula – The Mangoldt Function $\Lambda(n)$ – Multiplicative Functions – Multiplicative Functions and Dirichlet Multiplication – The Inverse of a Completely Multiplicative Function – Liouville's Function $\lambda(n)$ – The Divisor Function $\sigma_\alpha(n)$.

Chapter 2: Sections 2.1 – 2.13

UNIT II **(12hrs)**

Averages of Arithmetical Functions: Introduction – The Big Oh Notation. Asymptotic Equality of Functions – Euler's Summation Formula – Some Elementary Asymptotic Formulas – The Average Order of d(n) – The Average Order of the Divisor Functions $\sigma_\alpha(n)$ – The Average Order of $\varphi(n)$ – An Application to the Distribution of Lattice Points Visible from the Origin – The Average Order of $\mu(n)$ and $\Lambda(n)$. **Congruences:** Definition and Basic Properties of Congruences – Residue Classes and Complete Residue Systems – Linear Congruences – Reduced Residue Systems and Euler–Fermat Theorem – Polynomial Congruences modulo p. Lagrange's Theorem – Applications of Lagrange's Theorem – Simultaneous Linear Congruences. The Chinese Remainder Theorem – Applications of the Chinese Remainder Theorem.

Chapter 3: Sections 3.1 – 3.9

Chapter 5: Sections 5.1 – 5.8

UNIT III **(12hrs)**

Quadratic Residues and the Quadratic Reciprocity Law: Quadratic Residues – Legendre's Symbol and its Properties – Evaluation of (-1|p) and (2|p) – Gauss' Lemma – The Quadratic Reciprocity Law – Applications of the Reciprocity Law – The Jacobi Symbol.

Chapter 9: Sections 9.1 – 9.7

UNIT IV **(12hrs)**

Primitive Roots: The Exponent of a Number mod m. Primitive Roots – Primitive Roots and Reduced Residue Systems – The Nonexistence of Primitive Roots mod 2^α for $\alpha \geq 3$ – The Existence of Primitive Roots mod p for Odd Primes p – Primitive Roots and Quadratic Residues – The Existence of Primitive Roots mod p^α - The Existence of Primitive

Roots mod $2p^{\alpha}$ – The Nonexistence of Primitive Roots in the Remaining Cases – The Number of Primitive Roots mod m.

Chapter 10: Sections 10.1 – 10.9

UNIT V **(12hrs)**

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

Chapter 12: Sections 12.1 – 12.3

TEXTBOOKS

1. Apostol, Tom M. *Introduction to Analytic Number Theory.* New Delhi: Narosa Publishing House, Eighth Reprint, 1998. **(UNITS I, II, III & IV)**
2. Neville Robbins. *Beginning Number Theory*. New Delhi: Jones & Bartlett India Pvt. Ltd., Second Edition, 2017. **(UNIT V)**

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1. Ivan Niven, Zuckerman, Herbert S. and Montgomery, Hugh L. *An Introduction to the Theory of Numbers*. Singapore: John Wiley & Sons Inc., Fifth Edition, 2006.
2. Burton, Hugh L. *Elementary Number Theory*. Chennai: McGraw Hill Education Private Limited, Seventh Edition, 2019.
3. Thomas Koshy. *Elementary Number Theory with Applications*, New Delhi: Academic Press, 2005.

Web Resources

1. https://www.pdfdrive.com/introduction-to-analytic-number-theory-d187462955.html
2. https://books.google.co.in/books?id=TtLMrKDsDuIC&printsec=frontcover&dq=beginning+number+theory+pdf&hl=en&sa=X&ved=2ahUKEwiO_5PrkZnvAhUszDgGHTkTDJkQ6AEwA3oECAAQAw#v=onepage&q&f=false
3. https://www.pdfdrive.com/niven-i-an-introduction-to-the-theory-of-numbers-d19435701.html
4. https://1lib.in/book/447861/b4c7fa
5. https://www.pdfdrive.com/koshy-elementary-number-theory-with-applicati-d47052510.html

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - II
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC –IV: NEURAL NETWORKS
(23PMAO24)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 4 **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 60 hrs **MAX. MARKS : 100**

Course Objectives

- To introduce the preliminary concepts of neural networks
- To study various neural network models

Course Outcomes (CO)

On successful completion of the course, the learners willbe able to

CO1[K1]: state the basic terminologies in neural network

CO2[K2]: explain the features/principles/laws of neural network, neural network models

CO3[K3]: apply the basic principles/ laws of neural network to build a neural network model

CO4[K4]: classify the types of neural networks and characterize their characteristic

CO5[K5]: evaluate the pattern recognition problem

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	2	2	1	1	1	-
CO2[K2]	3	2	2	2	1	1	-
CO3[K3]	3	2	2	1	-	1	1
CO4[K4]	3	3	2	2	-	2	1
CO5[K5]	3	3	3	2	-	2	1
Weightage of the course	14	12	11	08	02	07	03

Weighted percentage of Course contribution to POs	4.23	4.58	6.04	4.21	4.76	5.93	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(12 hrs)**

Basics of Artificial Neural Networks, Characteristics of Neural Networks, Historical Development of Neural Network Principles.

Chapter 1

UNIT II **(12 hrs)**

Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Activation and Synaptic Dynamics, Activation Dynamics Models.

Chapter 2

UNIT III **(12 hrs)**

Synaptic Dynamics Models, Learning Methods, Stability and Convergence. Functional Units of ANN for Pattern Recognition Tasks, Pattern Recognition Problem.

Chapter 3

UNIT IV **(12 hrs)**

Basic Functional Units, Pattern Recognition Tasks by the Functional, Feedforward Neural Networks, Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks.

Chapter 4: Sections 4.1 - 4.3

UNIT V **(12 hrs)**

Feedback Neural Networks, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks.

Chapter 5: Sections 5.1 - 5.3

TEXTBOOK

1. R. Yegnanarayana, Artificial Neural Networks, Prentice Hall of India, 2005, 2, 3,

REFERENCES

Books

1. Charu C. Aggarwal, Neural Networks and Deep Learning, Springer.
2. Adam Gibson and Josh Patterson, Deep Learning: A Practioner's Approach, First Edition.
3. Charu C. Aggarwal, Data Classification Algorithms and Applications, CRC Press, 2014.

Web Sources

1. https://www.javatpoint.com/artificial-neural-network
2. https://www.geeksforgeeks.org/introduction-artificial-neural-network-set-2/

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - II
NON MAJOR ELECTIVE COURSE -I: STATISTICS FOR LIFE SCIENCES (23PMAN21)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 4 **INT. MARKS : 25**
CREDITS : 2 **EXT. MARKS : 75**
DURATION : 60hrs **MAX. MARKS : 100**

Course Objectives

- To study the measures of descriptive statistics
- To introduce the basic statistical concepts and the basic statistical methods

Course Outcomes (CO)

On successful completion of the course, the learners willbe able to
CO1[K1]: describe the basic terminologies in statistics
CO2[K2]: explain the tools and techniques of statistics
CO3[K3]: find various measures of descriptive statistics
CO4[K4]: analyze the quantitative data and calculate different statistical measures
CO5[K5]: choose the appropriate statistical measures to interpret the data

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	1	-	2	-	-	1
CO2[K2]	3	2	-	2	-	1	1
CO3[K3]	3	2	2	2	-	2	1
CO4[K4]	2	2	-	2	-	2	1
CO5[K5]	2	1	-	2	-	2	1
Weightage of the course	12	08	02	10	-	07	05
Weighted percentage of Course contribution to POs	3.63	3.05	1.1	5.26	0	5.93	5.32

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(12hrs)**

Measures of Central Value: Introduction - Average-Defined - Types of Averages - Arithmetic Mean - Calculation of Arithmetic Mean—Continuous Series – Median - Calculation of Median—Continuous Series - Computation of Quartiles – Deciles - Percentiles, etc.

Chapter 7: Page 7.1 – 7. 25

UNIT II **(12 hrs)**

Mode – Calculation of Mode —Continuous Series – Geometric Mean - Calculation of Geometric Mean —Continuous Series – Harmonic Mean - Calculation of Harmonic Mean — Continuous Series.

Chapter 7: Page 7.26 – 7.50

UNIT III **(12 hrs)**

Measures of Dispersion: Significance of Measuring Variation – Range - The Interquartile Range or the Quartile Deviation - Merits and Limitations - The Standard Deviation.

Chapter 8: Page 8.1 - 8.15

UNIT IV **(12 hrs)**

Skewness, Moments and Kurtosis: Introduction - Difference between Dispersion and Skewness - Tests of Skewness - Measures of Skewness - Absolute Measures of Skewness - Contents Relative Measures of Skewness - Bowley's Coefficient of Skewness - Kelly's Coefficient of Skewness - Measure of Skewness Based on the Third Moment.

Chapter 9: Page 9.1 – 9.11

UNIT V **(12 hrs)**

Moments - Moments about Arbitrary Origin - Conversion of Moments about an Arbitrary Origin into Moments About Mean or Central Moments - Moments About Zero - Sheppard's Correction for Grouping Errors - Conditions for Applying Sheppard's Corrections - Measure of Skewness Based on Moments – Kurtosis - Measures of Kurtosis - List of Formulae – Skewness.

Chapter 9: Page 9.11 – 9.20

TEXTBOOK

1. S. P. Gupta. *Statistical Methods*. New Delhi: Sultan Chand & Sons, Forty Sixth Revised Edition, 2021.

REFERENCES

Books

1. Goon A.M. Gupta. A.K. and Das Gupta, B. *Fundamental of Statistics.*Kolkatta: World Press Pvt. Ltd, vol.2, 1987.

2. Gupta. S.C. &Kapoor,V.K. *Fundamentals of Mathematical Statistics*, New Delhi, Sultan Chand & Sons Pvt. Ltd., 2002.
3. Mood A. M &Graybill F. A &Boes D. *Introduction to theory of Statistics*, Mcgraw Hill, 1974.

Web Sources

1. https://www.sultanchandandsons.com/images/BookImages/Chapters/59_Statistical%20Methods.pdf
2. https://home.iitk.ac.in/~kundu/Statistical-Methods.pdf
3. https://www.jsscacs.edu.in/sites/default/files/Files/STATISTICAL_METHODS_FOR_THE_SOCIAL_SCIENCES_Academia.pdf
4. https://sccn.ucsd.edu/~arno/mypapers/statistics.pdf
5. https://eclass.uoa.gr/modules/document/file.php/ECD363/%CE%92%CE%B9%CE%B2%CE%BB%CE%B9%CE%BF%CE%B3%CF%81%CE%B1%CF%86%CE%AF%CE%B1/Statistical%20Methods%20and%20Data%20Analysis%205Ed.pdf

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - III
CORE COURSE - VII: COMPLEX ANALYSIS (23PMAC31)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6(L-5, T-1) **INT. MARKS : 25**
CREDITS : 5 **EXT. MARKS : 75**
DURATION : 90hrs **MAX. MARKS: 100**

Course Objective

- To study Cauchy integral formula, local properties of analytic functions, general form of Cauchy's theorem and evaluation of definite integral and harmonic functions

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the methods and techniques of complex integration

CO2[K2]: explain the basic concepts, theories, properties of functions of a complex variable

CO3[K3]: apply the abstract concepts to produce proofs of results that arise in the context of analytic functions

CO4[K4]: interpret the several forms of Cauchy's theorem, the properties of harmonic and entire function

CO5[K5]: evaluate the definite integrals by the method of residues, the series expansion, partial fractions, infinite products, canonical products of analytic functions

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	3	-	-	-
CO2[K2]	3	2	1	3	-	-	-
CO3[K3]	3	2	2	2	1	1	1
CO4[K4]	3	2	2	2	-	1	1
CO5[K5]	3	2	2	2	-	1	1
Weightage of the course	15	10	8	12	01	3	3
Weighted percentage of Course contribution to Pos	4.53	3.82	4.4	6.32	2.38	2.54	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low, '-' No Correlation)

UNIT I **(18hrs)**

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 - Taylors's Theorem – Zeros and poles – The local Mapping – The Maximum Principle.

Chapter 4 : Section 2 : 2.1 - 2.3

Chapter 4 : Section 3 : 3.1 - 3.4

UNIT II **(18 hrs)**

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. **The Calculus of Residues:**Residue theorem - The argument principle - Evaluation of definite integrals.

Chapter 4 : Section 4 : 4.1 - 4.7

Chapter 4 : Section 5: 5.1 - 5.3

UNIT III **(18 hrs)**

Harmonic Functions: Definition and basic properties – The Mean - value property - Poisson formula.

Chapter 4 : Sections 6 : 6.1 - 6.3

UNIT IV **(18 hrs)**

Harmonic Functions (Continued): Schwarz theorem - The reflection principle. **Power Series Expansions:**Weierstrass's theorem – The Taylor's Series – The Laurent series .

Chapter 4 : Sections 6.4 and 6.5

Chapter 5 : Sections 1.1 - 1.3

UNIT V **(18 hrs)**

Partial Fractions: Partial Fractions - Infinite products – Canonical products – Gamma Function. **Entire Functions:** Jensen's formula – Hadamard's Theorem.

Chapter 5 : Sections 2.1 - 2.4

Chapter 5 : Sections 3.1 and 3.2

TEXTBOOK

1. Lars V. Ahlfors, *Complex Analysis*, New York, McGraw Hill Co., Third Edition1979

REFERENCES

Books

1. Presfly H.A., *Introduction to complex Analysis*, Clarendon Press, oxford, 1990.

2. Conway J.B., *Functions of one complex variables* Springer - Verlag, International student Edition, Naroser Publishing Co., 1978.
3. Hille E., *Analytic function Theory* (2 vols.), Gonm& Co, 1959.
4. Heins M., *Complex function Theory*, New York, Academic Press, 1968.

Web Sources

1. http://mathforum.org,
2. http://ocw.mit.edu/ocwweb/Mathematics,
3. http://www.opensource.org ,
4. http://en.wikipedia.org

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - III
CORE COURSE -VIII: PROBABILITY THEORY (23PMAC32)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6(L-5, T-1) **INT. MARKS :25**
CREDITS : 5 **EXT. MARKS : 75**
DURATION : 90hrs **MAX. MARKS: 100**

Course Objectives:

- To introduce axiomatic approach to probability theory.
- To study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: state the general probability rules and axioms, basic terminologies of probability theory

CO2[K2]: explain the method of finding various parameters of probability distributions, characteristic functions of random variables and the condition for the convergence sequence of distribution functions

CO3[K3]: find the conditional probability of random events, various parameters of probability distributions, characteristic functions of random variables

CO4[K4]: investigate the characteristics of probability distributions and its parameters, limits of sequence of distribution functions

CO5[K5]: determine various parameters of distributions of random variables, distribution function by the characteristic function

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	1	1	1	1	-	1
CO2[K2]	3	1	1	1	1	1	1
CO3[K3]	3	2	1	1	-	1	1
CO4[K4]	3	2	2	1	-	1	1
CO5[K5]	3	3	2	1	-	1	1
Weightage of the course	15	09	07	05	02	04	05
Weighted	4.53	3.44	3.85	2.63	4.76	3.39	5.32

percentage of Course contribution to Pos							

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low, '-' No Correlation)

UNIT I **(18 hrs)**

Random Events and Random Variables: Random events – Probability axioms – Combinatorial formulae – Conditional Probability – Bayes Theorem – Independent events – Random Variables – Distribution Function – Joint Distribution – Marginal Distribution – Conditional Distribution – Independent Random Variables – Functions of Random Variables.

Chapter 1: Sections 1.1 - 1.7

Chapter 2: Sections 2.1 - 2.4, 2.6 - 2.8 (Omit Section 2.5)

UNIT II **(18 hrs)**

Parameters of the Distribution: Expectation - Moments – The Chebyshev Inequality – Absolute moments – Order parameters – Moments of random vectors – Regression of the first and second types.

Chapter 3: Sections 3.1 - 3.8

UNIT III **(18 hrs)**

Characteristic functions: Properties of characteristic functions – Characteristic functions and moments – semi - invariants – characteristic function of the sum of the independent random variables – Determination of distribution function by the Characteristic function – Probability generating functions.

Chapter 4: Sections 4.1 - 4.5, 4.7 (Omit Section 4.6)

UNIT IV **(18 hrs)**

Some Probability distributions: One point, two point, Binomial – Polya – Hypergeometric – Poisson (discrete) distributions – Uniform distribution – Normal distribution - Gamma distribution – Beta distribution – Cauchy and Laplace (continuous) distributions.

Chapter 5: Section 5.1 - 5.10 (Omit Section 5.11)

UNIT V **(18 hrs)**

Limit Theorems: Stochastic convergence – Bernoulli's law of large numbers – Convergence of sequence of distribution functions – Levy-Cramer Theorems – The de Moivre-Laplace Theorem – Poisson, Chebyshev, Khintchine Weak law of large numbers – Lindberg Theorem – Lapunov Theorem – Borel-Cantelli Lemma - Kolmogorov Inequality and Kolmogorov Strong Law of large numbers.

Chapter 6 : Sections 6.1 - 6.4, 6.6 - 6.9 , 6.11 and 6.12. (Omit Sections 6.5, 6.10,6.13 - 6.15)

TEXTBOOK

1. Fisz M., *Probability Theory and Mathematical Statistics,* New York, John Wiley and Sons, 1963.

REFERENCES

Books

1. Ash R.B., *Real Analysis and Probability*, New York, Academic Press, 1972.
2. Chung K.L., *A course in Probability*, New York, Academic Press, 1974.
3. Durrett R., *Probability : Theory and Examples*, New York, Duxbury Press, second edition 1996.
4. Rohatgi. *An Introduction to Probability Theory and Mathematical Statistics*, New Delhi: Wiley Eastern Ltd., Third print 1988.
5. Resnick S.I., *A Probability Path*, Berlin, Birhauser, 1999.
6. Bhat B.R., *Modern Probability Theory*, New Delhi, New Age International (P)Ltd, Third edition, 1999

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2. http://ocw.mit.edu/ocwweb/Mathematics,
3. http://www.opensource.org,
4. http://www.probability.net

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - III
CORE COURSE –IX: TOPOLOGY (23PMAC33)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6 (L-5, T-1) **INT. MARKS : 25**
CREDITS : 5 **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 (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: define and illustrate the basic concepts of topological spaces
CO2[K2]: express connectedness, compactness of a topological spaces
CO3[K3]: apply the abstract concepts to produce proof of results that arise in the context of general topology
CO4[K4]: explore the characterizations of countability, separation axioms and continuity of functions
CO5[K5]: evaluate the results that characterizes continuity of functions, connectedness, compactness, countability and separation axioms

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	1	-	-	-
CO2[K2]	3	2	1	1	-	-	-
CO3[K3]	3	3	2	2	1	1	1
CO4[K4]	3	3	2	2	-	1	1
CO5[K5]	3	3	2	2	-	1	1
Weightage of the course	15	13	08	08	01	03	03
Weighted percentage of Course contribution	4.53	4.96	4.4	4.21	2.38	2.54	3.19

to POs							

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(18hrs)**

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

Chapter 2: Sections 12 - 17

UNIT II **(18hrs)**

Continuous Functions – The Product Topology – The Metric Topology - The Metric Topology (continued).

Chapter 2: Sections 18 - 21

UNIT III **(18hrs)**

Connectedness: Connected Spaces- Connected Subspaces of the Real Line – Components and Local Connectedness.

Chapter 3: Sections 23 - 25.

UNIT IV **(18hrs)**

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

Chapter 3: Sections 26 - 29.

UNIT V **(18hrs)**

Countability and Separation Axioms: The Countability Axioms – The Separation Axioms – Normal Spaces – The Urysohn Lemma – The UrysohnMetrization Theorem – The Tietz Extension Theorem.

Chapter 4 : Sections 30 t- 35.

TEXTBOOK

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

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1. Gamelin, Theodore W., Robert Everist Greene. *Introduction to Topology*. Canada: General Publishing Company Limited, Second Edition, 1999.

2. Simmons, George F. *Introduction to Topology and Modern Analysis.*New Delhi: Tata McGraw - Hill Publishing Company Limited, 2006.
3. Joshi, K.D. *Introduction to General Topology*. New Delhi: New Age International (P) Ltd., 2006.

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1. https://editorialdinosaurio.files.wordpress.com/2012/03/topology2ed_-james_munkres.pdf
2. https://www.pdfdrive.com/introduction-to-topology-and-modern-analysis-d176226233.html
3. https://www.scribd.com/book/271615365/Introduction-to-Topology-Second-Edition
4. https://proofwiki.org/wiki/Sequence_Lemma
5. https://youtu.be/zENk0YqNOjU

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - III
CORE COURSE - X: MECHANICS (23PMAC34)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6(L-5, T-1) **INT. MARKS :25**
CREDITS : 4 **EXT. MARKS : 75**
DURATION : 90 hrs **MAX. MARKS: 100**

Course Objectives

- To study mechanical systems under generalized coordinate systems, virtual work, energy and momentum.
- To study mechanics developed by Newton, Lagrange, Hamilton Jacobi and Theory of Relativity due to Einstein.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: state the laws and facts of mechanics
CO2[K2]: explain the core principles in mechanics
CO3[K3]: apply the core concepts and principles to solve complex problems in classical mechanics
CO4[K4]: interpret Lagrange's equation, Hamilton's equations, Hamilton – Jacobi equations and Canonical transformations of co-ordinates
CO5[K5]: determine energy and momentum of mechanical systems, integrals of motion and separability of Hamilton

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	1	1	1	-	-	-
CO2[K2]	3	2	1	1	-	1	-
CO3[K3]	3	2	2	1	1	1	1
CO4[K4]	3	3	2	2	-	1	1
CO5[K5]	3	3	2	2	-	1	1
Weightage of the course	15	11	08	07	01	04	03
Weighted percentage of Course contribution	4.53	4.2	4.4	3.68	2.38	3.39	3.19

to Pos							

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low, '-' No Correlation)

UNIT I **(18 hrs)**

Mechanical Systems: The Mechanical system- Generalised coordinates – Constraints - Virtual work - Energy and Momentum

Chapter 1: Sections 1.1 to 1.5

UNIT II **(18 hrs)**

Lagrange's Equations: Derivation of Lagrange's equations- Examples- Integrals of motion.

Chapter 2: Sections 2.1 to 2.3 (Omit Section 2.4)

UNIT III **(18 hrs)**

Hamilton's Equations: Hamilton's Principle - Hamilton's Equations - Other variational principles.

Chapter 4: Sections 4.1 to 4.3 (Omit section 4.4)

UNIT IV **(18 hrs)**

Hamilton-Jacobi Theory: Hamilton's Principle function – The Hamilton-Jacobi Equation - Separability

Chapter 5: Sections 5.1 to 5.3

UNIT V **(18 hrs)**

Canonical Transformations: Differential forms and generating functions – Special Transformations– Lagrange and Poisson brackets.

Chapter 6: Sections 6.1, 6.2 and 6.3 (omit sections 6.4, 6.5 and 6.6)

TEXTBOOK

1. Greenwood D., *Classical Dynamics*, New Delhi, Prentice Hall of India, 1985.

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1. Goldstein H., *Classical Mechanics*, New Delhi, Narosa Publishing House, second edition.
2. Rane N.C. and JoagP.S.C.c, *Classical Mechanics*, Tata McGraw Hill, 1991.
3. Synge J.L. and Griffth B.A., *Principles of Mechanics*, New York, McGraw Hill Book Co., Third edition, 1970.

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SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - III
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC –V: ALGEBRAIC NUMBER THEORY (23PMAO31)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 3 **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 45 hrs **MAX. MARKS : 100**

Course Objective

- To provide the learners with an essentially self-contained introduction to the theory of algebraic number fields.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the basic terminologies of algebraic number theory

CO2[K2]: explain the tools and techniques of abstract algebra that are useful in solving number theory questions

CO3[K3]: apply the abstract concepts to produce proof of results that arise in the context of algebraic number theory

CO4[K4]: analyze the method of factorization/prime factorization of polynomials, factorization of an algebraic integer into irreducibles, prime factorization of ideals

CO5[K5]: determine the uniqueness of factorization/prime factorization of polynomials, factorization of an algebraic integer into irreducibles, prime factorization of ideals

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	1	1	1	-	-	-
CO2[K2]	3	2	1	1	-	-	-
CO3[K3]	3	2	2	2	1	1	1
CO4[K4]	3	2	2	2	-	1	1
CO5[K5]	3	2	2	2	-	1	1
Weightage of the course	15	09	08	08	01	03	03

Weighted percentage of Course contribution to POs	4.53	3.44	4.4	4.21	2.38	2.54	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(9 hrs)**

Rings and Fields- Factorization of Polynomials - Field Extensions – Symmetric Polynomials - Modules - Free Abelian Groups

Chapter 1: Sections 1.1 - 1.6

UNIT II **(9 hrs)**

Algebraic numbers - Conjugates and Discriminants - Algebraic Integers – Integral Bases - Norms and Traces - Rings of Integers.

Chapters 2: Sections 2.1 - 2.6

UNIT III **(9 hrs)**

Quadratic fields and cyclotomic fields - Factorization into Irreducibles - Trivial factorization - Factorization into irreducibles - Examples of non-unique factorization into irreducibles.

Chapter 3: Sections 3.1 and 3.2 Chapter 4: Sections 4.2 - 4.4

UNIT IV **(9 hrs)**

Prime Factorization - Euclidean Domains - Euclidean Quadratic fields – Consequences of unique factorization - The Ramanujan-Nagell Theorem

Chapter 4: Sections 4.5 - 4.9

UNIT V **(9 hrs)**

Prime Factorization of Ideals - The norms of an Ideal - Nonunique Factorization in Cyclotomic Fields

Chapter 5: Sections 5.2 - 5.4

TEXTBOOK

1. Steward and D.Tall, Algebraic Number Theory and Fermat's Last Theorem (3rd Edition) A.K.Peters Ltd., Natrick, Mass. 2002.

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1. Z.I.Bosevic and I.R.Safarevic, Number Theory, Academic Press, New York, 1966.
2. J.W.S.Cassels and A.Frohlich, Algebraic Number Theory, Academic Press, New York, 1967.

3. P.Ribenboim, Algebraic Numbers, Wiley, New York, 1972.
4. P. Samuel, Algebraic Theory of Numbers, Houghton Mifflin Company, Boston, 1970.
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2. https://math.stackexchange.com/questions/1758208/computing-prime-factorization-of-ideals

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - III
ELECTIVE COURSE GENERIC/ DISCIPLINE SPECIFIC – V: STOCHASTIC PROCESSES
(23PMAO32)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 3 **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 45 hrs **MAX. MARKS: 100**

Course Objective

- To introduce the students the most important random processes namely Martingale, Markov processes, Wiener processes, Random walk, Poisson processes and their mathematical properties.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to
CO1[K1]: describe the basic terminologies in stochastic processes
CO2[K2]: explain the general theory and properties of probability distributions and random processes
CO3[K3]: compute the probability distribution of various random processes
CO4[K4]: classify random processes according to state space and parameter space
CO5[K5]: evaluate the statistical properties of random processes

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	1	1	1	-	-	-
CO2[K2]	3	2	1	1	-	-	-
CO3[K3]	3	2	2	2	1	1	1
CO4[K4]	3	2	2	2	-	1	1
CO5[K5]	3	2	2	2	-	1	1
Weightage of the course	15	09	08	08	01	03	03
Weighted percentage of Course contribution to POs	4.53	3.44	4.4	4.21	2.38	2.54	3.19

Based on the level of contribution('3'-High, '2'-Medium, '1'-Low, '-' No Correlation)

UNIT I **(9 hrs)**

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

Chapter 1: Sections 1.1 - 1.3

UNIT II **(9 hrs)**

Stochastic Processes: Some Notions: Introduction – Specification of Stochastic Processes – Stationary Processes – Martingales. **Markov Chains:** Definition and Examples

Chapter 2: Sections 2.1 - 2.4

Chapter 3: Section 3.1

UNIT III **(9 hrs)**

Higher Transition Probabilities – Generalisation of Independent Bernoulli Trails: Sequence of Chain-Dependent Trials - Classification of States and Chains.

Chapter 3: Sections 3.2 - 3.4

UNIT IV **(9 hrs)**

Determination of Higher Transition Probabilities – Stability of a Markov System – Graph Theoretic Approach.

Chapter 3: Sections 3.5 - 3.7

UNIT V **(9 hrs)**

Markov Chain with Denumerable Number of States – Reducible Chains.

Chapter 3: Sections 3.8, 3.9

TEXTBOOK

1. Medhi, J. *Stochastic Processes.* Chennai: New age international (P) Limited, Publishers, Second Edition, 2004.

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1. Basu, A.K. *Introduction to Stochastic Process.* New Delhi: Narosa Publishing House, 2007.
2. Srinivasan, S.K. and Mehata, K.M. *Stochastic Processes.* New Delhi: Tata McGraw-Hill Publishing Company Limited, 1976.
3. Kai Lai Chung. *Elementary Probability Theory with Stochastic Processes*. New Delhi: Narosa Publishing House, Third Edition, 1998.

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2. https://www.pdfdrive.com/introduction-to-stochastic-process-d188666367.html
3. https://1lib.in/book/2050203/60bbb3

4. https://www.google.com/url?sa=t&source=web&rct=j&url=https://maths.dur.ac.uk/stats/courses/ProbMC2H/_files/handouts/1516MarkovChains2H.pdf&ved=2ahUKEwi1kvOW76_vAhUOWX0KHdzqAfM4ChAWMAR6BAgBEAI&usg=AOvVaw0goFuQOjTWTQxxerTUu5oH
5. https://www.google.com/url?sa=t&source=web&rct=j&url=http://www.columbia.edu/~ks20/stochastic-I/stochastic-I-MCI.pdf&ved=2ahUKEwi8maiN8K_vAhWXaCsKHVVkD9gQFjAEegQIFxAC&usg=AOvVaw1c6VLUhoTLSs21Qf-Avle4

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme
SEMESTER - III
NON MAJOR ELECTIVE COURSE II: STATISTICS FOR SOCIAL SCIENCES (23PMAN31)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 3 **INT. MARKS : 25**
CREDITS : 2 **EXT. MARKS : 75**
DURATION : 45 hrs **MAX. MARKS : 100**

Course Objectives

- To study the Index numbers and its types.
- To study the trend values in time series analysis

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the basic terminologies of index numbers and time series

CO2[K2]: explain the methods of finding index numbers and trend values, variations of the series

CO3[K3]: calculate the value of index numbers and trend values, variations of time series

CO4[K4]: classify the types of index numbers and trend values

CO5[K5]: choose the appropriate method of finding index numbers and trend values to draw valid inference

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	1	-	2	-	-	1
CO2[K2]	3	2	-	2	-	1	1
CO3[K3]	3	2	2	2	-	2	1
CO4[K4]	2	2	-	2	-	2	1
CO5[K5]	2	1	-	2	-	2	1
Weightage of the course	12	08	02	10	-	07	05

Weighted percentage of Course contribution to POs	3.63	3.05	1.1	5.26	0	5.93	5.32

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(9 hrs)**

Index Numbers: Introduction - Uses of Index Numbers – Classification of Index Numbers – Problems in the construction of Index numbers – Methods of constructing Index numbers.

Chapter 13: Page 13.1 – 13.21

UNIT II **(9 hrs)**

Quantity or Volume Index number – Value Index numbers – Test of Adequasy of Index Number formulae – The chain Index numbers – Base shifting, Splicing and Deflating the Index numbers – Consumer price index numbers.

Chapter 13: Page 13.22 – 13.43

UNIT III **(9 hrs)**

Analysis of Time Series: Introduction – Time series defined – Utility of time series analysis – Components of Time series – Preliminary adjustments before analyzing time series – Measurement of trend.

Chapter 14: Page 14.1 – 14.31

UNIT IV **(9 hrs)**

Measurement Trends by Logarithms – Shifting the Trend Origin – Conversion of annual trend values to monthly .

Chapter 14: Page 14.32 – 14.37

UNIT V **(9 hrs)**

Measurement of Seasonal variations – Measurement of cyclical variations – Measurement of Irregular variations.

Chapter 14: Page 14.38 – 14.58

TEXTBOOK

1. S. P. Gupta. *Statistical Methods*. New Delhi: Sultan Chand & Sons, Forty Sixth Revised Edition, 2021.

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1. Goon A.M. Gupta. A.K. and Das Gupta, B. *Fundamental of Statistics.*Kolkatta: World Press Pvt. Ltd, vol.2, 1987.
2. Gupta. S.C. & Kapoor,V.K. *Fundamentals of Mathematical Statistics*, New Delhi, Sultan Chand & Sons Pvt. Ltd., 2002.
3. Mood A. M &Graybill F. A &Boes D. *Introduction to theory of Statistics*, Mcgraw Hill, 1974.

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2. https://home.iitk.ac.in/~kundu/Statistical-Methods.pdf
3. https://www.jsscacs.edu.in/sites/default/files/Files/STATISTICAL_METHODS_FOR_THE_SOCIAL_SCIENCES_Academia.pdf
4. https://sccn.ucsd.edu/~arno/mypapers/statistics.pdf
5. https://eclass.uoa.gr/modules/document/file.php/ECD363/%CE%92%CE%B9%CE%B2%CE%BB%CE%B9%CE%BF%CE%B3%CF%81%CE%B1%CF%86%CE%AF%CE%B1/Statistical%20Methods%20and%20Data%20Analysis%205Ed.pdf

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M. Sc. Mathematics
SEMESTER- III
INTERNSHIP/ INDUSTRIAL ACTIVITY (23PMAJ31)
(From 2023-2024 Batch onwards)

HOURS/WEEK: - **INT. MARKS : 25**
CREDITS : 2 **EXT. MARKS : 75**
DURATION : - **MAX. MARKS: 100**

Course Objectives

- To learn and develop new skills relevant to the field of study or career interests.
- To understand different departments, roles, and functions within the organization to broaden knowledge and explore potential career paths.
- To apply the knowledge gained in academic studies to real-world scenarios.
- To bridge the gap between classroom learning and professional life.
- To gain exposure to different tasks, projects, and challenges relevant to the chosen field.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: identify different career paths within the industry and gain insights into potential future roles

CO2[K3]: apply theoretical concepts and academic knowledge to real-world situations and challenges encountered during the internship

CO3[K4]: analyse problems, generate innovative solutions, and make informed decisions

CO4[K5]: evaluate how to manage time effectively and prioritize tasks to meet deadlines and deliver quality work

CO5 [K6]: create a portfolio of the work, projects, and achievements during the internship

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	-	1	1	1	2
CO2[K3]	2	3	-	1	-	1	2
CO3[K4]	2	2	-	2	-	1	1
CO4[K5]	-	2	1	-	-	1	1
CO5[K6]	1	3	3	3	-	1	2

Weightage of the course	08	12	04	07	01	05	08
Weighted percentage of Course contribution to POs	2.42	4.58	2.2	3.68	2.38	4.24	8.51

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

Rules and Regulations

1. Each Student has to undergo 30 hours institutional/industry based training during the fourth semester summer vacation.
2. Internships could be undertaken in different media organizations, industries and educational institutions which should be approved by the department.
3. Students should keep a detailed record of activities performed and hours spent in training and report the same to the Faculty Coordinator/Mentor/Guide regularly about the progress of internship on weekly basis.
4. At the end of the internship, the student must submit a full-fledged detailed internship report (not exceeding 20 pages) along with attendance certificate.
5. The Internship carries 100 marks out of which 25 marks for Internal and 75 Marks for External.
6. The viva voce board shall consist of the Head of the Department and the Internal Examiner (Senior Faculty member)
7. The training programme shall be evaluated as per the following pattern

Internal (25 Marks)
Training Review: 15 Marks
Daily Log Report: 5 Marks
PPT Presentation :5 Marks

External (75 Marks)
Training Report :25 Marks
Viva Voce : 50 Marks

EACH INTERNSHIP REPORT WILL FOLLOW THE FORMAT DESCRIBED:

- Title Page
- College Certificate Page
- Internship Certificate provided by the internship institution
- Declaration Page
- Acknowledgement
- Company Profile
- Organizational structure of the concern
- Weekly work plan

- List of figures, List of Tables
- Index
- Chapters

List of Chapters

1. Introduction
2. Nature of work
3. Role in the organization
4. Questionnaires and Observations about work
5. Operating Environment
6. Detailed Description of Technology used
7. Implementation
8. Conclusion
9. Appendix

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - IV
CORE COURSE – XI: FUNCTIONAL ANALYSIS (23PMAC41)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6 (L-5, T-1) **INT. MARKS : 25**
CREDITS : 5 **EXT. MARKS : 75**
DURATION : 90 hrs **MAX. MARKS: 100**

Course Objectives

- To provide students with a strong foundation in functional analysis, focusing on spaces, operators and fundamental theorems.
- To develop student's skills and confidence in mathematical analysis and proof techniques.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the basic concepts, principles and methods of functional analysis

CO2[K2]: explain the various operators and fundamental theorems on Banach spaces, Hilbert spaces, Banach algebras

CO3[K3]: apply the analytical technique and theoretical knowledge to produce the proofs of results that arise in the context of functional analysis

CO4[K4]: examine the characterizations of Banach spaces, Hilbert spaces and Banach algebra

CO5[K5]: evaluate the structure of Banach spaces, Hilbert spaces, Banach algebras

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1 [K1]	3	1	1	1	-	-	-
CO2 [K2]	3	2	1	1	-	-	-
CO3 [K3]	3	2	2	2	1	1	1
CO4 [K4]	3	2	2	2	-	1	1
CO5 [K5]	3	2	2	2	-	1	1
Weightage of the course	15	09	08	08	01	03	03

Weighted percentage of Course contribution to POs	4.53	3.44	4.4	4.21	2.38	2.54	3.19

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low ,'-' No Correlation)

UNIT I **(18 hrs)**

Banach Spaces: The Definition and Some Examples - Continuous Linear Transformations - The Hahn-Banach Theorem - The Natural Imbedding of N in N** - The Open Mapping Theorem - The Conjugate of an Operator.

Chapter 9: Sections 46 - 51

UNIT II **(18 hrs)**

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.

Chapter 10: Sections 52 - 59

UNIT III **(18 hrs)**

Finite-Dimensional Spectral Theory: Matrices - Determinants and the Spectrum of an Operator - The Spectral Theorem.

Chapter 11: Sections 60 - 62

UNIT IV **(18 hrs)**

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.

Chapter 12: Sections 64 - 69

UNIT V **(18 hrs)**

The Structure of Commutative Banach Algebras: The Gelfand Mapping - Application of the Formula - Involutions in Banach Algebras - The Gelfand-Neumark Theorem.

Chapter 13: Sections 70 - 73

TEXTBOOK

1. Simmons, G. F. *Introduction to Topology and Modern Analysis*. New Delhi: McGraw Hill Education (India) Private Limited, 1963.

REFERENCES

Books

1. Rudin, W. *Functional Analysis*. New Delhi: McGraw Hill Education (India) Private Limited, 1973.
2. Limaye, B. V. *Functional Analysis*. New Age International, 1996.
3. Goffman, C. and Pedrick, G. *First course in Functional Analysis*. New Delhi: Prentice Hall of India, 1987.
4. Kreyszig, E. *Introductory Functional Analysis with Applications*. New York: John Wiley and Sons, 1978.
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4. http://en.wikiepedia.org

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - IV
CORE COURSE – XII: DIFFERENTIAL GEOMETRY (23PMAC42)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 6 (L-5, T-1) **INT. MARKS : 25**
CREDITS : 5 **EXT. MARKS : 75**
DURATION : 90 hrs **MAX. MARKS: 100**

Course Objectives

- To introduce space curves and their intrinsic properties of a surface and geodesics.
- To explore the non-intrinsic properties of surface and the differential geometry of surfaces.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to
CO1[K1]: describe the basic concepts of space curves and surfaces
CO2[K2]: explain the theory of space curves and surfaces
CO3[K3]: apply the abstract concepts to produce the proofs of results that arise in the context of surface theory.
CO4[K4]: investigate the properties of various surfaces in the Euclidean space
CO5[K5]: evaluate the problems on space curves and surfaces

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1 [K1]	3	2	1	1	-	-	-
CO2 [K2]	3	2	1	1	-	-	-
CO3 [K3]	3	3	2	2	1	1	-
CO4 [K4]	3	3	2	2	-	1	1
CO5 [K5]	3	3	2	3	-	1	1
Weightage of the course	15	13	08	09	01	03	02
Weighted percentage of Course contribution to POs	4.53	4.96	4.4	4.74	2.38	2.54	2.13

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low ,'-' No Correlation)

UNIT I **(18 hrs)**

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 - Helies.

Chapter I: Sections 1 - 9.

UNIT II **(18 hrs)**

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.

Chapter II: Sections 1 - 9.

UNIT III **(18 hrs)**

Geodesics: Geodesics - Canonical Geodesic Equations - Normal Property of Geodesics - Existence Theorems - Geodesic Parallels - Geodesics Curvature - Gauss-Bonnet Theorem - Gaussian Curvature - Surface of Constant Curvature.

Chapter II: Sections 10 - 18.

UNIT IV **(18 hrs)**

Non Intrinsic Properties of a Surface: The Second Fundamental Form - Principle Curvature - Lines of Curvature - Developable - Developable Associated with Space Curves and with Curves on Surface - Minimal Surfaces - Ruled Surfaces.

Chapter III: Sections 1 - 8.

UNIT V **(18 hrs)**

Compact Surfaces whose Points Are Umblics - Hilbert's Lemma - Compact Surface of Constant Curvature - Complete Surface and Their Characterization - Hilbert's Theorem - Conjugate Points on Geodesics.

Chapter IV: Sections 1 – 8.

TEXTBOOK

1. Willmore,T.J. *An Introduction to Differential Geometry,* New Delhi: Oxford University Press (Indian Print) (17th Impression), 2002.

REFERENCES

Books

1. Struik, D.T. *Lectures on Classical Differential Geometry*. Addison – Wesley, Mass. 1950.
2. Kobayashi, S. and Nomizu, K. *Foundations of Differential Geometry*. Inter science Publishers, 1963.
3. Wilhelm Klingenberg. *A course in Differential Geometry*. Graduate Texts in Mathematics, Springer-Verlag, 1978.

4. Thorpe, J. A. *Elementary topics in Differential Geometry*. Under- graduate Texts in Mathematics, Springer – Verlag, 1979.

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2. http://ocw.mit.edu/ocwweb/Mathematics
3. http://www.opensource.org
4. www.physicsforum.com

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER- IV
CORE COURSE –XIII: PROJECT WITH VIVA VOCE (23PMAJ41)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 10 **INT. MARKS : 25**
CREDITS : 7 **EXT. MARKS : 75**
DURATION : 150 hrs **MAX. MARKS: 100**

Course Objectives

- To familiarize the students with the objectives and stages in formulating a Research Project
- To enable the learners to identify the different stages of Research Methodology
- To employ the accurate documentation in executing Research project

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: identify the unexplored areas of research
CO2[K2]: outline the objectives in formulating a research paper
CO3[K3]: apply the latest rules of documentation to cite Print, Non-print and Web Publications in a research paper
CO4[K4]: analyze the stages in writing a thesis – collecting and evaluating Sources and drafting documentation
CO5[K6]: prepare a rightly documented research project with adequate discussion, interpretation and evaluation

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	3	2	1	2	1	1	1
CO2[K2]	3	2	2	2	1	1	1
CO3[K3]	3	2	2	2	1	1	1
CO4[K4]	3	2	3	3	1	1	1
CO5[K6]	2	2	3	3	2	1	1
Weightage of the course	14	10	11	12	6	5	5
Weighted percentage of Course contribution	4.23	3.82	6.04	6.32	14.29	4.24	5.32

to POs							

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

Guidelines

1. Students are required to submit a project at the end of the IV semester.
2. The student will work under a faculty member as the research guide.
3. Depending on the interest of the students, project research areas will be chosen.
4. Students must meet the guide periodically.
5. The project carries 100 marks of which 25 Marks for Internal Assessment and 75 Marks for External Examination.
6. There will be two project review sessions.
7. Each student must either present paper or participate in Conferences/Seminars related to his/her Project work.
8. A draft of the final project report should be submitted to the Project Guide for review at least three weeks prior to the end of the semester.
9. The project report should be of minimum 40 pages (excluding bibliography & appendices)
10. Three copies of the final project report should be submitted.
11. The Head of the department and the Project Guide will evaluate the final Project Report.
12. The viva voce board shall consist of the External Examiner, the Head of the Department and the Internal Examiner (Research Project Guide)

The following rubrics will be taken into account for the evaluation of Project work and viva-voce:

Internal Assessment (25 Marks)		**External Examination (75 Marks)**	
Project Report & Review	: 15 Marks	Project Report	: 25 Marks
PowerPoint Presentation	: 5 Marks	Viva Voce	: 50 Marks
Participation/Publications in Conferences or Seminars	: 5 Marks		

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - IV
ELECTIVE COURSE GENERIC/DISCIPLINE SPECIFICS -VI: ALGEBRAIC TOPOLOGY
(23PMAO41)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 4 **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 60 hrs **MAX. MARKS : 100**

Course Objectives

- To know the fundamentals of algebraic topology
- To find algebraic invariants that classify topological spaces up to homeomorphism

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the basic terminologies in algebraic topology
CO2[K2]: explain the fundamental concepts of algebraic topology
CO3[K3]: apply the abstract concepts to produce the proofs of results that arise in the context of algebraic topology
CO4[K4]: analyze the characterization of simplicial homology groups, the fundamental groups and covering spaces
CO5[K5]: evaluate the structure of simplicial homology groups, the fundamental groups and covering spaces

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	2	1	1	-	-	-
CO2[K2]	3	2	2	2	-	1	1
CO3[K3]	3	2	2	2	1	1	1
CO4[K4]	3	2	2	2	1	1	1
CO5[K5]	3	3	3	2	1	1	1
Weightage of the course	14	11	10	09	03	04	04

Weighted percentage of Course contribution to POs	4.23	4.2	5.49	4.74	7.14	3.39	4.26

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(12 hrs)**

Geometric Complexes and Polyhedra: Introduction. Examples, Geometric Complexes and Poly- hedra, Orientation of geometric complexes.

Chapter 1: Sections 1.1 - 1.4

UNIT II **(12 hrs)**

Simplicial Homology Groups: Chains, cycles, Boundaries and homology groups, Examples of homology groups, The structure of homology groups- Simplicial Homology Groups(Contd.): The Euler Poincare's Theorem, Pseudomanifolds and the homology groups of Sn ;

Chapter 2: Sections 2.1 - 2.5

UNIT III **(12 hrs)**

Simplicial Approximation: Introduction, Simplicial approximation, Induced homomorphisms on the Homology groups, The Brouwer fixed point theorem and related results

Chapter 3: Sections 3.1 - 3.4

UNIT IV **(12 hrs)**

The Fundamental Group: Introduction, Homotopic Paths and the Fundamental Group, The Covering Homotopy Property for S 1 , Examples of Fundamental Groups.

Chapter 4: Sections 4.1 - 4.4

UNIT V **(12 hrs)**

Covering spaces: The definitions and some examples- Properties of covering spaces – Classification of covering space- universal covering space.

Chapter 5: Sections 5.1 - 5.4

TEXTBOOK

1. Fred h. Croom, Basic Concepts of Algebraic Topology, utm, springer - verlag, ny, 1978.

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Books

1. Eilenberg S, Steenrod N.: Foundations of Algebraic Topology; Princeton Univ. Press; 1952.

2. S.T. Hu: Homology Theory; Holden-Day; 1965.
3. Massey W.S.: Algebraic Topology : An Introduction; Springer Verlag NY; 1977.
4. C.T.C. Wall: A Geometric Introduction to Topology; Addison - Wesley Pub. Co. ReadingMass;1972

Web Sources

1. https://www.maths.tcd.ie/~dwilkins/Courses/421/421S6_0809.pdf
2. https://mathworld.wolfram.com/FundamentalGroup.html

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - IV
ELECTIVE COURSE GENERIC/DISCIPLINE SPECIFICS -VI: RESOURCE MANANGEMENT TECHNIQUES (23PMAO42)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 4 **INT. MARKS : 25**
CREDITS : 3 **EXT. MARKS : 75**
DURATION : 60 hrs **MAX. MARKS : 100**

Course Objectives

- To study about network optimization algorithms.
- To know about the methods and techniques of inventory control.
- To study about nonlinear programming algorithms.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: describe the problem solving process in network models, inventory models, non-linear programming problems, constrained and unconstrained optimization problems

CO2[K2]: explain the methods and algorithms of finding the optimum solution of network models, inventory models, non-linear programming problems, constrained and unconstrained optimization problems

CO3[K3]: solve network models, inventory models, non-linear programming problems, constrained and unconstrained optimization problems

CO4[K4]: investigate the solutions of network models, inventory models, non-linear programming problems, constrained and unconstrained optimization problems

CO5[K5]: determine the appropriate method of solving network models, inventory models, non-linear programming problems, constrained and unconstrained optimization problems

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	2	1	1	-	-	-
CO2[K2]	3	2	2	2	-	1	1
CO3[K3]	3	2	2	2	1	1	1
CO4[K4]	3	2	2	2	1	1	1
CO5[K5]	3	3	3	2	1	1	1
Weightage	14	11	10	09	03	04	04

of the course							
Weighted percentage of Course contribution to POs	4.23	4.2	5.49	4.74	7.14	3.39	4.26

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(12hrs)**

Network Models: Network Definitions – Minimal Spanning Tree Algorithm – Shortest - Route Problem - CPM and PERT.

Chapter 6: Sections 6.1 – 6.3, 6.6

UNIT II **(12hrs)**

Deterministic Inventory Models: General Inventory Model – Static Economic Order Quantity (EOQ) Model – Dynamic EOQ Models.

Chapter 11: Sections 11.1 – 11.3

UNIT III **(12hrs)**

Probabilistic Inventory Models: Continuous Review Models – Single Period Models – Multiperiod Model.

Chapter 16: Sections 16.1 – 16.3

UNIT IV **(12hrs)**

Classical Optimization Theory: Unconstrained Problems – Constrained Problems.

Chapter 20: Sections 20.1, 20.2

UNIT V **(12hrs)**

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

Chapter 21: Sections 21.1, 21.2(21.2.1 – 21.2.4)

TEXTBOOK

1. Taha, Hamdy A. *Operations Research An Introduction*. New Delhi: Prentice Hall of India Private Limited, Seventh Edition, 2003.

REFERENCES

Books

1. KantiSwarup, Gupta, P.K. and Man Mohan. *Operations Research*. New Delhi: Sultan Chand & Sons, Sixteenth Edition, 2012.

2. Premkumar Gupta, Er. and Kira, D.S. *Problems in Operations Research.* New Delhi: S.Chand and Company Ltd, 2012.
3. Hillier, Frederick S. and Lieberman, Gerald J. *Introduction to Operations Research.* New York: Tata McGraw-Hill, Eighth Edition, 2006.

Web Sources

1. https://www.scribd.com/document/415170803/Hamdy-A-Taha-Operations-Research-An-Introduction-2007-Prentice-Hall-PTR-Pearson-pdf
2. www.brainkart.com/article/Classical -optimaztion theory - 11259/
3. https://www.pdfdrive.com/introduction-to-operations-research-e34458313.html
4. https://www.pdfdrive.com/operations-research-e176219303.html
5. https://youtu.be/xGkpXk-AnWU

SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI
DEPARTMENT OF MATHEMATICS
PG Programme - M.Sc. Mathematics
SEMESTER - IV
SKILL ENCHANCEMENT COURSE: PROFESSIONAL COMPETENCY COURSE: TRAINING FOR COMPETITIVE EXAMINATIONS (23PMAS41)
(From 2023-2024 Batch onwards)

HOURS/WEEK: 4 (L-3, T-1) **INT. MARKS : 100**
CREDITS : 2
DURATION : 60 hrs

Course Objective

- To prepare the learners to face the challenges of the competitive examinations

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1[K1]: identify the formulas, identities related to binomial theorem, mathematical induction, permutation, combinations and describe the basic terminologies in reasoning, teaching aptitude and research methodology

CO2[K2]: explain the concepts related to teaching aptitude, research methods, reasoning, binomial theorem, mathematical induction, permutation and combinations

CO3[K3]: apply the concepts of reasoning, permutation and combination, mathematical induction, binomial theorems, teaching aptitude and research methodology to answer questions in competitive examinations

CO4[K4]: explore the choices of possible answers to the questions in competitive examinations

CO5[K5]: choose the best answer to the questions in competitive examinations

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1[K1]	2	2	1	1	-	2	1
CO2[K2]	2	3	1	1	-	2	1
CO3[K3]	2	3	1	1	-	2	1
CO4[K4]	2	3	1	1	-	2	2
CO5[K5]	2	3	1	1	-	2	2
Weightage of the course	10	14	05	05	-	10	07

Weighted percentage of Course contribution to POs	3.02	5.34	2.75	2.63	0	8.47	7.45

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

UNIT I **(12 hrs)**

Logical Reasoning - Data Interpretation – Information and Communication Technology - People and Environment – Higher Education System

Chapter II: Sections 36 - 39

UNIT II **(12 hrs)**

Permutation and Combination: The Fundamental Principle of Counting – Permutation as an Arrangement and combination – Meaning of P(n, r) and C(n, r) – Simple Applications. **Mathematical Induction:** Principle of Mathematical Induction and its Simple Applications.

Chapter I: Section 30

Chapter IV: Sections 1, 2

UNIT III **(12 hrs)**

Binomial Theorems and its Simple Applications: Binomial Theorem for Positive Integral Index – General Term and Middle Term – Properties of Binomial Coefficients and Simple Applications.

Chapter 3: Page 99 – 118

UNIT IV **(12 hrs)**

Teaching Aptitude: Introduction – What is Teaching? – Role of a Teacher – Teachers and Their Tasks – Characteristics of a Great/Good Teacher – Method of Teaching – Traditional Teaching Method - Modern Teaching Method – Teaching Aid – Teaching Learning Objectives – How to Write a Lesson Plan? – Evaluation System.

Chapter 1: Sections 1.1 – 1.13

UNIT V **(12 hrs)**

Research Methodology: Meaning and Characteristics of Research – Quality of a Good Researcher – Characteristics of the Researcher – Classification of Research –Steps of Research – What Research can do in Human Life? – The Variable – Standard of Good Research – How to find the Research Problem – Source of Research Problem – Criteria of Good Research Problem – Hypothesis.

Chapter 2: Sections 2.1 – 2.14

TEXTBOOKS

1. R. S. Aggarwal, *Quantitative* Aptitude. New Delhi: S. Chand & Company Ltd, 2012. **(UNITS I & II)**
2. T.K.ManicavachagomPillay, T.Natarajan and K.S.Ganapathy.*Algebra, Volume I*. Viswanathan Publication, 2012.**(Unit II &III)**
3. Narayan Changder. *Teaching & Research Aptitude for UGC/CBSE NET, B.ED*.**(UNITS IV & V)**

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Books

1. David S. Gunderson. *Handbook of Mathematical Induction Theory and Applications*. First Edition, 2010.
2. ShyamSaraf and AbhilashaSwarup. *Quantitative Aptitude and Reasoning.* First Edition.
3. K.V.S Madaan. *Teaching and Research Aptitude*. Third Edition, Pearson India Education Services Pvt. Ltd, 2019.

Web Sources

1. https://www.selfstudyworld.com/2022/09/rs-agarwal-aptitude-book-pdf-free-Download.html
2. https://sanjitkundugeo.files.wordpress.com/2017/12/ugc-net-book-for-paper-i.pdf
3. https://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/NET-UGC-Teaching-and-Learning-Aptitude-KVS-Madan.pdf
4. https://ncert.nic.in/pdf/publication/exemplarproblem/classXI/mathematics/keep208.pdf
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SRI KALISWARI COLLEGE (AUTONOMOUS), SIVAKASI

PG Programme

SEMESTER III & IV

EXTENSION ACTIVITY

(From 2023 -2024 Batch Onwards)

HOURS/WEEK: -

CREDIT : 1

DURATION : - **INT. MARKS : 100**

Course Objectives

- To promote community involvement, encourage civic participation, and foster a sense of ownership and responsibility.
- To involve the learners in organizing campaigns, seminars, or public events to educate the public, promote understanding, and advocate for positive change.
- To create platforms for knowledge sharing, partnership development, and collective action.
- To encourage environmental conservation, promote responsible resource management, or foster sustainable livelihoods.
- To raise awareness about social issues, advocate for marginalized groups, or implement programs that promote inclusivity and equal opportunities.

Course Outcomes (CO)

On successful completion of the course, the learners will be able to

CO1 [K1]: recognize the importance of community service through training and education

CO2 [K2]: interpret ecological concerns, consumer rights, gender issues & legal protection

CO3 [K3]: develop team spirit, verbal/nonverbal communication and organizational ethics by participating in community service

CO4 [K4]: examine the necessity of professional skills & community-oriented services for a holistic development

CO5 [K6]: create awareness on human rights, legal rights, First Aid, Physical fitness and wellbeing

CO-PO Mapping table (Course Articulation Matrix)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1 [K1]	2	-	-	2	2	1	1
CO2 [K2]	2	1	-	2	1	1	1
CO3 [K3]	2	-	-	1	2	2	1
CO4 [K4]	1	1	1	1	2	2	1
CO5 [K6]	1	-	-	1	2	2	1
Weightage of	08	02	01	07	09	08	05

the course							
Weighted percentage of Course contribution to Pos	2.42	0.76	0.55	3.68	21.43	6.78	5.32

Based on the level of contribution ('3'-High, '2'-Medium, '1'-Low '-' No Correlation)

Details of the Courses

1. Physical Education
2. Red Ribbon Club (RRC)
3. Youth Red Cross (YRC)
4. Fine Arts Club
5. Library and Information Service Club
6. Yoga Club
7. ECO Club
8. Consumer Club
9. Human Rights Club
10. Women Empowerment Cell
11. Legal Awareness League