

COURSE INFORMATION SHEET

Course code: MA 24201

Course title: Numerical Methods

Pre-requisite(s): NIL

Co- requisite(s): MA24202 Numerical Methods Lab.

Credits: L: 2 T: 0 P: 0 C:2

Class schedule per week: 2 Lectures

Class: BTech.

Semester / Level: III-IV /2

Branch: All

Name of Teacher:

Course Objectives: This course enables the students to

1.	comprehend suitable numerical methods to solve algebraic and transcendental equations
2.	learn proper numerical methods to solve linear system of equations
3.	approximate a function using various interpolation techniques
4.	evaluation of derivatives and integrals using interpolating polynomials
5.	find the numerical solutions of initial value problems

Course Outcomes: After completion of this course, students will be able to

CO1	solve algebraic and transcendental equations using numerical methods for real-world problem solving
CO2	apply numerical techniques to solve linear system of equations in scientific and engineering computations
CO3	use interpolation methods to approximate functions in data analysis and modeling
CO4	compute derivatives and integrals for complex mathematical and physical problems
CO5	solve ordinary differential equations numerically for dynamic system modeling and simulations

Handan

Is. Jain

S. Bhatia

Pratima

N. K.

T. Das

S. Singh

Sudhakar Chakraborty

MA24201

Syllabus
Numerical Methods

2-0-0-2

MODULE I: ERRORS AND NONLINEAR EQUATIONS

Types and sources of errors, Propagation of errors.

Bisection method, Regula-Falsi method, Secant method, Newton-Raphson method and its variants, General Iterative method. [05L]

MODULE II: SYSTEM OF LINEAR EQUATIONS

Gaussian Elimination, Gauss-Jordan, LU Decomposition (Crout's method), Gauss-Jacobi and Gauss-Siedel methods to solve linear system of equations. [05L]

MODULE III: INTERPOLATION

Lagrange's interpolation, Newton's divided differences interpolation formulas, Interpolating polynomial using Newton forward and backward differences. [05L]

MODULE IV: DIFFERENTIATION AND INTEGRATION

Differentiation using interpolation formulas, Integration using Newton-Cotes formulas: Trapezoidal rule, Simpson's one-third and three-eighth rules. [05L]

MODULE V: SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Euler's method, modified Euler's method, Runge-Kutta Methods of second and fourth order to solve initial value problems. [05L]

Textbooks:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age Publications, Fourth Edition, 2004.
2. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI, Fourth Edition, 2005.
3. E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

Reference Books:

1. S.C. Chapra and R. P. Canale, Numerical Methods for Engineers, McGraw Hill, Seventh Edition, 2014.
2. C.F. Gerald and P.O. Wheatley, Applied Numerical Analysis, Pearson Education, Seventh Edition, 2003.
3. R. W. Hamming, Numerical Methods for Scientists and Engineers, Second Edition, Dover Publications Inc. 1987.

Handon

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