Faculty of Computer Science & Applications
Master of Computer Application (MCA)
(W. E. F.: 2023-24)

Document ID: SUTEFCAM-01

Name of Faculty	:	Faculty of Computer Science & Applications
Name of Program	:	Master of Computer Application (MCA)
Course Code	:	2MNM01
Course Title	:	Numerical Methods
Type of Course	:	Basic Science
Year of Introduction	:	2023-24

Prerequisite	:	Discrete Mathematics
Course Objective	:	This Course will enhance the students ability to think logically and mathematically
Course Outcomes	:	At the end of this course, students will be able to:
	CO 1	Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to solutions to otherwise intractable mathematical problems.
	CO 2	Apply numerical methods to obtain approximate solutions to mathematical problems.
	CO 3	Analyse and evaluate the accuracy of common numerical methods.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
3	0	0	3	70	30	0	0	100

*Legends: **L**-Lecture; **T**–Tutorial/Teacher Guided Theory Practice; **P**– Practical, **C** – Credit, **SEE** – Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	**Interpolation:** Lagrange's Interpolation, Newton's forward & backward Interpolation Formula. Extrapolation; Newton's Divided Difference Formula; Error; Problems.	8	20%	CO1
2	**Numerical Differentiation:** Use of Newton's forward and backward interpolation formula only. **Numerical Integration:** Trapezoidal formula (composite); Simson's 1/3rd formula (composite); Romberg Integration (statement only); Problems.	10	25%	CO1 CO2

3	**Numerical Solution of System of Linear Equations:** Gauss elimination method; Matrix Inversion; Operations Count; LU Factorization Method (Crout's Method); Gauss-Jordan Method; Gauss-Seidel Method; Sufficient Condition of Convergence.	10	25%	CO2
4	**Numerical Solution of Algebraic and Transcendental Equations:** Iteration Method: Bisection Method; Secant Method; Regula-Falsi Method; Newton-Raphson Method.	6	15%	CO3
5	**Numerical solution of Initial Value Problems of First Order Ordinary Differential Equations:** Taylor's Series Method; Euler's Method; Runge-Kutta Method (4th order); Modify Euler's Method	6	15%	CO3

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**25%**	**35%**	**20%**	**10%**	**5%**	**5%**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	Solution of Non-linear equation by Newton Raphson Method	
2	Solution of Non-linear equation by Bisection Method	
3	Solution of Gauss Jordan Method	
4	Solution of Iteration Method: Bisection Method and Secant Method	
5	Solution of Regula-Falsi	

Suggested Learning Websites

Sr. No.	Name of Website
1	http://www.numerical-methods.com
2	https://nm.mathforcollege.com

Reference Books

Sr. No.	Name of Reference Books
1	Numerical Analysis & Algorithms, Pradeep Niyogi, TMH, 1st ed.
2	Numerical Mathematical Analysis by J.B. Scarborough
3	Numerical Methods (Problems and Solution) by Jain, Iyengar , & Jain