

**IT9154            SCIENTIFIC COMPUTING**

**L T P C  
3 0 0 3**

**UNIT I            INTRODUCTION TO SYSTEM MODELING**

**10**

.Modeling and General Systems Theory-Concepts of Simulation-Types of Simulation-Experimental Design Consideration- Comparison and Selection of Simulation Languages-Development of Simulation Models Using any one of the Languages for Some Problems -Stochastic Simulation - Randomness and Random Numbers - Random Number Generators - Software for Generating Random Numbers.

**UNIT II            APPROXIMATIONS IN SCIENTIFIC COMPUTING**

**8**

General Strategy - Approximations in Scientific Computation - Mathematical Software - Mathematical Software Libraries - Scientific Computing Environments - Extended Arithmetic Packages

**UNIT III           OPTIMIZATION**

**8**

Optimization Problems - Existence and Uniqueness - Convexity - Optimization in One Dimension- Multidimensional Unconstrained Optimization - Constrained Optimization - Linear Programming

**UNIT IV           ROOTS OF EQUATION ,LINEAR ALGEBRAIC EQUATION AND INTERPOLATION**

**10**

Graphical Method – Iterative Methods- Newton-Raphson Method- Break-Even Analysis-Gauss Elimination-Solution Of Linear Systems By Gaussian, Gauss-Jordan, Jacobi And Gauss Seidel Methods-Matrix Inversion-Gauss-Jordan Method. Least-Square Regression -Newton’s Divided-Difference Interpolating Polynomials-Lagrange’s polynomials-Newton’s Forward and Backward Difference Formula- Stirling’s and Bessel’s Central Difference Formula.

**UNIT V            NUMERICAL ORDINARY AND PARTIAL DIFFERENTIATION AND INTEGRATION**

**9**

Numerical Differentiation: Runge-Kutta Methods, Boundary-Value and Eigen value Problems.Partial Differential Equation-Elliptic Equation, Parabolic Equations.Numerical Integration: Trapezoidal and Simpson’s Rules – Two and Three Point Gaussian Quadrature Formula – Double Integral Using Trapezoidal and Simpson’s Rule.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Jerry Banks and John Carson, “Discrete Event System Simulation”, Third Edition, PHI, 2002.

2. Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineering", Second Edition, McGraw-Hill, 1989.

**REFERENCES:**

1. Sastry S.S "Introductory Methods of Numerical Analysis", Third Edition, Prentice Hall India, 1998
2. **Geoffery Gordon, "System Simulation", Second Edition, PHI, 2002.**