HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)
Re-Accredited with A++ Grade by NAAC (3rd Cycle)
Uthamapalayam - 625 533.

DEPARTMENT OF MATHEMATICS

MASTER OF SCIENCE - MATHEMATICS

PART IV-SYLLABUS

Choice Based Credit System – CBCS

(As per TANSCHE)

With

Outcome Based Education (OBE)

(Academic Year 2023 -2025)

Semester - II

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23PMASE2P	Mathematical Documentation using LATEX	4	40	60	100	2

Semester - III

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23PMASE3P	Computational Mathematics using Sage Math	4	40	60	100	2
	23PMAIS31	Internship / Industrial Activity	-	-	-	-	2

Semester - IV

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23PMASE41	Training for Competitive Examinations	4	25	75	100	2

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23PMASE2P	MATHEMATICAL DOCUMENTATION USING LATEX	SEC	2	4	40	60	100

Learning Objectives		
L1	To introduce students with a software that is used for typesetting and develop typing skill for students with various documents formats of LATEX.	
UNIT	Contents	No. of Hours
I	1. Constructing Arrays & Table Using LATEX. 2.Construct a document with different Alignments (Left, Right, Center, Justify). 3.Typing mathematical Expression Using All Expressions.	12
II	4. Typing mathematical Expression Using inequalities. 5. Insert Picture in a LATEX. 6.Typing mathematical Expression involving Differentiation, Integration, and Trignometry.	12
III	7.Typing a letter for Applying a job. 8. Creation of an Article Using LATEX. 9.Latex Code to form display 4x4 matrix using Array.	12
IV	10.Latex Code to form a equation using Union, intersection and summation. 11. Latex Code to form display 3x3 Matrix using Nested Array. 12. Latex Code to display text with bullets	12
V	13. Latex Code to display the Ph.d thesis format. 14. Latex Code to display the Bibliography. 15. Latex Code to display Logical and Visual design.	12
	Total	**60**

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Know how to create basic types of LaTex documents (article).	K1,K2,K3,K4, K5
2	Typeset latex commands.	K1,K2,K3,K4, K5
3	Create a paragraph, symbols, comments and font style.	K1,K2,K3,K4, K5,K6
4	Change font characteristics.	K1,K2,K3,K4, K5,K6
5	Know about various environments.	K1,K2,K3,K4, K5,K6

Textbooks	
1.	Math into Latex : *An Introduction to Latex and AMS Latex*
2.	George Grazer ISBN 0-8176-3805-9. © Birkhauser Boston 1996.

Reference Books	
1.	*.A document preparation system LATEX*, Second Edition,Leslie Lamport
2.	LATEX- *A Beginner Guide to Professional documentation*, S. Swapna Kumar.
Web Resources	
1.	https://services.math.duke.edu/computing/tex/online.html,
2.	https://www.overleaf.com/learn

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	1	1	1	1
CO 2	3	2	1	1	1
CO 3	3	2	1	1	1
CO 4	3	1	1	1	1
CO 5	3	2	1	1	1

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	2	1	-
CO2	2	3	3	2	-
CO3	1	3	2	2	-
CO4	1	3	2	1	-
CO5	2	3	2	2	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23PMASE3P	COMPUTATIONAL MATHEMATICS USING SAGE MATH	SEC	2	4	40	60	100

Learning Objectives		
L1	Problem solving and Programming capability	
UNIT	Contents	No. of Hours
I	1.Constructing factors and Matrix Using SageMath. 2.Calculating LCM and HCF Using SageMath. 3.Calculating Eigen Values and Eigen Vectors using SageMath. 4.Mean,Median ,Mode in SageMath. 5.Exploring Integers in SageMath	12
II	6.Typing Mathematical Expressions using Assignment inequality and Arithmetic Operations 7. Express Mathematical functions Using SageMath. 8. Construct the Tangent function Using SageMath. 9.To find the natural logarithm of the real number 2. 10.Solve the 9×9Sudoku Puzzle defined by the matrix Using SageMath.	12
III	11.Working with vectors in SageMath. 12. To solve equations Using SageMath. 13. Construct a Program for Differentiation and Integration. 14. Solving Differential Equations 15.Write a Program for Standard set theoretic Operations.	12
IV	16. Solving Quadratic equations and finding Roots 17.Defining a function to convert from rectangular co ordinates to polar coordinates Using SageMath. 18. Plotting the Equations in a Graph. 19. Finding the area b/w two 2D curves and Plotting it 20.Finding the points on the sphere that are closest and farthest from the point.	12
V	21.Typing Equation of Elliptic Curve and find the square of numbers Using SageMath. 22.Improper Integrals Using SageMath. 23.Interpolation in SageMath. 24.Numerical Interpolation in SageMath. 25.Results in L.P.P Using SageMath	12
	Total	**60**

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Deal with Symbolic Variables	K1,K2,K3,K4,K5
2	Describe the symbolic expressions and some Pitfalls	K1,K2,K3,K4,K5
3	Demonstrates the analysis concepts	K1,K2,K3,K4,K5,K6

4	Solve the simultaneous equations	K1,K2,K3,K4,K5,K6
5	Displaying the solutions of Differential	K1,K2,K3,K4,K5,K6
Textbooks		
1.	Computational Mathematics with SageMath by Paul Zimmermann and others	
Reference Books		
1.	Gregory V. Bard;Sage for Undergraduates (online version)	
2.	2.Craig Finch; Sage Biginner's Guide; PACKT Publishing (Open Source)	
Web Resources		
1.	https://onlinecourses.nptel.ac.in/noc21_ma29/preview	
2.	https://mosullivan.sdsu.edu/Teaching/sdsu-sage-tutorial/sageprog.html	

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	3	2	3	3	-	-
CO 2	2	1	3	1	3	3	-	-
CO 3	3	2	3	1	3	3	-	-
CO 4	1	2	3	2	3	3	-	-
CO 5	3	1	2	3	3	3	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	-
CO2	3	2	1	1	-
CO3	3	2	1	1	-
CO4	3	2	1	1	-
CO5	3	2	1	1	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23PMASE41	TRAINING FOR COMPETITIVE EXAMINATION	SEC	2	4	25	75	100

Learning Objectives		
L1	The course provides various mathematical aptitude techniques of solving problems in Percentage – profit and loss and proportion partnership	
UNIT	**Contents**	**No. of Hours**
I	**Algebra:** Groups–Sub Groups-Quotients groups –Homomorphisms-Cyclic groups-Permutations-Combinations-Matrices-Rank and Determinant of matrices-Linear equations-Eigen values and Eigen vectors.	12
II	**Analysis:** Elementary set theory-Countable and Uncountable sets-Sequences and Series-Convergence-Continuity and Differentiability-Uniform Convergence-Algebra of complex Numbers:Polynomials-Power Series-Analytic functions-Cauchy Riemann Equations-Calculus of Residues-Singular points.	12
III	**Differential Equations:** Existence and Uniqueness of solutions of IVP-General Theory of Homogeneous and non-homogeneous linear ODE's-Lagrange and Charpit Methods for solving first order PDE's-Method of Separation of variables for Laplace, Heat and Wave Equations.	12
IV	Percentage – profit and loss and proportion partnership	12
V	Simple Interest and Compound interest	12
	Total	**60**

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Understand the basic concepts of Algebra and linear Algebra.	K1,K2,K3,K4,K5
2	Enhance their ability in Real and Complex Analysis	K1,K2,K3,K4,K5
3	Utilize the knowledge to solve the problems in Differential Equations.	K1,K2,K3,K4,K5,K6
4	Apply for competitive examinations with more confidence	K1,K2,K3,K4,K5,K6
5	Solve mathematical problems within a limited time frame.	K1,K2,K3,K4,K5,K6

Textbooks	
1.	Upkar's CSIR-UGC NET/JRF/SET Mathematical Science by Dr. Alok Kumar.
2.	Agarwal R.S, Publishers: S.Chand and Co " Quantitative Aptitude" 1990
Reference Books	
1.	I.N. Herstein. Topics in Algebra (II Edition) Wiley Eastern Limited, New Delhi, 1975.
2.	Tom M.Apostol : Mathematical Analysis, 2nd Edition, Addison- Wesley Publishing Company Inc. New York, 1974.
3.	E.A.Coddington, A introduction to ordinary differential equations (3rd Printing) Prentice-Hall of India Ltd.,New Delhi, 1987.
Web Resources	
1.	https://www.classcentral.com/course/swayam-operations-research-14219

2.	https://developers.google.com/optimization/support/resources

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	3	1	1	2	2	-	-
CO 2	1	2	3	2	3	1	-	-
CO 3	3	2	2	1	3	1	-	-
CO 4	1	2	2	3	2	2	-	-
CO 5	3	1	2	2	3	1	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	-
CO2	2	2	1	1	-
CO3	2	1	3	1	-
CO4	1	3	2	1	-
CO5	1	3	2	1	-

Strong-3 Medium-2 Low-1