TMA 502

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUE

Unit 1:

- Introduction to Numbers and their accuracy
- Computer Arithmetic
- Mathematical preliminaries
- Errors and their Computation
- General error formula
- Order of Approximation

Solution of Algebraic and Transcendental Equation:

- Bisection Method
- Iteration method
- Secant Method
- Newton Raphson method
- Rate of convergence
- their algorithms

Solution of system of linear equations:

- Gauss Elimination method
- Gauss Jordan method
- Gauss Seidel method
- their algorithms

Unit 2:

Interpolation:

- Introduction to Finite Differences,
- Difference tables
- Polynomial Interpolation:
    - Newton's forward and backward formula
- Central difference formulae:
    - Gauss forward and backward formula
- Interpolation with unequal intervals:
    - Lagrange's interpolation
    - Newton divided difference formula
    - their algorithms

Unit 3:

Numerical Differentiation and Integration:

- Numerical Differentiation for Interpolation Formulae
- General Quadrature formula
- Trapezoidal rule
- Simpson's 1/3 and 3/8 rule
- their algorithms

Numerical Solution of Differential Equations:

- Euler's explicit and implicit methods
- modified Euler's method
- Runge-Kutta Method
- Solution of Boundary Value Problem by Finite Difference Method
- their algorithms

Unit 4:

Statistical Computation:

- Introduction to Method of least squares
- Curve Fitting of different types of curves
- Data fitting with Cubic spline Interpolation

Unit 5:

Correlation and Regression Analysis:

- Introduction of correlation and regression
- Correlation coefficient and its application in computer science
- Linear and Nonlinear Regression
- Multiple Regression