**Course Name:NUMERICAL ANALYSIS**     **CourseCode:MT(N) 221**

**SYLLABUS-MINOR(VOC)**

## Numerical Methods for Solving Algebraic and Transcendental Equations

Round-off error and computer arithmetic, Local and global truncation errors, Algorithms and convergence; Bisection method, False position method, Fixed point iteration method, Newton's method and secant method for solving equations.

## Numerical Methods for Solving Linear Systems

Partial and scaled partial pivoting, Lower and upper triangular (LU) decomposition of a matrix and its applications, Thomas method for tridiagonal systems; Gauss––Jacobi, Gauss–Seidel and successive over-relaxation (SOR) methods.

## Interpolation

Lagrange and Newton interpolations, Piecewise linear interpolation, Cubic spline interpolation, Finite difference operators, Gregory–Newton forward and backward difference interpolations.

## Numerical Differentiation and Integration

First order and higher order approximation for first derivative, Approximation for second derivative; Numerical integration: Trapezoidal rule, Simpson's rules and error analysis, Bulirsch–Stoer extrapolation methods, Richardson extrapolation.Picard's Method of successive Approximations, Milne's Method


## Initial and Boundary Value Problems of Differential Equations

Euler's method, Runge–Kutta methods, Higher order one step method, multi-step methods; Finite difference method, Shooting method, Real life examples: Google search engine, 1D and 2D simulations, Weather forecasting.

# REFERENCE BOOKS

1. C. F. Gerald & P. O. Wheatley, Applied Numerical Analysis (7th edition), Pearson Education, India, 2008.

2. F. B. Hildebrand, Introduction to Numerical Analysis: (2nd edition). Dover Publications, 2013.

3. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, 2007.

4. M. K. Jain, S. R. K. Iyengar& R. K. Jain, Numerical Methods for Scientific and Engineering Computation (6th edition). New Age International Publishers, 2012.

5. Advanced Numerical Analysis | P.P. Gupta | 851 Paperback – 1 January 2020 By P.P Gupta (Author), G.S. Malik (Author)