

MT-442 Numerical Methods

Error Analysis

Types of errors (relative, Absolute, inherent, round off, truncation), significant digits and numerical instability, flow chart.

Use any Computational tools to Analysis the Numerical Solutions.

Linear Operators

Functions of operators, difference operators and the derivative operators, identities.

Difference Equations

Linear homogeneous and non homogeneous difference equations.

Solution of Non-linear Equations

Numerical methods for finding the roots of transcendental and polynomial equations (Secant, Newton – Raphson Chebyshev and Graeffe's root squaring methods), rate of convergence and stability of an iterative method.

Solution of Linear Equations

Numerical methods for finding the solutions of system of linear equations (Gauss-Elimination, Gauss-Jordan Elimination, triangularization, Cholesky, Jacobi and Gauss – Seidel).

Interpolation &- Curve Fitting

Lagrange's, Newton, Hermit, Spline, least squares approximation. (Linear and non-linear curves).

Numerical Integration & Differentiation

Computation of integrals using simple Trapezoidal rule, $\frac{1}{3}$ th Simpson's rule, $\frac{3}{8}$ th Simpson's rule, Composite Simpson's and Trapezoidal rules, computation of solutions of differential equations using (Euler method, Euler modified method, Runge Kutta method of order 4). Numerical Solutions of Partial differential Equations, Optimization problem (Simplex Method). Steepest Ascent and Steepest Descent Methods.

Recommended Books

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| 1. Advance Engineering Mathematics | Erwin Kreyszig | Seven |
| 2. Numerical Methods for Engineering | Chapra | 1988 |
| 3. Applied Numerical Analysis | Gerald | 1999 |