

MT – 441 Advance Mathematical Techniques

Complex Variable

Limit, continuity, zeros and poles of a complex function. Cauchy-Reimann equations, conformal transformation, contour integration.

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.

Finite Difference

Functions of operators, difference operators and the derivative operators, identities. Linear homogeneous and non-homogeneous difference equations. Numerical Differentiation, Forward Difference Method, Backward Difference Method, Central Difference Method.

Interpolation & Curve Fitting

Lagrange's, Newton, Hermit, Spline, least squares approximation. (Linear and non-linear curve). With numerical problem in engineering.

Numerical Integration & Differentiation

Computation of integrals using simple Trapezoidal rule, $\frac{1}{3}$ th Simpson's rule, $\frac{1}{8}$ 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).

Improper Integrals

Definitions, Types of improper integral and their convergence.

Elliptic Integrals

Introduction and identification of elementary elliptic integrals of first, second and third kinds. Simple applications.

Recommended Books

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| 1. Complex Analysis for
Mathematics and Engineering | John H. Mathews | 2001 |
| 2. Advance Engineering Mathematics | Erwin Kreyszig | Seven |
| 3. Numerical Methods for Engineering | Chapra | 1988 |
| 4. Applied Numerical Analysis | Gerald | 1999 |
| 5. Calculus & Analytical Geometry | Howard Anton | Fifth |