FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A++" Grade by NAAC (4th Cycle)
Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT : MATHEMATICS

NAME OF THE PROGRAMME : M.Sc. MATHEMATICS

PROGRAMME CODE : PSMA

ACADEMIC YEAR : 2023 - 2024

Minutes of the Board of Studies meeting in the Department of Mathematics to be implemented from 2023-2024 onwards.

Venue : B5
Convened on : 5.4.2023 Convened at : 2pm.

Members Present : Name with Initial and Designation)

1.	Dr. S. Muralisankar Professor School of Mathematics Madurai Kamaraj University Madurai - 625021	University Nominee
2.	Dr. M. Navaneethakrishnan Associate Professor & Head Department of Mathematics Kamaraj College, Thoothukudi - 628003	Subject Expert.
3.	Dr. D. Muthuramakrishnan Dean of Sciences, Head of the Department Department of Mathematics National College, Trichy - 620001	Subject Expert.
4.	Dr. K. P. V. Preethi. Assistant Professor Department of Mathematics	Alumna.

	Saiv Bhanu Kshatriya College, Aruppukottai - 626101	
5.	Ms. S. Sindhuja, Senior Statistical Officer NSSO(FOD)TN(N) Chennai. R.O. Ministry of Statistics & P.I Government of India. Chennai.	Industrialist
6.	Dr. A. Paulin Mary Associate Professor.	Head of the Dept.
7.	Dr. A. Rajeswari Assistant Professor	Dean of Academic Affairs
8.	Mrs. A. Sheela Roselin	Staff Member
9.	Dr. Sr. M. Fatima Mary	"
10.	Dr. C. Prasanna Devi	"
11.	Dr. F. Helena	"
12.	Mrs. Nigila Ragavan	"
13.	Mrs. M. Teresa Nirmala.	"
14.	Dr. V. Vanitha	"
15.	Dr. M. V. Selvi Meenakshi	"
16.	Dr. A. Jose Little Flower	"
17.	Mrs. R. Rajeswari	"
18.	Mrs. R. Jenovi Rosary Deepa	"
19.	Mrs. B. Velta Mary Jacqueline.	"
20	Mrs. J. Annal Mercy	"
21.	Dr. K. Amutha	"
22.	Dr. M. Subha	"
23	Dr. J. Joseline Charishma	

Minutes of the Board of Studies:

1. PRESENTATION OF THE ACTION TAKEN REPORT

Action Taken Report for 2022-2023 UG

S.No	Common Suggestions offered in the Previous Board.	Action Taken for the Academic year 2022-23
1.	The Board recommended to introduce Variable Separable method in Unit I, "Differential Equations of First order' of 19M2CC3/19G2CC3, "Differential Equations".	Introduced Variable Separable method in Unit-I, 'Differential Equations of First order' of the Core paper 19M2CC3/19G2CC3 - "Differential Equations"
2.	The Board recommended to introduce variable Separable method in Unit-I, "Differential Equations of First order' of 21M2ACP2, "Allied Mathematics -II"	Introduced Variable Separable method in Unit-I, 'Differential Equations of First order' of the Allied paper 21M2ACP2, "Allied Mathematics -II"
3.	The Board recommended to introduce Linear Equations in Unit-III, Exact 'Differential Equations & Hr. order of 21M4ACC2, "Allied Mathematics -I"	Introduced Linear Equations in Unit-III, Exact "Differential Equations and Higher orders of the Allied paper, 21M4ACC2, - "Allied Mathematics -I"
4.	The Board recommended to remove Unit IV, "Simple	Removed Unit IV, "Simple Harmonic

Harmonic Motion' and to include 'Moment of Inertia' and to rearrange the units according to the chapters given in the text-book of 22M6CC14 - Dynamics.	Motion' and included "Moment of Inertia' and rearranged the units according to the chapters given in the text book of 22M6CC14 - Dynamics.

Action Taken Report for 2022-2023 - PG.

1.	The Board recommended to remove 'Bertrand's Theorem' from Unit-V, Classification of orbits' of 19PG1M4, "Classical Mechanics"	Removed 'Bertrand's theorem' from Unit V, Classification of orbits of 19PG1M4 - Classical Mechanics.
2.	The Board recommended to remove Appendix from Unit-I - 'The Real and Complex number Systems' of 19PG1M2 - Real Analysis	Removed Appendix from Unit I - 'The Real and Complex number Systems' of 19PG1M2 - Real Analysis
3.	The Board recommended to include Justification of the power Series Method in Unit-II - "Linear Equations with Variable Coefficients" of 19PG2M7 - Differential Equations	Introduced Justification of the power Series Method' in unit - II - Linear Equations with Variable Coefficients' of 19PG2M7 - Differential Equations.
4.	The Board recommended to remove Unit V; Functions of Several Variables' and to divide 'Unit III into two Units in 22PG2M6 - Advanced	Removed 'Functions of Several Variables - Unit V' and divided Unit III into two Units in 22PG2M6 - Advanced

	Real Analysis	Real Analysis.
5.	The Board recommended to remove Unit V, "Measure and integration in a Product Space' and to divide the first Unit into two Units of 22PC2M9 - Measure and Integration.	Removed Unit V 'Measure and integration in a Product Space' and divided the first Unit into two Units of 22PC2M9, Measure and integration:
6.	The Board recommended to introduce 'The Tychonoff theorem in Unit V - Countability and Separation axioms' of 19PC3M12 - Topology.	Introduced 'The Tychonoff's theorem in Unit V - Countability and Separation axioms of 19PC3M12, - Topology

New Courses Introduced in 2022-23.

1.	The Board passed the Syllabi for new Skill based paper - 22M4SB2 - Trigonometry	The Syllabi passed by the board for new Skill based paper - 22M4SB2 - Trigonometry was implemented
2.	The Board passed the Syllabi for new Self Learning Course - 22UC4EMSL - Financial Mathematics	The Syllabi passed by the Board for new Self Learning Course - 22UC4EMSL - Financial Mathematics was implemented.
3.	The Board passed the Syllabi for new Value	The Syllabi passed by the Board for

	added Certificate Course 22UCVACM1 - Quantitative and Qualitative methods for Competitive Examinations.	new Value added Certificate Course. 22UCVACM1 - Quantitative and Qualitative Methods for Competitive Examinations. was implemented.
4.	The Board passed the Syllabi for new value added Certificate Course 22UCVACC1 - 'Concrete Mathematics'	The Syllabi passed by the Board for new Value added Certificate Course. 22UCVACC1 'Concrete Mathematics was implemented

Core Courses Introduced - UG.

S.No	Course Code	Course Title	Relevance to L	R	N	C	Scope for EMP	ENTRE	SD	Need for Introduction
1.	23MCC1	Algebra and Trigonometry				✓	✓			As per TANSCHE Guide Lines.
2.	23MCC2	Differential Calculus				✓	✓			
3.	23MCC3	Analytical Geometry				✓	✓			
4.	23MCC4	Integral Calculus.				✓	✓			

Elective Courses Introduced

S.No	Generic/ Discipline Specific with Sem.	Course Code	Course Title	Relevance to L	R	N	G	Scope for Emp	Entre	SD	Need for Introduction
1.	Discipline Specific	EC1	Mathematics -I&II for Physics	✓			✓				As per TANSCHE Guide Lines
2.	Discipline Specific	EC2	Mathematics -II for Physics Chemistry		✓			✓			

Skill Enhancement / Foundation / Ability Enhancement Course.

S.No.	SEC/FC/ AEC	Course Code	Course Title	Relevance to L	R	N	G	Scope for Emp	Entre	SD	Need for Introduction.
1.	SEC 1	23M1SE1/ 23G1SE1	Quantitative Aptitude			✓				✓	As per TANSCHE Guide Lines
2.	FC	23M1FC/ 23G1FC	Foundation Course.			✓				✓	
3.	SEC 2	23M2SE3/ 23G2SE3	Mathematics for Competitive Examinations			✓				✓	
4.	SEC 3	23M2SE2/ 23G2SE2	Data Interpretation			✓				✓	

I PG - Core Courses Introduced:

S.No	Course Code	Course Title	Relevance to				Scope for			Need for Introduction
			L	R	N	C	Emp	Entre	SD	
1.	23PG1M1	Algebraic Structures				✓			✓	As per TANSCHE Guidelines
2	23PG1M2	Real Analysis-I				✓			✓	
3	23PG1M3	Differential Equations				✓			✓	As per TANSCHE Guidelines
4	23PG2M4	Advanced Algebra				✓			✓	As per TANSCHE Guidelines
5	23PG2M5	Real Analysis-II				✓			✓	
6.	23PG2M6	Mechanics				✓				

Elective Courses Introduced.

S.No	Generic/ Discipline Specific	Course Code	Course Title	Relevance to				Scope for			Need for Introduction
				L	R	N	C	Emp	Entre	SD	
1.	Discipline Specific	23PG1ME3	Number Theory				✓				As per TANSCHE Guidelines
2.	D.S.	23PG1ME4	Fuzzy Sets and its applications				✓				
3	D.S.		Mathematical Statistics				✓				
4.	D.S.		Graph Theory				✓				

Skill Enhancement / Ability Enhancement Course

S.No.	SEC / AECC	Course Code	Course Title	Relevance to				Scope for			Need for Introduction
				L	R	N	A	Emp	Entre	SD	
1.	SEC1	23PA1SE1	Optimization Method - I			✓					As per TANSCHE Guidelines
2.	SEC2	23PA2SE1	Optimization Method - II			✓					

1. Introduction of Value-added Course - Certificate / Diploma / Advanced Diploma - Nil.

2. Introduction of Purely Skill-Embedded Certificate / Diploma / Advanced Diploma Course - Nil.

The Board Scrutinized II & III UG Syllabus and II PG Syllabus. The Board approved the Syllabus for new Elective papers:
23M5ME1 / 23G5ME1 - Numerical Methods and
23M5ME2 / 23G5ME2 - Vector Calculus and Fourier Transforms.

The Board also approved the following Allied / Elective Courses offered by the Mathematics Department (BF) for B.Sc. I:
19G1AL11 - Discrete mathematics, 19G2AL12 - Operations Research

The Board approved the following papers for III and IV Semesters of M.Sc Mathematics

III Semester

CC7 - Complex Analysis
CC8 - Measure theory
CC9 - Topology
EC5 - Algebraic Number Theory
Core Industry Module - Industrial Statistics.
SE3 - By the Dept - Research Methodology

IV Semester

Functional Analysis
Differential Geometry
Combinatorics
EC6 - Formal Languages
Professional Competency Skill Enhancement Course - NET / UGC-CSIR / SET / TRB Competitive Examinations - By the Dept.

The Board approved the following papers for III, IV, V & VI Semesters of B.Sc Mathematics.

III Semester

CC5 - Vector Calculus and its Applications.
CC6 - Differential Equations and its Applications

EC3 - Mathematics for Computer Science-I
Linear Programming

SEC 4 - MATLAB.
SEC 5 - Fourier Transforms.

Semester IV

CC7 - Industrial Statistics.

CC8 - Mathematical Analysis

EC4 - 1. Mathematics for Computer Science II

2. Mathematics II for Chemistry

SEC7 - Applications of Differential Equations and Calculus

Semester V

CC9 - Abstract Algebra

CC10 - Real Analysis

CC11 - Mathematical Modelling

EC5 - Numerical Methods.

EC6 - Fuzzy Sets and its Applications

CC12 - Project with Viva Voce.

Semester VI

CC13 - Linear Algebra

CC 14 - Complex Analysis

CC 15 - Mechanics.

EC7 - Operations Research.

EC8 - Lattices and Boolean Algebra

The Board Scrutinized II & III UG Syllabus and there are no changes in the Syllabus. The following are the Papers without any change.

UG - 19M3CC5/19G3CC5 - Modern Algebra
19M3CC6/19G3CC6 - Advanced Statistics.
19M4CC7/19G4CC7 - Sequences and Series
19M4CC8/19G4CC8 - Linear Algebra
19M5CC9/19G5CC9 - Real Analysis
19M5CC10/19G5CC10 - Statics
19M5CC11/19G5CC11 - Linear Programming
19M5CC12/19G5CC12 - Graph Theory
19M6CC13/19G6CC13 - Complex Analysis
22M6CC14/22G6CC14 - Dynamics
19M6CC15/19G6CC15 - Operations Research
19M6ME3/19G6ME3 - Fuzzy Mathematics
19M6ME4/19G6ME4 - Theory of Numbers
19M6ME5/19G6ME5 - Lattices and Boolean Algebra
19M6ME6/19G6ME6 - Discrete Mathematics

PA - 19PA3M9 - Measure and Integration
19PA3M10 - Optimization Techniques
19PA3M11 - Combinatorics
19PA3M12 - Topology
21PA3ME1/19PA3ME2 - Fuzzy Sets and its Applications/Numerical Analysis
19PA4M13 - Complex Analysis
19PA4M14 - Statistics
19PA4M15 - Methods of Applied Mathematics
19PA4M16 - Functional Analysis
19PA4ME3 - Formal Languages
19PA4ME4 - Algebraic Graph Theory

NAME	SIGNATURE
1. Dr. A. Paulin Mary	A.P
2. S. MURALISANKAR	5/4/23
3. Dr. M. Navaneethakrishnan	5/4/23
4. Dr. D. Muthuramakrishnan	5/4/2023
5. Dr. K.P.V. Preethi	5/04/2023
6. A. Sheela Roselin	
7. Dr. Sr. M. Fatima Mary	
8. Dr. C. Prasanna Devi	
9. Dr. E. Helena	

10. Mrs. Nigila Ragavan

11. M. Teresa Nirmala — M. Teresa Nirmala

12. Dr. V. Vanitha

13. Dr. M. V. Sethu Meenakshi — M. V.

14. Dr. Jose Little Flower — A. Joselit

15. Mrs. R. Rajeswari — R. R

16. Mrs. R. Jenovi Rosary Deepa

17. Mrs. B. VETHAMARY JACQULINE — B. V

18. Mrs. J. Annaal Mercy — J. Anal M

19. Dr. K. Amutha.

20. Dr. M. Subha — M. S

21. Dr. J. JOSELINE CHARISMA

22. Dr. A. Rajeswari — 5/04/2023

05/04/2023

COLLEGE PROFILE

Fatima College (Autonomous), Mary Land, Madurai, is a Post Graduate and Research Institution for Women affiliated to Madurai Kamaraj University. It is a Catholic Minority institution established and run by St. Joseph's Society of Madurai (of the Congregation of the Sisters of St. Joseph of Lyons, France). This institution came into existence through the tireless efforts of the missionary sisters of St. Joseph of Lyons and the zeal and heroic sacrifice of Rev. Sr. Rose Benedicta, the Foundress of the College.

The College was started in St. Joseph's Campus Madurai as a Second Grade College with 63 students in 1953. It was upgraded into a Post Graduate College in 1964; Autonomous in 1990 and a Research Institute in 2004. The College now offers 21 Undergraduate Programmes, 13 Postgraduate Programmes, 2 Professional Programme, 5 M.Phil. Programmes and 6 Departments have become Research Centres. It has strength of 4134 Students, 206 Teaching Staff and 100 Non-Teaching Staff.

The comprehensive assessment by NAAC in 1999 placed Fatima College in Five Star Status of merit. The college strives to sustain excellence, quality and relevance while equipping the students to meet the demands of higher education in India. In 2004 UGC conferred on Fatima College the status of College with Potential for Excellence. In 2006 and 2013 NAAC Re-Accredited the College with 'A' Grade. The College was ranked 94th in the All India NIRF Ranking in 2019 by MHRD.

VISION

WOMEN'S EMPOWERMENT THROUGH EDUCATION

The vision of the college is to empower women by developing human capabilities through quality education based on Christian values, making them responsible citizens who can work for the advancement of the society and promote communal harmony in the multi-religious and multi-cultural reality of India eventually evolving into women of communion.

MISSION

To enhance quality of life through the development of individuals.

To enable women to become contributors in the economic, social and political development of India.

To equip the students with 21st century skill-sets with a focus on problem-solving abilities

To motivate them to work for social justice

To give preference to the rural economically backward and first-generation learners

To enable students to be employed in the technology oriented competitive market

VISION OF THE DEPARTMENT

To enhance quality of life through Mathematical skills and its applications

MISSION OF THE DEPARTMENT

To empower the students to contribute to the world of Mathematics by their inventions

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

A graduate of M.Sc. Mathematics programme after five years will be

PEO 1	Our graduates will be academic, digital and information literates, creative, inquisitive, innovative and committed researchers who would be desirous for the "more" in all aspects
PEO 2	They will be efficient individual and team performers who would deliver excellent professional service exhibiting progress, flexibility, transparency, accountability and in taking up initiatives in their professional work
PEO 3	The graduates will be effective managers of all sorts of real – life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating apt leadership skills
PEO 4	They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

GRADUATE ATTRIBUTES (GA)

Fatima College empowers her women graduates holistically. A Fatimite achieves all-round empowerment by acquiring Social, Professional and Ethical competencies. A graduate would sustain and nurture the following attributes:

SOCIAL COMPETENCE	
GA 1	Deep disciplinary expertise with a wide range of academic and digital literacy
GA 2	Hone creativity, passion for innovation and aspire excellence
GA 3	Enthusiasm towards emancipation and empowerment of humanity
GA 4	Potentials of being independent
GA 5	Intellectual competence and inquisitiveness with problem solving abilities befitting the field of research
GA 6	Effectiveness in different forms of communications to be employed in personal and professional environments through varied platforms
GA 7	Communicative competence with civic, professional and cyber dignity and decorum
GA 8	Integrity respecting the diversity and pluralism in societies, cultures and religions
GA 9	All – inclusive skill sets to interpret, analyse and solve social and environmental issues in diverse environments
GA 10	Self awareness that would enable them to recognise their uniqueness through continuous self-assessment in order to face and make changes building on their strengths and improving their weaknesses

GA 11	Finesse to co-operate exhibiting team-spirit while working in groups to achieve goals
GA 12	Dexterity in self-management to control their selves in attaining the kind of life that they dream for
GA 13	Resilience to rise up instantly from their intimidating setbacks
GA 14	Virtuosity to use their personal and intellectual autonomy in being life-long learners
GA 15	Digital learning and research attributes
GA 16	Cyber security competence reflecting compassion, care and concern towards the marginalised
GA 17	Rectitude to use digital technology reflecting civic and social responsibilities in local, national and global scenario
PROFESSIONAL COMPETENCE	
GA 18	Optimism, flexibility and diligence that would make them professionally competent
GA 19	Prowess to be successful entrepreuners and become employees of trans-national societies
GA 20	Excellence in Local and Global Job Markets
GA 21	Effectiveness in Time Management
GA 22	Efficiency in taking up Initiatives
GA 23	Eagerness to deliver excellent service
GA 24	Managerial Skills to Identify, Commend and tap Potentials
ETHICAL COMPETENCE	
GA 25	Integrity and be disciplined in bringing stability leading a systematic life promoting good human behaviour to build better society

GA 26	Honesty in words and deeds
GA 27	Transparency revealing one's own character as well as self-esteem to lead a genuine and authentic life
GA 28	Social and Environmental Stewardship
GA 29	Readiness to make ethical decisions consistently from the galore of conflicting choices paying heed to their conscience
GA 30	Right life skills at the right moment

PROGRAMME OUTCOMES (PO)

On completion (after years) of M. Sc Programme, the graduates would be able to

PO 1	**Acquire advanced research skills by utilising their Mathematical knowledge**
PO 2	**Develop analytical ability and carry out complex activities with an application approach**
PO 3	**Access the effective computability using Mathematical models**

PROGRAMME SPECIFIC OUTCOMES (PSO)

On completion (after two years) of M.Sc. Mathematics programme, the graduates would be able to

PSO 1	Develop proficiency in the analysis of complex mathematical problems and the use of Mathematical or other appropriate techniques to solve them.
PSO 2	Provide a systematic understanding of core mathematical concepts, principles and theories along with their applications.
PSO 3	Demonstrate the ability to conduct Research independently and pursue higher studies towards the Ph. D degree in Mathematics and computing.
PSO 4	Understand the fundamental axioms in Mathematics and develop Mathematical ideas based on them.
PSO 5	Provide advanced knowledge on topics in Pure Mathematics, empowering the students to pursue higher studies.

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

DEPARTMENT OF MATHEMATICS

For those who joined in June 2021 onwards

PROGRAMME CODE: PSMA

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
SEMESTER - I						
23PG1M1	Algebraic Structures	6	5	40	60	100
23PG1M2	Real Analysis-I	6	5	40	60	100
23PG1M3	Ordinary Differential Equations	6	4	40	60	100
23PG1ME1/23PG1ME2	Number Theory / Integral Transforms	5	3	40	60	100
23PG1ME3/23PG1ME4	Fuzzy Sets and its Applications / Differential Geometry	5	3	40	60	100
23PG1MAE	Linear Programming – EDC	4	2	40	60	100
	Library	3	-	-	-	-
Total		**30**	**19**			
SEMESTER - II						
23PG2M4	Advanced Algebra	6	5	40	60	100
23PG2M5	Real Analysis-II	6	5	40	60	100
23PG2M6	Mechanics	6	4	40	60	100

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
23PG2ME5/ 23PG2ME6	Mathematical Statistics / Statistical Methods	4	3	40	60	100
23PG2ME7 / 23PG2ME8	Graph Theory / Numerical Analysis	4	3	40	60	100
23PG2MSE1	Optimization Methods – EDC	4	2	40	60	100
	Library	3	-	-	-	-
Total		**30**	**19**			
SEMESTER - III						
22PG3M9	Measure and Integration	6	4	50	50	100
19PG3M10	Optimization Techniques	6	4	40	60	100
19PG3M11	Combinatorics	6	4	40	60	100
19PG3M12	Topology	6	6	40	60	100
21PG3ME1/21PG3ME 2	Fuzzy sets and Applications/Numerical Analysis	4	4	40	60	100
	Library/Seminar	2	-	-	-	-
Total		**30**	**22**			
SEMESTER - IV						
19PG4M13	Complex Analysis	6	5	40	60	100
19PG4M14	Statistics	6	5	40	60	100
19PG4M15	Methods of Applied Mathematics	6	5	40	60	100
19PG4M16	Functional Analysis	6	5	40	60	100

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
19PG4ME3/19PG4ME4	Formal Languages/ Algebraic Graph Theory	4	4	40	60	100
19PG4MPR	Project*& Viva Voce	-	3	40	60	100
	Library/Seminar	2	-	-	-	-
Total		**30**	**30**			
	Total	**120**	**90**			

OFF-CLASS PROGRAMME

ADD-ON COURSES

Course Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
	SOFT SKILLS	40	4	I	40	60	100
	COMPUTER APPLICATIONS LaTex	40	4	II	40	60	100
	MOOC COURSES (Department Specific Courses/any other courses) * Students can opt other than the listed course from UGC-SWAYAM /UGC /CEC	-	Minimum 2 Credits	-	-	-	
	COMPREHENSIVE VIVA (Question bank	-	2	I-IV	-	-	100

	to be prepared for all the papers by the respective course teachers)						
	READING CULTURE	15/ Semester	1	I-IV	-	-	-
	TOTAL		13 +				

EXTRA CREDIT COURSE

Course Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
21PG2SLLM1	**VERBAL AND NUMERICAL APTITUDE FOR NATIONAL EXAMINATIONS**	-	4	II	40	60	100
19PGSLM1	**PROBLEMS IN ADVANCED MATHEMATICS**	-	4	III & IV	40	60	100

Summer Internship:

Duration-1 month (2nd Week of May to 2nd week of June-before college reopens)

Project:

Off class

Evaluation components-Report writing + Viva Voce (Internal marks-50) + External marks 50

EDC:

Syllabus should be offered for two different batches of students from other than the parent department in Sem-I & Sem-II

I M.Sc. Mathematics

SEMESTER – I

For those who joined in 2023 onwards

Employablility-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG1M1	Algebraic Structures	PG Core	6	5

COURSE DESCRIPTION

This course is designed to emphasis the study of Algebra.

COURSE OBJECTIVES

To introduce the concepts and to develop working knowledge on class equation, solvability of groups, finite abelian groups, linear transformations, real quadratic forms.

UNIT-I :

Counting Principle - Class equation for finite groups and its applications - Sylow's theorems (For theorem 2.12.1, First proof only).

UNIT-II :

Solvable groups - Direct products - Finite abelian groups- Modules

UNIT-III :

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

UNIT-IV :

Jordan form - rational canonical form.

UNIT-V:

Trace and transpose - Hermitian, unitary, normal transformations, real quadratic form.

TEXT BOOKS:

1. I.N. Herstein. *Topics in Algebra* (II Edition) Wiley Eastern Limited, New Delhi, 1975

Unit I : Chapter 2: Sections 2.11 and 2.12 (Omit Lemma 2.12.5)

Unit II: Chapter 5 : Section 5.7 (Lemma 5.7.1, Lemma 5.7.2, Theorem 5.7.1)

Chapter 2: Section 2.13 and 2.14 (Theorem 2.14.1 only)

Chapter 4: Section 4.5

Unit III : Chapter 6: Sections 6.4, 6.5

Unit IV : Chapter 6 : Sections 6.6 and 6.7

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

REFERENCE BOOKS

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

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Counting Principle	4	Chalk & Talk	Black Board
1.2	Class equation for finite groups	3	Chalk & Talk, Discussion	Black Board
1.3	Applications	4	Chalk & Talk, Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.4	Sylow's theorems	6	Chalk & Talk, Discussion	Black Board
UNIT -2				
2.1	Solvable groups	5	Chalk & Talk	Black Board
2.2	Direct products	4	Chalk & Talk	Black Board
2.3	Finite abelian groups	5	Chalk & Talk	Black Board
2.4	Modules	4	Chalk & Talk	Black Board
UNIT -3				
3.1	Linear Transformations	5	Chalk & Talk	Black Board
3.2	Canonical forms	4	Chalk & Talk	Black Board
3.3	Triangular form	4	Chalk & Talk	Black Board
3.4	Nilpotent transformations	3	Chalk & Talk	Black Board
UNIT -4				
4.1	Introduction	5	Chalk & TalkDiscussion	Black Board
4.2	Jordan form	4	Chalk & Talk Discussion	Black Board
4.3	rational canonical form	4	Chalk & Talk Discussion	Black Board
UNIT -5 ELLIPTIC FUNCTIONS				
5.1	Introduction	4	Chalk & Talk Discussion	Black Board
5.2	Trace and transpose	4	Chalk & Talk Discussion	Black Board
5.3	Hermitian, unitary	4	Chalk & Talk Discussion	Black Board
5.4	normal transformations	4	Chalk & Talk Discussion	Black Board
5.5	real quadratic form	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Recall basic counting principle, define class equations to solve problems, explain Sylow's theorems and apply the theorem to find number of Sylow subgroups .	K2 ,K3	PSO 1
CO 2	Define Solvable groups, define direct products, examine the properties of finite abelian groups, define modules	K2, K3	PSO 3
CO 3	Define similar Transformations, define invariant subspace, explore the properties of triangular matrix, to find the index of nilpotence to decompose a space into invariant subspaces, to find invariants of linear transformation, to explore the properties of nilpotent transformation relating nilpotence with invariants	K4	PSO 5
CO 4	Define Jordan, canonical form, Jordan blocks, define rational canonical form, define companion matrix of polynomial, find the elementary devices of transformation, apply the concepts to find characteristic polynomial of linear transformation	K2, K5	PSO 2
CO 5	Define trace, define transpose of a matrix, explain the properties of trace and transpose, to find trace, to find transpose of matrix, to prove Jacobson lemma using the	K2	PSO 4

	triangular form, define symmetric matrix, skew symmetric matrix, adjoint, to define Hermitian, unitary, normal transformations and to verify whether the transformation in Hermitian, unitary and normal		

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Mrs. Nigila Ragavan

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –I

For those who joined in 2023 onwards

Employablility-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG1M2	REAL ANALYSIS-I	PG Core	6	5

COURSE DESCRIPTION

This course provides a comprehensive idea about the principles of Real Analysis.

COURSE OBJECTIVES

To enable the students learn real number system, metric spaces, limits, continuity and differentiation.

UNITS

UNIT-I : 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 to 6.8

Infinite Series : Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series.

Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18

UNIT-II : 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 to 7.14

UNIT-III : The Riemann-Stieltjes Integral - Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes integrals-Necessary conditions for the existence of RS 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 criteriaon for existence of Riemann integrals. Chapter - 7 : 7.15 to 7.26

UNIT-IV : Infinite Series and infinite Products - Double sequences - Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series – Cesaro summability - Infinite products.

Chapter - 8 Sec, 8.20, 8.21 to 8.26

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 9.14 9.15, 9.19, 9.20, 9.22, 9.23

UNIT-V: 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 - 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.

Chapter -9 Sec 9.1 to 9.6, 9.8,9.9,9.10,9.11, 9.13

TEXT BOOK:

Tom M.Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1974.

UNIT-I : Chapter – 6 : Sections 6.1 to 6.8

Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18

UNIT-II : Chapter - 7 : Sections 7.1 to 7.14

UNIT-III : Chapter - 7 : 7.15 to 7.26

UNIT-IV : Chapter - 8 Sec, 8.20, 8.21 to 8.26

Chapter 9 : Sections 9.14 9.15, 9.19, 9.20, 9.22, 9.23

UNIT-V: Chapter -9 Sec 9.1 to 9.6, 9.8, 9.9, 9.10, 9.11, 9.13

REFERENCES:

1. Bartle, R.G. *Real Analysis*, John Wiley and Sons Inc., 1976.

2. Rudin,W. *Principles of Mathematical Analysis*, 3rd Edition. McGraw Hill Company, New York, 1976.

3. Malik,S.C. and Savita Arora. *Mathematical Anslysis*, Wiley Eastern Limited.New Delhi, 1991.

4. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, New Delhi, 1991.

5. Gelbaum, B.R. and J. Olmsted, *Counter Examples in Analysis*, Holden day, San Francisco, 1964.

6. A.L.Gupta and N.R.Gupta, *Principles of Real Analysis*, Pearson Education, (Indian print) 2003.

Website and e-Learning Source

http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics,

http://www.opensource.org, www.mathpages.com

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Properties of monotonic functions	4	Chalk & Talk Discussion	Black Board
1.2	Functions of bounded variation	4	Chalk & Talk Discussion	Black Board
1.3	Total variation	5	Chalk & Talk Discussion	Black Board
1.4	Additive property of total variation	5	Chalk & Talk Discussion	Black Board
1.5	Continuous functions of bounded variation	3	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -2				
2.1	Change of variable in a Riemann-Stieltjes integral	5	Chalk & Talk Discussion	Black Board
2.2	Reduction to a Riemann Integral	3	Chalk & Talk Discussion	Black Board
2.3	Euler's summation formula	3	Chalk & Talk Discussion	Black Board
2.4	Monotonically increasing integrators	3	Chalk & Talk Discussion	Black Board
2.5	Upper and lower integrals	3	Chalk & Talk Discussion	Black Board
2.6	Riemann's condition - Comparison theorems.	3	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Sufficient conditions for the existence of Riemann-Stieltjes integrals	4	Chalk & Talk Discussion	Black Board
3.2	Necessary conditions for the existence of RS integrals	5	Chalk & Talk Discussion	Black Board
3.3	Mean value theorems	4	Chalk & Talk Discussion	Black Board
3.4	Second fundamental theorem of integral calculus	5	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Infinite Series and infinite Products	3	Chalk & Talk Discussion	Black Board
4.2	**Power series**	4	Chalk & Talk Discussion	Black Board
4.3	Bernstein's theorem	4	Chalk & Talk Discussion	Black Board
4.4	Abel's limit theorem	4	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Sequences of Functions	3	Chalk & Talk Discussion	Black Board
5.2	Pointwise convergence of sequences of functions	5	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.3	Uniform convergence and continuity	4	Chalk & Talk Discussion	Black Board
5.4	Cauchy condition for uniform convergence	4	Chalk & Talk Discussion	Black Board
5.5	Uniform convergence and differentiation	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Describe analysis concepts in Functions of bounded variation and Infinite series	K2	PSO1& PSO2
CO 2	Explain concepts of Reimann Steljes Integral	K2 & K3	PSO3
CO 3	Descirbe the theorems on Reimann Steljes Integral	K3 & K2	PSO4
CO 4	Describe Infinite products	K2 & K4	PSO5
CO 5	Describe Sequences of function	K2 & K4	PSO3

CIA	

Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Sheela Roselin

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –I

For those who joined in 2023 onwards

Entrepreneurship -100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG1M3	ORDINARY DIFFERENTIAL EQUATIONS	PG Core	6	4

COURSE DESCRIPTION

This course will provide the knowledge for solving of ordinary and partial differential equations in physical and other phenomena.

COURSE OBJECTIVES

To give an in-depth knowledge for solving differential equations which are frequently used in Physics, Chemistry, Biology, Economics and Mechanics.

UNIT-I: LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS (18 HRS.)

Second order homogeneous equations-Initial value problems-Linear dependence and independence-Wronskian and a formula for Wronskian-Non-homogeneous equation of order two.

UNIT-II: LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS (18 HRS.)

Homogeneous and non-homogeneous equation of order n –Initial value problems- Annihilator method to solve non-homogeneous equation- Algebra of constant coefficient operators.

UNIT-III: LINEAR EQUATION WITH VARIABLE COEFFICIENTS (18 HRS.)

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.

UNIT-IV: LINEAR EQUATION WITH REGULAR SINGULAR POINTS (18 HRS.)

Euler equation – Second order equations with regular singular points –Exceptional cases – Bessel Function.

UNIT-V: EXISTENCE AND UNIQUENESS OF SOLUTIONS TO FIRST ORDER EQUATIONS **(18 HRS.)**

Equation with variable separated – Exact equation – method of successive approximations – the Lipschitz condition – convergence of the successive approximations and the existence theorem.

TEXT BOOKS:

1. E. A. Coddington, *A introduction to ordinary differential equations* (3rd Printing) Prentice-Hall of India Ltd., New Delhi, 1987.

UNIT-I: Chapter 2: Sections 1 to 6

UNIT-II: Chapter 2: Sections 7 to 12.

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

UNIT-IV: Chapter 4: Sections 1 to 4 and 6 to 8(Omit sections 5 and 9)

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

REFERENCES:

1. S. G. Deo, & V. Raghvendra Rao- *Ordinary Differential Equations and stability Theory* - Prentice Hall Second Edition - 1988
2. John. F, Narosa - *Partial Differential Equations* - 3rd Edition – 1979
3. D. Somasundaram, Narosa - *Ordinary Differential Equations* -Narosa Publishing House - Fifth Reprint -2011.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Second order homogeneous equations	4	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.2	Initial value problems	4	Chalk & Talk Discussion	Black Board
1.3	Linear dependence and independence	5	Chalk & Talk Discussion	Black Board
1.4	Non-homogeneous equation of order two.	5	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Homogeneous and non-homogeneous equation of order n	5	Chalk & Talk Discussion	Black Board
2.2	Initial value problems	5	Chalk & Talk Discussion	Black Board
2.3	Annihilator method to solve non-homogeneous equation	4	Chalk & Talk Discussion	Black Board
2.4	Algebra of constant coefficient operators.	3	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Initial value problems	4	Chalk & Talk Discussion	Black Board
3.2	Existence and uniqueness theorems	5	Chalk & Talk Discussion	Black Board
3.3	Solutions to solve a non-homogeneous equation	4	Chalk & Talk Discussion	Black Board
3.4	The Legendre equation	5	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Euler equation	4	Chalk & Talk Discussion	Black Board
4.2	Second order equations with regular singular points	4	Chalk & Talk Discussion	Black Board
4.3	Bessel Function	4	Chalk & Talk Discussion	Black Board
UNIT -5				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.1	*Equation with variable separated*	3	Chalk & Talk Discussion	Black Board
5.2	*Exact equation*	5	Chalk & Talk Discussion	Black Board
5.3	*method of successive approximations*	4	Chalk & Talk Discussion	Black Board
5.4	*Lipschitz condition*	4	Chalk & Talk Discussion	Black Board
5.5	*convergence of the successive approximations*	4	Chalk & Talk Discussion	Black Board
5.6	*existence theorem.*			

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Establish the qualitative behavior of solutions of systems of differential equations.	K1	PSO1& PSO2
CO 2	Recognize the physical phenomena modeled by differential equations and dynamical systems.	K2 & K3	PSO3
CO 3	Analyze solutions using appropriate methods and give examples.	K1 & K2	PSO4
CO 4	Formulate Green's function for boundary value problems.	K1 & K4	PSO5

CO 5	Understand and use various theoretical ideas and results that underlie the mathematics in this course.	K2 & K4	PSO3

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. A. Paulin Mary

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER – I

For those who joined in 2023 onwards

Skill Development - 100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG1ME1	NUMBER THEORY	PG Elective	5	3

COURSE DESCRIPTION

This course discovers interesting and unexpected relationships between different sorts of numbers and to prove that these relationships are true.

COURSE OBJECTIVES

To help the students to learn the concepts of Divisibility, Congruences, Quadratic Reciprocity, some functions and Diophantine equations in Number Theory.

UNITS

UNIT –I DIVISIBILITY (15 HRS.)

Divisibility, Primes.

UNIT –II CONGRUENCES (15 HRS.)

Congruences, Solutions of Congruences, Congruences of Degree 1, the Function φ (n).

UNIT –III QUADRATIC RECIPROCITY (15 HRS.)

Quadratic Residues, Quadratic Reciprocity, the Jacobi Symbol.

UNIT –IV SOME FUNCTIONS OF NUMBER THEORY (15 HRS.)

Greatest Integer Function, Arithmetic Functions, the Moebius Inversion Formula.

UNIT –V SOME DIOPHANTINE EQUATIONS (15 HRS.)

Diophantine Equations, The Equation $x^2 + y^2 = z^2$, Sums of Four and Five Squares, Sum of Two Squares.

TEXT BOOK:

1. Ivan Nivan and Herbert S. Zuckerman, *An Introduction to the Theory of Numbers,* Third Edition, Wiley Eastern Ltd, 1976.

Unit 1: Chapter 1: 1.2 , 1.3

Unit 2: Chapter 2: 2.1 – 2.4

Unit 3: Chapter 3: 3.1 – 3.3

Unit 4: Chapter 4: 4.1 – 4.3

Unit 5: Chapter 5: 5.1, 5.5, 5.7, 5.10

REFERENCES

1. T. M. Apostle, *Introduction to Analytic number theory*, Narosa Publishing House, 1998.

2. D.M. Burton, *Elementary Number Theory*, McGraw Hill Book Company, 7th Edition, 2006.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Introduction	4	Chalk & Talk Discussion	Black Board
1.2	Divisibility	4	Chalk & Talk Discussion	Black Board
1.3	Primes	5	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Congruences	5	Chalk & Talk Discussion	Black Board
2.2	Solutions of Congruences	4	Chalk & Talk Discussion	Black Board
2.3	Congruences of Degree 1	3	Chalk & Talk Discussion	Black Board
2.4	the Function φ (n)	4	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Quadratic Residues	4	Chalk & Talk Discussion	Black Board
3.2	Quadratic Reciprocity	5	Chalk & Talk Discussion	Black Board
3.3	the Jacobi Symbol	4	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Greatest Integer Function	3	Chalk & Talk Discussion	Black Board
4.2	Arithmetic Functions	4	Chalk & Talk Discussion	Black Board
4.3	The Moebius Inversion Formula.	4	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Diophantine Equations	4	Chalk & Talk Discussion	Black Board
5.2	The Equation $x^2 + y^2 = z^2$	4	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.3	Sums of Four and Five Squares	4	Chalk & Talk Discussion	Black Board
5.4	Sum of Two Squares	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Define and interpret the concepts of divisibility	K2, K3, K4, K5	PSO1
CO 2	Explain properties of congruences	K2, K3, K4, K5	PSO3
CO 3	Apply the Law of Quadratic Reciprocity	K2, K3, K4, K5	PSO5
CO 4	Classify functions of number theory	K2, K3, K4, K5	PSO4
CO 5	Solve Linear Diophantine equation	K2, K3, K4, K5	PSO2

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

SCHOLASTIC	NON - SCHOLASTIC	MARKS

C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2 C3	Test (CIA 2) Assignment		1 2 *	10 Mks 5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Mrs. Nigila Ragavan

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER – I

For those who joined in 2023 onwards

Skill Development - 100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG1ME2	INTEGRAL TRANSFORMS	PG Elective	5	3

COURSE DESCRIPTION

This course discovers interesting and unexpected relationships between transforms.

COURSE OBJECTIVES

To help the students to learn the concepts of various transforms such as Laplace transform, Fourier transform, Mellin transform and z-transform.

UNITS

UNIT –I LAPLACE TRANSFORM (15 HRS.)

Definition of Laplace Transform, Laplace transforms of some elementary functions, Properties of Laplace transform, Laplace transform of the derivative of a function, Heaviside's expansion theorem, Application of Laplace transform to solutions of ODEs and PDEs.

UNIT –II INVERSE LAPLACE TRANSFORM

Inverse Laplace Transform, Properties of Inverse Laplace Transform, Inverse Laplace Transform of derivatives, Convolution Theorem

Unit -III FOURIER TRANSFORM (15 HRS.)

Fourier Integral theorem, Properties of Fourier Transform, Inverse Fourier Transform, Convolution Theorem, Fourier Transform of the derivatives of functions, Parseval's Identity, Relationship of Fourier and Laplace Transform, Application of Fourier transforms to the solution of initial and boundary value problems.

Unit -IV MELLIN TRANSFORM (15 HRS.)

Properties and evaluation of Mellin transforms, Convolution theorem for Mellin transform, Complex variable method and applications.

UNIT –V Z-TRANSFORM SOME FUNCTIONS (15 HRS.)

Definition of Z-transform, Inversion of the Z-transform, Solutions of difference equations using Z-transform.

TEXT BOOK:

1. Brian Davies, Integral transforms and their Applications, Springer.
2. L. Andrews and B. Shivamogg, Integral Transforms for Engineers, Prentice Hall of India.
3. I.N.Sneddon, Use of Integral Transforms, Tata-McGraw Hill.
4. R. Bracemell, Fourier Transform and its Applications, MacDraw hill.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Definition of Laplace Transform	4	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.2	Laplace transforms of some elementary functions	4	Chalk & Talk Discussion	Black Board
1.3	Properties of Laplace transform	5	Chalk & Talk Discussion	Black Board
1.4	Laplace transform of the derivative of a function	5	Chalk & Talk Discussion	Black Board
1.5	Heaviside's expansion theorem	3	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Inverse Laplace Transform	5	Chalk & Talk Discussion	Black Board
2.2	Properties of Inverse Laplace Transform	3	Chalk & Talk Discussion	Black Board
2.3	Inverse Laplace Transform of derivatives	3	Chalk & Talk Discussion	Black Board
2.4	Convolution Theorem	3	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Fourier Integral theorem	4	Chalk & Talk Discussion	Black Board
3.2	Properties of Fourier Transform	3	Chalk & Talk Discussion	Black Board
3.3	Inverse Fourier Transform	4	Chalk & Talk Discussion	Black Board
3.4	Convolution Theorem	3	Chalk & Talk Discussion	Black Board
3.5	Relationship of Fourier and Laplace Transform	3	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Properties and evaluation of Mellin transforms	3	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.2	Convolution theorem for Mellin transform	5	Chalk & Talk Discussion	Black Board
4.3	Complex variable method	4	Chalk & Talk Discussion	Black Board
4.4	Applications	3	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Definition of Z-transform	4	Chalk & Talk Discussion	Black Board
5.2	Inversion of the Z-transform	5	Chalk & Talk Discussion	Black Board
5.3	Solutions of difference	4	Chalk & Talk Discussion	Black Board
5.4	equations using Z-transform	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Define Laplace Transform and apply them to solve differential equations	K2, K3, K4, K5	PSO1
CO 2	Define Inverse Laplace Transform and solve problems	K2, K3, K4, K5	PSO3
CO 3	Define Fourier Transform and use them to solve differential equations	K2, K3, K4, K5	PSO5
CO 4	Define Mellin Transform and use them to solve differential equations	K2, K3, K4, K5	PSO4
CO 5	Define Z-Transform and use them to solve differential equations	K2, K3, K4, K5	PSO2

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2 C3	Test (CIA 2) Assignment		1 2 *	10 Mks 5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2

CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. E. Helena

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –I

For those who joined in 2023 onwards

Employablility-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG1ME3	FUZZY SETS AND ITS APPLICATIONS	Lecture	5	3

COURSE DESCRIPTION

This course is focused on the fundamental theory of fuzzy sets, fuzzy logic which can be applied in data mining and decision making in various fields.

COURSE OBJECTIVES

To enable the students to understand the basic concepts of Crisp sets, Fuzzy sets, operations on fuzzy set, Fuzzy relations and applications of Fuzzy sets.

UNIT –I CRISP SETS AND FUZZY SETS (15 HRS.)

Crisp sets: An over view, the notion of Fuzzy sets, Basic concepts of Fuzzy sets, Classical Logic: an over view, Fuzzy logic.

UNIT –II OPERATIONS ON FUZZY SETS (15 HRS.)

General discussion, Fuzzy Complements, Fuzzy Union, Fuzzy Intersection, Combinations of operations.

UNIT –III FUZZY RELATIONS (15 HRS.)

Crisp and Fuzzy Relations, Binary Relations on a single set, Equivalence and similarity Relations.

UNIT –IV FUZZY MEASURES (15 HRS.)

General Discussion, Belief and Plausibility Measures, Possibility and Necessity Measures.

UNIT –V APPLICATIONS (15 HRS.)

General Discussion, natural, Life and Social Sciences, Engineering, Medicine and Management and Decision making.

TEXT BOOK:

1.George J. Klir And Tina A. Folger, *Fuzzy Sets*, Uncertainty and Information-Prentice Hall of India Private Limited, New Delhi – 1, 2009.

REFERENCES:

1. George J. Llir and Boyuan, *Fuzzy Sets and Fuzzy logic, Theory and applications*- Prentice Hall of India, 2002.

2. Zimmermann, *Fuzzy Set Theory and its applications*, Affiliated East West Press Pvt , Ltd, Second Edition 1996.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 CRISP SETS AND FUZZY SETS				
1.1	Crisp sets: An over view	4	Chalk & Talk Discussion	Black Board
1.2	The notion of Fuzzy sets	4	Chalk & Talk Discussion	Black Board
1.3	Basic concepts of Fuzzy sets	5	Chalk & Talk Discussion	Black Board
1.4	Classical Logic: an over view	5	Chalk & Talk Discussion	Black Board
1.5	Fuzzy logic	3	Chalk & Talk Discussion	Black Board
UNIT -2 OPERATIONS ON FUZZY SETS				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.1	General discussion of fuzzy operations	5	Chalk & Talk Discussion	Black Board
2.2	Fuzzy Complements	3	Chalk & Talk Discussion	Black Board
2.3	Fuzzy Union	3	Chalk & Talk Discussion	Black Board
2.4	Fuzzy Intersection	3	Chalk & Talk Discussion	Black Board
2.5	Combinations of operations	3	Chalk & Talk Discussion	Black Board
UNIT -3 FUZZY RELATIONS				
3.1	Crisp Relations	4	Chalk & Talk Discussion	Black Board
3.2	Fuzzy Relations	5	Chalk & Talk Discussion	Black Board
3.3	Binary Relations on a single set	4	Chalk & Talk Discussion	Black Board
3.4	Equivalence Relations	5	Chalk & Talk Discussion	Black Board
3.5	Similarity Relations	3	Chalk & Talk Discussion	Black Board
UNIT -4 FUZZY MEASURES				
4.1	General Discussion fuzzy measures	3	Chalk & Talk Discussion	Black Board
4.2	Belief Measures	4	Chalk & Talk Discussion	Black Board
4.3	Plausibility Measures	4	Chalk & Talk Discussion	Black Board
4.4	Possibility Measures	4	Chalk & Talk Discussion	Black Board
4.5	Necessity Measures	4	Chalk & Talk Discussion	Black Board
UNIT -5 APPLICATIONS				
5.1	General Discussion of fuzzy applications	3	Chalk & Talk Discussion	Black Board
5.2	Fuzzy applications of Natural & Life	5	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.3	Fuzzy applications of Social Sciences & Engineering	4	Chalk & Talk Discussion	Black Board
5.4	Fuzzy applications of Medicine and Management	4	Chalk & Talk Discussion	Black Board
5.5	Fuzzy applications of Decision making	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Distinguish crisp sets and Fuzzy sets
CO 2	Classify operators on Fuzzy sets
CO 3	Describe Fuzzy relations
CO 4	Describe Fuzzy Measures
CO 5	Apply Fuzzy sets in real life situations

CIA	
Scholastic	**35**

Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**3**	**3**	**2**	**2**	**2**
CO2	**2**	**3**	**2**	**3**	**2**
CO3	**3**	**2**	**2**	**2**	**2**

CO4	**2**	**2**	**2**	**2**	**3**
CO5	**2**	**2**	**3**	**2**	**3**

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	**3**	**2**	**2**	**2**
CO2	**3**	**2**	**2**	**2**
CO3	**2**	**2**	**3**	**2**
CO4	**2**	**3**	**2**	**2**
CO5	**2**	**3**	**2**	**2**

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. A. Jose Little Flower

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –II

For those who joined in 2023 onwards

Employablility-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CRED
PSMA	23PG2ME4	DIFFERENTIAL GEOMETRY	PG ELECTIVE	5	3

COURSE DESCRIPTION

This course provides various concepts of Differential Geometry which can be applied in real life situations

COURSE OBJECTIVES

To enable the students to understand curves, space curves, smooth surface and the curvature of curves on a surface.

UNITS

UNIT –I (12 HRS.)

Curves- arc length- Reparametrization-Level curves - Curvature - Plane curves.

Sections: 1.1 to 1.4 and Sections 2.1,2.2.

UNIT –II (12 HRS.)

Space curves-Torsion- Serret Frenet equations- Simple closed curves- The Isoperimetric Inequality The Four vertex Theorem.

Sections 2.3 and Sections 3.1 to 3.3

UNIT –III (12 HRS.)

Smooth surface- Tangents, normal and orientability- Examples of surfaces- Quadratic surfaces- Triple orthogonal systems- Applications of Inverse function theorem

Sections 4.1 to 4.7

UNIT –IV (12 HRS.)

Lengths of curves on surfacesa- First fundamental form- Isometries of surfaces- Conformal mapping of surfaces-Surface area- Equiareal maps and a theorem of Archimedes.

Sections: 5.1 to 5.5

UNIT –V (12 HRS.)

The Second Fundamental form- The Curvature of curves on a surface- The normal and principal curvature- Euler's theorem- The geometric interpretation of principal curvatures.

Sections: 6.1 to 6.4

TEXT BOOK:

1. Andrew Pressley, Elementary Differential Geometry, Springer, 2004.

REFERENCES:

1. Christian Bar, Elementary Differential Geometry, Cambridge University Press, 2011.

2. Thomas F. Banchoff and Stephen T. Lovett, Differential Geometry of Curves and Surfaces, A.K Peters/CRC press, 2010.

3. W. Klingenberg, A course in Differential Geometry, Springer-Verlag, New York, 1978.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Curves- arc length	4	Chalk & Talk Discussion	Black Board
1.2	Level curves – Curvature	4	Chalk & Talk Discussion	Black Board
1.3	Plane curves	5	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Space curves-Torsion	3	Chalk & Talk Discussion	Black Board
2.2	Serret Frenet equations	4	Chalk & Talk Discussion	Black Board
2.3	Simple closed curves	3	Chalk & Talk Discussion	Black Board
2.4	The Isoperimetric Inequality	3	Chalk & Talk Discussion	Black Board
2.5	The Four vertex Theorem	3	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Smooth surface	4	Chalk & Talk Discussion	Black Board
3.2	Tangents and normal	5	Chalk & Talk Discussion	Black Board
3.3	Examples of surfaces	4	Chalk & Talk Discussion	Black Board
3.4	Quadratic surfaces	4	Chalk & Talk Discussion	Black Board
3.5	Triple orthogonal systems	4	Chalk & Talk Discussion	Black Board
UNIT -4				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.1	Lengths of curves on surface	3	Chalk & Talk Discussion	Black Board
4.2	First fundamental form	4	Chalk & Talk Discussion	Black Board
4.3	Isometries of surfaces	4	Chalk & Talk Discussion	Black Board
4.4	Conformal mapping of surfaces	4	Chalk & Talk Discussion	Black Board
4.5	Surface area	4	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	The Second Fundamental form	3	Chalk & Talk Discussion	Black Board
5.2	The Curvature of curves on a surface	5	Chalk & Talk Discussion	Black Board
5.3	The normal and principal curvature	4	Chalk & Talk Discussion	Black Board
5.4	Euler's theorem	4	Chalk & Talk Discussion	Black Board
5.5	The geometric interpretation of principal curvatures.	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Classify Reparametrization of curves	K2	PSO1& PSO4
CO 2	Describe the Isoperimetric Inequality	K1, K2, & K5	PSO2& PSO3
CO 3	Summarize Triple orthogonal systems	K1 & K3	PSO3& PSO5
CO 4	Describe the Conformal mapping of surfaces	K1, K2, K3 & K5	PSO5
CO 5	Distinguish the normal and pr curvature	K2 & K4	PSO3& PSO5

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks

C4	-	Open Book Test/PPT	2 *	- 5 Mks
C5	-	Seminar	1	- 5 Mks
C6	-	Attendance		- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. C. Prasanna Devi

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –I

For those who joined in 2023 onwards

Employablility-40%

Skill Development - 60%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG1MAE	LINEAR PROGRAMMING	PG EDC	2	2

COURSE DESCRIPTION

This course helps the students to convert real life problems into mathematical models and solve them using various techniques.

COURSE OBJECTIVES

To enable the students to learn LPP, Graphical Method, Simplex Method, Decision Analysis.

UNITS

UNIT –I MATHEMATICAL FORMULATION OF LPP (6 HRS)

Formulation of Linear Programming Problem - Model Formulation - Problem in Mathematical Model Formulation.

UNIT –II GRAPHICAL SOLUTION OF LPP (6 HRS)

Graphical Solution Method –Maximization & Minimization Case

Standard Form & Basic Solutions.

UNIT –III SOLUTIONS OF LPP (6 HRS)

Definition of objective function - Linear and Non-negative Constraints - Feasible Solution - Basic Feasible Solution - Optimum Basic Feasible Solution - Degenerate solution - Evaluation and Net Evaluation - Unbounded Solutions and conditions for Optimality of a Feasible Solution in terms of net Evaluations (no proof) - Pivotal element

UNIT –IV SIMPLEX METHOD (6 HRS)

Computational procedure of the simplex method - Tie for entering basis vector and leaving basis vector - Problems in Simplex Method .

UNIT –V DECISION ANALYSIS (6 HRS.)

Introduction – decision making environment – decisions under uncertainity – the Laplace criterion – the Maximin or Minimax criterion – the Maximax or Minimin criterion – the Savage criterion – the Hurwicz criterion.

TEXT BOOKS:

1.Kanti Swarup, P.K.Gupta, Man Mohan - Operations Research, 2015– Sultan Chand & Sons, New Delhi.

Unit I – Chapters II
Unit II – Chapters III
Unit III- Chapters IV (sec 4.1-4.2)
Unit IV- Chapters IV (sec 4.3)
Unit V – Chapter XVI (sec 16.1 – 16.5)

REFERENCES:

1.P.K.Gupta, Man Mohan – Problems in Operation Research, 2015 - Sultan Chand & Sons, New Delhi.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Formulation of Linear Programming Problem	4	Chalk & Talk Discussion	Black Board
1.2	Model Formulation	4	Chalk & Talk Discussion	Black Board
1.3	Problem in Mathematical Model Formulation	5	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Graphical Solution Method	5	Chalk & Talk Discussion	Black Board
2.2	Maximization & Minimization Case	4	Chalk & Talk Discussion	Black Board
2.3	Standard Form	4	Chalk & Talk Discussion	Black Board
2.4	Basic Solutions	3	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Linear and Non-negative Constraints	4	Chalk & Talk Discussion	Black Board
3.2	Feasible Solution	5	Chalk & Talk Discussion	Black Board
3.3	Basic Feasible Solution	4	Chalk & Talk Discussion	Black Board
3.4	Degenerate solution	5	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Computational procedure of	5	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	the simplex method			
4.2	Tie for entering basis vector and leaving basis vector	4	Chalk & Talk Discussion	Black Board
4.3	Problems in Simplex Method	4	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	decision making environment	4	Chalk & Talk Discussion	Black Board
5.2	the Laplace criterion	3	Chalk & Talk Discussion	Black Board
5.3	the Maximin or Minimax criterion	3	Chalk & Talk Discussion	Black Board
5.4	the Savage criterion	4	Chalk & Talk Discussion	Black Board
5.5	the Hurwicz criterion	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Formulate linear programming problems
CO 2	Solve linear programming problems by graphical method
CO 3	Describe feasible Solution, basic feasible solution, optimum basic feasible solution and degenerate solution.
CO 4	Describe simplex method to solve linear programming problems

NO.	COURSE OUTCOMES
CO 5	Solve problems in decision making.

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

PG CIA

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Mrs. Nigila Ragavan

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER – II

For those who joined in 2023 onwards

Employability-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG2M4	ADVANCED ALGEBRA	PG Core	6	5

COURSE DESCRIPTION

This course enables the students to study some advanced concepts in Algebra.

COURSE OBJECTIVES

To study the Dual spaces, Matrices, Linear Transformations and Galois Theory.

UNITS

UNIT –I DUAL SPACES (18 HRS.)

Dual spaces, the algebra of linear transformations, Characteristic roots.

UNIT –II MATRICES & TRANSFORMATIONS (18 HRS.)

Matrices, Canonical forms: triangular form, Nilpotent transformations.

UNIT –III TYPES OF LINEAR TRANSFORMATIONS (18 HRS.)

Hermitian, Unitary and Normal transformations, Real quadratic forms

UNIT –IV ROOTS IN EXTENSION FIELDS (18 HRS.)

Extension Fields, Roots of polynomials, More about roots.

UNIT –V GALOIS THEORY (18 HRS.)

The elements of Galois Theory, Solvability by radicals, Finite fields**.**

TEXT BOOK:

I. N. Herstein -*Topics in algebra,* 2nd Edition, John Wiley and Sons, 2002.

UNIT I : Chapter 4 (Section 4.3) , Chapter 6 (Section 6.1, 6.2)

UNIT II : Chapter 6 (Section 6.3, 6.4, 6.5)

UNIT III : Chapter 6 (Section 6.10 , 6.11)

UNIT IV : Chapter 5 (Section 5.1 , 5.3, 5.5)

UNIT V: Chapter 5 (Section 5.6) , Section 5.7 (Lemma 5.7.3, Theorems 5.7.2 & 5.7.3)

Chapter 7 (Section 7.1)

REFERENCES:

1. Micheal Artin - *Algebra*, Prentice Hall of India, 2002.

2. Surjeet Singh and Quazi Zameeruddin - *Modern Algebra*, 7th Edition, Vikas Publishing House Pvt Ltd., 1990.

3. K. Hoffman and R. Kunze - *Linear Algebra*, Prentice Hall, 1972.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Dual spaces	6	Chalk & Talk Discussion	Black Board
1.2	The algebra of linear transformations	6	Chalk & Talk Discussion	Black Board
1.3	Characteristic roots	6	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Matrices	6	Chalk & Talk Discussion	Black Board
2.2	Canonical forms: triangular form	6	Chalk & Talk Discussion	Black Board
2.3	Nilpotent transformations.	6	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Hermitian	4	Chalk & Talk Discussion	Black Board
3.2	Unitary Transformation	5	Chalk & Talk Discussion	Black Board
3.3	Normal transformations	4	Chalk & Talk Discussion	Black Board
3.4	Real quadratic forms	5	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Extension Fields	6	Chalk & Talk Discussion	Black Board
4.2	Roots of polynomials	6	Chalk & Talk Discussion	Black Board
4.3	More about roots	6	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	The elements of Galois Theory	6	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.2	Solvability by radicals	5	Chalk & Talk Discussion	Black Board
5.3	Finite fields	7	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Appraise characteristic roots of linear transformations	K2, K3, K4, K5	PSO1& PSO2
CO 2	Explain Matrices and Nilpotent transformation	K2, K3, K4, K5	PSO3
CO 3	Classify transformations	K2, K3, K4, K5	PSO5
CO 4	Describe various concepts of fields	K2, K3, K4, K5	PSO4
CO 5	Analyse Galois theory	K2, K3, K4, K5	PSO3

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4

CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Mrs. Nigila Ragavan

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –II

For those who joined in 2023 onwards

Employability-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG2M5	REAL ANALYSIS II	PG Core	6	5

COURSE DESCRIPTION

This course enables the students to study some advanced concepts in Real Analysis.

COURSE OBJECTIVES

To study the Riemann integral, sequences and series of functions and special functions.

UNIT-I :Measure on the Real line - Lebesgue Outer Measure - Measurable sets - Regularity - Measurable Functions - Borel and Lebesgue Measurability

Chapter - 2 Sec 2.1 to 2.5 (de Barra)

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

Chapter - 3 Sec 3.1,3.2 and 3.4 (de Barra)

UNIT-III : 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 –Cesaro summability of Fourier series- Consequences of Fejes's theorem - The Weierstrass approximation theorem

Chapter 11 : Sections 11.1 to 11.15 (Apostol)

UNIT-IV : 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

Chapter 12 : Section 12.1 to 12.14 (Apostol)

UNIT –I THE RIEMANN - STIELTJES INTEGRAL [18 HRS.]

Definition and Existence of the Integral – Properties of the Integral – Integration and Differentiation – Integration of Vector-valued Functions – Rectifiable Curves.

UNIT –II SEQUENCES AND SERIES OF FUNCTIONS [18 HRS.]

Discussion of Main problem – Uniform Convergence – Uniform Convergence and Continuity – Uniform Convergence and Integration – Uniform Convergence

and Differentiation – Equicontinuous Families of Functions – The Stone-Weierstrass Theorem.

UNIT –III SOME SPECIAL FUNCTIONS [18 HRS.]

Power Series – The Exponential and Logarithmic Functions – The Trigonometric Functions

UNIT –IV SOME SPECIAL FUNCTIONS [18 HRS.]

The Algebraic Completeness of the Complex Field – Fourier Series – The Gamma Function.

UNIT –V FUNCTIONS OF SEVERAL VARIABLES [18 HRS.]

Linear Transformations – Differentiation – The Contraction Principle – The Inverse Function Theorem

TEXT BOOK:

1. Walter Rudin, *Principles of Mathematical Analysis*, McGraw-Hill, Third edition, 1976.

UNIT I : Chapters: 6
UNIT II : Chapters: 7
UNIT III: Chapter: 8 : Pages 172 – 184
UNIT IV : Chapter: 8 : Pages 184 – 195
UNIT V : Chapter: 9 : 204 - 223

REFERENCES:

1. Richard R. Goldberg, *Methods of Real Analysis,* Oxford & IBH Publishing Company,1970
2. Apostol, *Mathematical Analysis* - Narosa Publishing House, Twentieth Reprint, 2002.
3. D. Somasundaram and Choudhary, *A first Course in Mathematical Analysi,* Narosa corrected Edition, 1999.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.1	Definition and Existence of the Integral, Properties of the Integral	4	Chalk & Talk Discussion	Black Board
1.2	Integration and Differentiation	4	Chalk & Talk Discussion	Black Board
1.3	Integration of Vector-valued Functions	5	Chalk & Talk Discussion	Black Board
1.4	Rectifiable Curves	5	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Discussion of Main problem, Uniform Convergence	3	Chalk & Talk Discussion	Black Board
2.2	Uniform Convergence and Continuity	3	Chalk & Talk Discussion	Black Board
2.3	Uniform Convergence and Integration	3	Chalk & Talk Discussion	Black Board
2.4	Uniform Convergence and Differentiation	3	Chalk & Talk Discussion	Black Board
2.5	Equicontinuous Families of Functions	3	Chalk & Talk Discussion	Black Board
2.6	The Stone-Weierstrass Theorem	3	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Power Series	4	Chalk & Talk Discussion	Black Board
3.2	The Exponential Functions	5	Chalk & Talk Discussion	Black Board
3.3	Logarithmic Functions	4	Chalk & Talk Discussion	Black Board
3.4	The Trigonometric Functions	5	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	The Algebraic Completeness of the Complex Field	7	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.2	Fourier Series	6	Chalk & Talk Discussion	Black Board
4.3	The Gamma Function	5	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Linear Transformations	5	Chalk & Talk Discussion	Black Board
5.2	Differentiation	5	Chalk & Talk Discussion	Black Board
5.3	The Contraction Principle	4	Chalk & Talk Discussion	Black Board
5.4	The Inverse Function Theorem	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify Riemann Integral and Riemann - Stieltjes Integral	K5	PSO1& PSO2
CO 2	Explain Uniform convergence of functions	K2	PSO1& PSO4
CO 3	Define Power Series and Logarithmic Functions	K3	PSO1& PSO4
CO 4	Define Fourier Series and Gamma Function	K2 & K3	PSO3 & PSO5
CO 5	Describe Linear Transformations and Explain Inverse function theorem	K2 & K4	PSO 3 & PSO5

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. C. Prasanna Devi

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –II

For those who joined in 2023 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSMA	23PG2M6	MECHANICS	PG Core	6	4

COURSE DESCRIPTION

This course provides a sound knowledge of the concepts and principles in mechanics.

COURSE OBJECTIVES

The aim of the course is to help the students to understand mechanics of a particle, Lagrange's equations, Hamilton's principles, Two body problem and Kepler's problem and apply it for solving problems.

UNITS

UNIT –I MECHANICS OF A PARTICLE (18 HRS.)

Mechanics of a particle, Mechanics of a system of particles, Constraints, D'Alambert's principle.

UNIT –II LAGRANGE'S EQUATIONS (18 HRS.)

Lagrange's equations, velocity – dependent potentials and the dissipation function, simple application of the Lagrangian formulation

UNIT –III HAMILTON'S PRINCIPLE (18 HRS.)

Hamilton's principle, some techniques of the calculus of variations, Derivation of Lagrange's equation from Hamilton's principle

UNIT –IV: LAGRANGE'S EQUATIONS FOR NON-HOLONOMIC SYSTEMS AND SYMMETRIC PROPERTIES (18 HRS.)

Extension of Hamilton's principle to non-holonomic systems, Advantages of a variational principle formulation , conservation theorems and symmetry properties.

UNIT –V CLASSIFICATION OF ORBITS (18 HRS.)

Two body central force problem – reduction to the equivalent one-body problem – the equations of motions and first integrals – the equivalent one -dimensional problem and classification of orbits – the Virial theorem – the differential equation for the orbit and integrable power law potentials – The Kepler problem; Inverse square law of force - The motion in time in the Kepler's problem-The Laplace –Runge-Lenz vector

TEXT BOOK:

1.Herbert Goldstein , *Classical Mechanics,* Narosa Publishing House, Second Edition, 2001.

UNIT I : Chapter: 1(1.1-1.4)

UNIT II : Chapter: 1(1.4-1.6)
UNIT III : Chapter: 2(2.1-2.3)
UNIT IV : Chapter: 2(2.4-2.6)
UNIT V : Chapter: 3(3.1 - 3.5,37-3.9)

REFERENCES:

1. Rutherford,*Classical Mechanics,* Oliver and Boyd Ltd, 1964

2. RanaN.C. and JoagR.S., *Classical Mechanics,* TMH Publishers

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Mechanics of a particle	4	Chalk & Talk Discussion	Black Board
1.2	Mechanics of a system of particles	4	Chalk & Talk Discussion	Black Board
1.3	Constraints	5	Chalk & Talk Discussion	Black Board
1.4	D'Alambert's principle	5	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Lagrange's equations, velocity	5	Chalk & Talk Discussion	Black Board
2.2	Dependent potentials and the dissipation function	5	Chalk & Talk Discussion	Black Board
2.3	simple application of the Lagrangian formulation	8	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Hamilton's principle	7	Chalk & Talk Discussion	Black Board
3.2	some techniques of the calculus of variations	6	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.3	Derivation of Lagrange's equation from Hamilton's principle	5	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Extension of Hamilton's principle to non-holonomic systems	5	Chalk & Talk Discussion	Black Board
4.2	Advantages of a variational principle formulation	5	Chalk & Talk Discussion	Black Board
4.3	conservation theorems	4	Chalk & Talk Discussion	Black Board
4.4	symmetry properties.	4	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Two body central force problem, reduction to the equivalent one-body problem	3	Chalk & Talk Discussion	Black Board
5.2	The equations of motions and first integrals	3	Chalk & Talk Discussion	Black Board
5.3	The equivalent one -dimensional problem and classification of orbits	3	Chalk & Talk Discussion	Black Board
5.4	The Virial theorem, The differential equation for the orbit and integrable power law potentials	3	Chalk & Talk Discussion	Black Board
5.5	The Kepler problem; Inverse square law of force	3	Chalk & Talk Discussion	Black Board
5.6	The motion in time in the Kepler's problem, The Laplace –Runge-Lenz vector	3	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Describe the behaviour of a particle, the system of particles and D'Alambert's principle.	K2	PSO2
CO 2	Solve problems using Lagrangian formulation	K2& K3	PSO1
CO 3	Explain Hamilton's principle in Physical reality	K2,K3 & K4	PSO3
CO 4	Construct Lagrange's equation for non - holonomic system	K2, K3 & K4	PSO4
CO 5	Apply the laws of forces in central orbit to solve Kepler's problem	K2, K4&K5	PSO5

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2

CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. A. Paulin Mary

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –II

For those who joined in 2023 onwards

Entrepreneurship-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSMA	23PG2ME5	MATHEMATICAL STATISTICS	PG Core	4	3

COURSE DESCRIPTION

This course provides various concepts of Statistics which can be applied in real life situations

COURSE OBJECTIVES

To enable the students to understand some discrete and continuous distributions, testing of hypothesis and Estimation

UNITS

UNIT –I SOME SPECIAL DISTRIBUTIONS (12 HRS.)

The Binomial and Related Distributions – The Poisson distribution – The Gamma, Chi-square and Beta distributions - The Normal distribution.

UNIT –II t, F DISTRIBUTIONS AND LIMITING DISTRIBUTIONS (12 HRS.)

t and F distributions, Expectations of Functions, central Limit theorem.

UNIT –III MAXIMUM LIKLELIHOOD METHODS (12 HRS.)

Maximum Likelihood Estimation, Rao-Cramer Lower Bound and efficiency, Maximum Likelihood Tests.

UNIT –IV SUFFICIENCY (12 HRS.)

Measures of quality of Estimators, A sufficient statistic for a parameter, Properties of a sufficient statistic.

UNIT –V OPTIMAL TESTS OF HYPOTHESES (12 HRS.)

Most Powerful Tests, Uniformly Most Powerful Test, Likelihood Ratio Tests.

TEXT BOOK:

1. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to mathematical statistics*, Sixth Edition, Pearson Education. Inc. and Dorling Kindersley Publishing, Inc.2007.

REFERENCES:

1. John E. Freund, M T.J. Wilmore, *Mathematical Statistics*, Prentice Hall of India, 2000.
2. Rohatgi V. K. and A. K. Md. L Saleh, *An Introduction to Probability and Statistics,* 2nd Edition, John Wiley & Sons, New York, 2002.
3. A. M. Mood, F. A. GrayBill and D. C. Bose, *Introduction to the Theory of Statistics*, Third Edition, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2001.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	The Binomial and Related Distributions	4	Chalk & Talk Discussion	Black Board
1.2	The Poisson distribution	4	Chalk & Talk Discussion	Black Board
1.3	The Gamma, Chi-square and Beta distributions	4	Chalk & Talk Discussion	Black Board
1.4	The Normal distribution	4	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	T distributions	3	Chalk & Talk Discussion	Black Board
2.2	F distributions	4	Chalk & Talk Discussion	Black Board
2.3	Expectations of Functions	3	Chalk & Talk Discussion	Black Board
2.4	central Limit theorem.	2	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Maximum Likelihood Estimation	5	Chalk & Talk Discussion	Black Board
3.2	Rao-Cramer Lower Bound and efficiency	3	Chalk & Talk Discussion	Black Board
3.3	Maximum Likelihood Tests	4	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Measures of quality of Estimators	5	Chalk & Talk Discussion	Black Board
4.2	A sufficient statistic for a parameter	4	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.3	Properties of a sufficient statistic	3	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Most Powerful Tests	4	Chalk & Talk Discussion	Black Board
5.2	Uniformly Most Powerful Test	5	Chalk & Talk Discussion	Black Board
5.3	Likelihood Ratio Tests	3	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Classify discrete and continuous distributions	K2	PSO1& PSO4
CO 2	Describe t, F and limiting distributions	K1, K2, & K5	PSO2& PSO3
CO 3	Summarize maximum likelihood methods	K1 & K3	PSO3& PSO5
CO 4	Describe the measures of quality estimators.	K1, K2, K3 & K5	PSO5
CO 5	Distinguish tests of hypothesis	K2 & K4	PSO3& PSO5

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2

CO2	**2**	**3**	**2**	**3**	**2**
CO3	**3**	**2**	**2**	**2**	**2**
CO4	**2**	**2**	**2**	**2**	**3**
CO5	**2**	**2**	**3**	**2**	**3**

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	**3**	**2**	**2**	**2**
CO2	**3**	**2**	**2**	**2**
CO3	**2**	**2**	**3**	**2**
CO4	**2**	**3**	**2**	**2**
CO5	**2**	**3**	**2**	**2**

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. A. Jose Little Flower

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –II

For those who joined in 2023 onwards

Skill Development-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG2ME6	Statistical Methods	Lecture	4	3

COURSE DESCRIPTION

This course is focused on the fundamental concepts of Statistical Methods and its applications in various fields.

COURSE OBJECTIVES

To enable the students to understand the basic concepts of Statistical Methods and R programming.

UNIT –I BASIC NOTIONS OF STATISTICS (15 HRS.)

Measures of central tendencies: Mean, Median, Mode. Measures of Dispersion: Range, Mean deviation, Standard deviation. Measures of skewness. Measures of relationship: Covariance, Karl Pearson's coefficient of Correlation, Rank Correlation.

Chapter 8 of Book 1

UNIT –II SAMPLING AND TESTING OF HYPOTHESIS (15 HRS.)

Sampling Distribution, Student's t-Distribution, Chi-square Distribution, Snedecor's F-Distribution. Standard Error. Central Limit theorem. Type I and Type II Errors, Critical Regions. F-test, t-test, x 2 test, goodness of Fit test.

Chapter 9,10 and 11 of Book 1

UNIT –III ANALYSIS OF VARIANCE (15 HRS.)

The Anova Technique. The basic Principle of Anova. One Way ANOVA, Two Way ANOVA. Latin square design. Analysis of Co-variance.

Chapter 12 of Book 1

UNIT –IV USE OF PACKAGE R (15 HRS.)

R as Statistical software and language, methods of Data input, Data accessing, usefull built-in functions

Chapter 1 of Book 2

UNIT –V Continuation of USE OF PACKAGE R (15 HRS.)

Graphics with R, Saving, storing and retrieving work.

Chapter 1 of Book 2

TEXT BOOK:

1. C. R. Kothari and G. Garg, Research Methodology Methods and Techniques, New Age International.
2. S.G. Purohit, S.D. Gore and S.R. Deshmukh, Statistics using R, Narosa.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Measures of central tendencies: Mean, Median, Mode	4	Chalk & Talk Discussion	Black Board
1.2	Measures of Dispersion: Range, Mean deviation, Standard deviation. Measures of skewness	4	Chalk & Talk Discussion	Black Board
1.3	Measures of relationship: Covariance, Karl Pearson's coefficient of Correlation	4	Chalk & Talk Discussion	Black Board
1.4	Rank Correlation	3	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Sampling Distribution, Student's t-Distribution	3	Chalk & Talk Discussion	Black Board
2.2	Chi-square Distribution	2	Chalk & Talk Discussion	Black Board
2.3	Snedecor's F-Distribution. Standard Error	3	Chalk & Talk Discussion	Black Board
2.4	Central Limit theorem	2	Chalk & Talk Discussion	Black Board
2.5	Type I and Type II Errors, Critical Regions	2	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.6	F-test, t-test, x 2 test, goodness of Fit test	3	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	The Anova Technique. The basic Principle of Anova.	3	Chalk & Talk Discussion	Black Board
3.2	One Way ANOVA	4	Chalk & Talk Discussion	Black Board
3.3	Two Way ANOVA	4	Chalk & Talk Discussion	Black Board
3.4	Latin square design. Analysis of Co-variance	4	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	R as Statistical software and language	3	Chalk & Talk Discussion	Black Board
4.2	methods of Data input	4	Chalk & Talk Discussion	Black Board
4.3	Data accessing	4	Chalk & Talk Discussion	Black Board
4.4	useful built-in functions	4	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Graphics with R	8	Chalk & Talk Discussion	Black Board
5.2	Saving, storing and retrieving work.	7	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Distinguish Correlation, Rank Correlation.
CO 2	Classify t-Distribution, Chi-square Distribution
CO 3	Describe Analysis of Co-variance
CO 4	Describe R Programming
CO 5	Apply R programming for storing and retrieving work

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks

C6	- Attendance		- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. E. Helena

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –II

For those who joined in 2023 onwards

Employability-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG2ME7	GRAPH THEORY	PG Core	4	3

COURSE DESCRIPTION

This course enables the students to study some advanced concepts in Graph Theory.

COURSE OBJECTIVES

To study the concepts of Connectivity, Digraphs, Matchings, Planarity and Domination in Graphs.

UNITS

UNIT –I: CONNECTIVITY (12 HRS)

Connectivity, Menger's theorem.

UNIT –II TRAVERSABILITY (12 HRS)

Eulerian graphs, Hamiltonian graphs

UNIT –III DIGRAPHS and TOURNAMENTS (12 HRS)

Strong digraphs, Tournaments

UNIT –IV MATCHINGS AND PLANARITY (12 HRS)

Matchings - Planar graphs

UNIT –V DOMINATION (12 HRS)

Dominating set- the domination number of a graph - Open dominating set-open domination number of a graph.

TEXT BOOK:

1.Gary Chartrand and Ping Zhang ,*Introduction to graph theory*, Tata McGraw Hill Publishing Company Ltd, Edition 2006.

UNIT I: Chapters 5: Sections 5.3 - 5.4,
UNIT II: Chapter 6: Sections 6.1 - 6.2
UNIT III: Chapter 7: Sections 7.1, 7.2,
UNIT IV: Chapter 8: Sections 8.1
Chapter 9: Section 9.1
UNIT V: Chapter13: Section 13.1

REFERENCES

1.Harary ,*Graph Theory*, Narosa Publishing company, 2001
2.Douglas West, *Introduction to graph Theory,* Pearson Prentice Hall, 2nd Edition, 2006.
3.Bondy J. A and Murty V. S. R, *Graph Theory with applications* Macmillan Press Ltd, 1976.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Connectivity	6	Chalk & Talk Discussion	Black Board
1.2	Menger's theorem.	5	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Eulerian graphs	5	Chalk & Talk Discussion	Black Board
2.2	Hamiltonian graphs	6	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Strong digraphs	7	Chalk & Talk Discussion	Black Board
3.2	Tournaments	5	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Matchings	6	Chalk & Talk Discussion	Black Board
4.2	Planar graphs	6	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Dominating set, the domination number of a graph	3	Chalk & Talk Discussion	Black Board
5.2	Open dominating set-	5	Chalk & Talk Discussion	Black Board
5.3	open domination number of a graph	4	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Build the knowledge of Connectivity in graphs	K1	PSO1& PSO2
CO 2	Identify Eulerian and Hamiltonian graphs	K1 & K4	PSO2 & PSO4
CO 3	Explain Digraphs in graphs	K1 & K3	PSO4 & PSO5
CO 4	Describe Planarity and Matchings in graphs	K2 & K3	PSO3 & PSO4
CO 5	Define and Explain Domination in graph	K2 & K4	PSO3 & PSO5

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4

CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Mrs. A. Sheela Roselin

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

II M.Sc. Mathematics

SEMESTER –II

For those who joined in 2023 onwards

Entrepreneurship-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG2ME8	NUMERICAL ANALYSIS	PG Core	4	4

COURSE DESCRIPTION

This course provides knowledge to solve equations using Numerical methods.

COURSE OBJECTIVES

To enable the students to solve equations like Algebraic, Transcendental, Differential Equations and Integrals by various Numerical methods.

UNITS

UNIT –I SOLVING SETS OF EQUATIONS (12 HRS.)

The Elimination Method, The Gaussian Elimination and Gauss- Jordan Method, Iterative Methods - The Relaxation Method.

UNIT –II INTERPOLATION AND CURVE FITTING (12 HRS.)

Lagrangian Polynomials, Divided Differences, Interpolation with Cubic Spline, Least-Square Approximation

UNIT –III NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION (12HRS.)

Derivatives form Difference tables, Extrapolation Techniques, The Trapezoidal Rule –A Composite formula, Simpson's rules.

UNIT –IV NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (12 HRS.)

The Taylor – Series method **,** Euler and Modified Euler methods, Runge- Kutta Methods, Milne's Method.

UNIT –V NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (12 HRS.)

Introduction, Difference Quotients, Geometrical representation of partial differential quotients.

TEXT BOOK:

Curtis .F. Gerald, Patrick O. Wheatley, *Applied Numerical Analysis*, 5th Edition Pearson Education, New Delhi, 2005.

UNIT I : Chapter 2 : Sections 2.3-2.4 & 2.10-2.11

UNIT II: Chapter 3: Sections 3.2-3.4 & 3.7

UNIT III: Chapter 5: Sections 5.2, 5.4 & 5.6-5.7

UNIT IV: Chapter 6: Sections 6.2- 6.4 & 6.6

UNIT V: Chapter 12 : Sections 12.1 – 12.3

REFERENCES:

1. R.L. Burden, J. Dougles Faires, *Numerical Analysis*, Thompson Books, USA, 2005.

2. S.S Sastry, *Introductory Methods of Numerical Analysis* , Prentice- Hall of India Pvt. Ltd., New Delhi, 2005.

3. M.K.Jain , S.R.K. Lyengar, R.K. Jain, *Numerical Methods for scientific and Engineering Computation*, 3rd Edition, Wiley Eastern Ltd., New Delhi, 1993.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	The Elimination Method, The Gaussian Elimination	4	Chalk & Talk Discussion	Black Board
1.2	Gauss- Jordan Method	4	Chalk & Talk Discussion	Black Board
1.3	Iterative Methods - The Relaxation Method	4	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Lagrangian Polynomials, Divided Differences	5	Chalk & Talk Discussion	Black Board
2.2	Interpolation with Cubic Spline	3	Chalk & Talk Discussion	Black Board
2.3	Least-Square Approximation	4	Chalk & Talk Discussion	Black Board
UNIT -3				
3.1	Derivatives form Difference tables	3	Chalk & Talk Discussion	Black Board
3.2	Extrapolation Techniques	3	Chalk & Talk Discussion	Black Board
3.3	The Trapezoidal Rule	2	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.4	A Composite formula, Simpson's rules	4	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	The Taylor – Series method	3	Chalk & Talk Discussion	Black Board
4.2	Euler and Modified Euler methods	4	Chalk & Talk Discussion	Black Board
4.3	Runge- Kutta Methods	3	Chalk & Talk Discussion	Black Board
4.4	Milne's Method.	2	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Introduction, Difference Quotients	7	Chalk & Talk Discussion	Black Board
5.2	Geometrical representation of partial differential quotients	5	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the various methods of solving simultaneous linear algebraic equations.	K2	PSO1& PSO2
CO 2	Recognize difference operators and apply the concept of interpolation.	K2	PSO2 & PSO4
CO 3	Compute the values of the derivatives at some point using numerical differentiation and integration.	K2 & K4	PSO4 & PSO5
CO 4	Solve problems on higher order differential equations using Euler's, Runge- kutta methods	K2 & K3	PSO4& PSO5
CO 5	Explain Geometrical representation of partial differential quotients.	K2 & K4	PSO1, PSO2 & PSO3

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. Dr. V. Vanitha

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature

& Name

I M.Sc. Mathematics

SEMESTER –II

For those who joined in 2023 onwards

Entrepreneurship-100%

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	23PG2MSE1	OPTIMIZATION METHODS	PG EDC	4	3

COURSE DESCRIPTION

This course helps the students to convert real life problems into mathematical models and solve them using various techniques.

COURSE OBJECTIVES

To enable the students to learn Transportation, Assignment Problems, Sequencing Problem and Game Theory.

UNITS

UNIT –I TRANSPORTATION PROBLEM (12 HRS)

Transportation Problem: Mathematical formulation - Existence of feasible solution - Feasible solution by (i) North – West corner rule (ii) Matrix – Minima method (iii) Vogel's approximation method.

UNIT –II MODIFIED DISTRIBUTION METHOD (12 HRS)

Optimal solution to a T.P by modified distribution method – Degeneracy in T.P – Unbalanced T.P.

UNIT –III ASSIGNMENT PROBLEM (12 HRS)

Introduction – Mathematical formulation of the problem – The assignment method – Special cases in assignment problems.

UNIT –IV SEQUENCING PROBLEM (12 HRS)

Introduction – problem of sequencing – Basic terms used in sequencing – Processing n jobs through two machines – Processing n jobs through k machines – Processing 2 jobs through k machines.

UNIT –V GAME THEORY **(12 HRS)**

Introduction – Two person zero sum games – Some basic terms - The maximin-minimax principle – Games without saddle points – mixed strategies – Graphical solution of 2 x n and m x 2 games – Dominance property .

REFERENCES:

1.Kanti Swarup, P.K.Gupta, Man Mohan - Operations Research, 2006 – Sultan Chand & Sons, New Delhi.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1				
1.1	Transportation Problem: Mathematical formulation, Existence of feasible solution	5	Chalk & Talk Discussion	Black Board
1.2	Feasible solution by (i) North – West corner rule	1	Chalk & Talk Discussion	Black Board
1.3	Matrix – Minima method (iii) Vogel's approximation method.	6	Chalk & Talk Discussion	Black Board
UNIT -2				
2.1	Optimal solution to a T.P by modified distribution method	5	Chalk & Talk Discussion	Black Board
2.2	Degeneracy in T.P	4	Chalk & Talk Discussion	Black Board
2.3	Unbalanced T.P.	3	Chalk & Talk Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -3				
3.1	Introduction, Mathematical formulation of the problem	4	Chalk & Talk Discussion	Black Board
3.2	The assignment method	4	Chalk & Talk Discussion	Black Board
3.3	Special cases in assignment problems	4	Chalk & Talk Discussion	Black Board
UNIT -4				
4.1	Introduction, problem of sequencing	3	Chalk & Talk Discussion	Black Board
4.2	Basic terms used in sequencing, Processing n jobs through two machines	3	Chalk & Talk Discussion	Black Board
4.3	Processing n jobs through k machines	3	Chalk & Talk Discussion	Black Board
4.4	Processing 2 jobs through k machines	3	Chalk & Talk Discussion	Black Board
UNIT -5				
5.1	Introduction, Two person zero sum games, Some basic terms	3	Chalk & Talk Discussion	Black Board
5.2	The maximin-minimax principle, Games without saddle points	2	Chalk & Talk Discussion	Black Board
5.3	mixed strategies, Graphical solution of 2 x n and m x 2 games	4	Chalk & Talk Discussion	Black Board
5.4	Dominance property .	3	Chalk & Talk Discussion	Black Board

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Distinguish Transportation problem and Assignment problem.	K2	PSO1& PSO2
CO 2	Classify the methods of finding IBFS to a transportation problem.	K2, K3,	PSO3
CO 3	Explain assignment problem and solve.	K2 & K4	PSO5
CO 4	Solve Sequencing problem.	K2, K3 & K4	PSO2
CO 5	Define two person zero sum game, saddle point and solve problems	K3 & K5	PSO4

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

PG CIA Components

		Nos		
C1	- Test (CIA 1)		1	- 10 Mks
C2	Test (CIA 2)		1	10 Mks
C3	Assignment		2 *	5 Mks
C4	- Open Book Test/PPT		2 *	- 5 Mks
C5	- Seminar		1	- 5 Mks
C6	- Attendance			- 5 Mks

The best out of two will be taken into account

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	3	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	3	2	2	2
CO3	2	2	3	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: ♦ Strongly Correlated – **3**

♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

CO 4	Define Fourier Series and Gamma Function	K2 & K3	PSO3 & PSO5
CO 5	Describe Linear Transformations and Explain Inverse function theorem	K2 & K4	PSO 3 & PSO5

COURSE DESIGNER:

1. Dr. Mrs. C. Prasanna Devi

2. Mrs. A. Sheela Roselin

Forwarded By

(Dr. A. Paulin Mary)

HOD'S Signature& Name