MAMDC 234T: Numerical Analysis

Semester: III	Course Title: Numerical Analysis	Credit: 2
Course No.: 234 T	MULTIDISCIPLINARY (T)	Hours: 2/week

COs with cognitive Abilities:

COs	COGNITIVE ABILITIES	COURSE OUTCOMES
CO1	REMEMBERING	Recall fundamental numerical methods for solving equations, performing interpolation, and analysing errors.
CO2	UNDERSTANDING	Explain the principles and procedures of root-finding methods, interpolation techniques, and error analysis
CO3	APPLYING	Apply numerical methods such as Newton-Raphson, Gaussian Elimination, and Newton's Interpolation to solve practical problems.
CO4	ANALYSING	Analyse the accuracy, convergence, and limitations of different numerical techniques in solving mathematical problems.
CO5	EVALUATING	Evaluate the efficiency of numerical algorithms by comparing their computational accuracy and convergence rates.
CO6	CREATING	Develop computational algorithms to implement numerical methods for solving equations and performing interpolation

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1					
CO 2					
CO 3					
CO 4					
CO 5					
CO 6					

Unit	Detailed Syllabus	No. of Hours of Teaching
I	Errors and Their Computations, Solutions of Algebraic and Transcendental Equations: Bisection Method, Iteration Method, Method of False Position, Newton- Raphson Method. Gaussian Elimination for solving system of linear equations.	15
II	Interpolation: Finite Differences, Forward, Backward and Central Differences, Symbolic Relations of Operators, Detection of Errors by Use of Difference Tables, Differences of a Polynomial, Newton's Forward and Backward Formulae, Gauss Forward and Backward Formulae, Newton Divided Difference & Langrage's Method	15

Suggested Reference Books:

1. ***Introductory Methods of Numerical Analysis*** by S.S. Sastry.

2. **Numerical Methods with C++ and MATLAB Programming** by Nita H. Shah Publisher: PHI Learning Pvt. Ltd.
3. **Computer-Oriented Numerical Methods** by R.S. Salaria Publisher: Khanna Book Publishing Co.
4. **Computer-Oriented Numerical Methods** by V. Rajaraman, Prentice Hall of India.
5. **Numerical Methods** by E. Balagurusamy Publisher: McGraw Hill Education
6. **Numerical Methods for Engineers** (2015, 7th ed., McGraw-Hill Education).
7. **Applied Numerical Methods with MATLAB for Engineers and Scientists** (2008, 3rd ed., McGraw-Hill Education).
8. **Introductory Methods of Numerical Analysis** (2012, 5th ed., PHI Learning Pvt. Ltd.).
9. **Numerical Methods for Scientific and Engineering Computation** (2012, 6th ed., New Age International Publishers).
10. **Numerical Methods in Engineering with Python** (2010, 2nd ed., Cambridge University Press).
11. **Python Programming and Numerical Methods: A Guide for Engineers and Scientists** (2021, 1st ed., Academic Press).
12. **MATLAB: An Introduction with Applications** (2014, 5th ed., Wiley).
13. **Excel for Scientists and Engineers: Numerical Methods** (2007, 1st ed., Wiley-Interscience).
14. **Numerical Analysis** (2010, 9th ed., Cengage Learning).
15. **Numerical Recipes: The Art of Scientific Computing** (2007, 3rd ed., Cambridge University Press).

MAMDC 234 P: Mathematics Major Practical

Semester: III	Course Title: Numerical Analysis	Credit: 2
Course No.: 234 P	MULTIDISCIPLINARY (P)	Hours: 4/week

COs with Cognitive Abilities

COs	COGNITIVE ABILITIES	COURSE OUTCOMES
CO1	REMEMBERING	Recall fundamental numerical methods for solving equations, performing interpolation, and analysing errors.
CO2	UNDERSTANDING	Explain the principles and procedures of root-finding methods, interpolation techniques, and error analysis
CO3	APPLYING	Apply numerical methods such as Newton-Raphson, Gaussian Elimination, and Newton's Interpolation to solve practical problems.
CO4	ANALYSING	Analyse the accuracy, convergence, and limitations of different numerical techniques in solving mathematical problems.
CO5	EVALUATING	Evaluate the efficiency of numerical algorithms by comparing their computational accuracy and convergence rates.
CO6	CREATING	Develop computational algorithms to implement numerical methods for solving equations and performing interpolation

CO-PO Mapping

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

(Manual/Computer)

Sr. No.	Title of the Practical	No. of Hours of Teaching
1.	Practical on Errors.	5
2.	Solving equation using bisection method	5
3.	Solving equation using iteration method	5
4.	Solving equation using method of false positions method	5
5.	Solving equation using Newton- Raphson Method	5
6.	Solving system of linear equation using gauss's eliminations method	5
7.	Examples on Newton forward interpolation method	5
8.	Examples on Newton backward interpolation method	5
9.	Examples on gauss's forward interpolation method	5
10.	Examples on gauss's backward interpolation method	5
11.	Examples on Newton Divided Difference (NDD) interpolation method	5
12.	Examples on Langrage's interpolation method	5