

# PVP SDDHARTHA INSTITUTE OF TECHNOLOGY

## 2/4 B.Tech.

EE3T6

### NUMERICAL METHODS WITH C PROGRAMMING

Credits: 4

Lecture: 4 periods/week

Internal assessment: 30 marks

Tutorial: 2 period /week Semester

end examination:70marks

Objective: At the end of the course the student should be able to familiar with numerical solution of equations, exposed to finite differences and interpolation, thorough with the numerical Differentiation and integration and find numerical solutions of ordinary and partial differential equations.

#### Course outcomes:

1. Obtain solution of simultaneous equations by c programming using Gauss-Seidel, Gauss elimination methods.
2. Able to find largest eigen value of given matrix using power method and learn to reduce given symmetric matrix to tridiagonal form.
3. Get the knowledge of solving algebraic and transcendental equations by iterative methods.
4. Use Newton, Lagrange's interpolation formulas to find interpolating polynomial to the given data.
5. Using Simpson's method able to solve definite integrals through computer program, obtain derivative at initial, final points.
6. Solve differential equation with given initial condition using numerical methods, finite difference methods.
7. Able to fit different curves by the method of least squares using C- program.

### Syllabus

UNIT I: Solution of system of linear algebraic equations: Introduction, Jacobi's method, Gauss-seidal iteration method, Computer programs.

UNIT II: Eigen systems: Jacobi transformation of a symmetric matrix, Reduction of a symmetric matrix to tridiagonal form: Givens and Householder reductions. Eigen values and Eigen vectors of a matrix: Given method, Jacobi method. Power method to find largest Eigen value, computer program to power method..

UNIT III: Approximation and round off errors, Truncation errors and Taylor's series. Determination of roots of polynomials and transcendental equations by Bisection, False position, Iteration method and Newton-Raphson methods.

UNIT IV: Finite differences – Forward differences- Backward differences – Central differences – Newton's formulae for interpolation (forward, backward)-Legranges interpolation formula for unequal intervals.

UNIT V: Numerical differentiation and Integration – Differentiation using finite differences – Newtoncotes quadrature formula: Trapezoidal rule, Simpson’s 1/3 rule, Simpson’s 3/8 rule, Computer programs.

UNIT VI: Numerical solution of ordinary differential equations: Solution by Taylor’s series, Picard’s method of successive approximation, Euler’s method, Computer programs.

UNIT VII: Curve fitting and approximation of functions: Least square approximation on fitting of straight line, second degree polynomial exponential curve, geometric curve, power curve, Computer programs.

UNIT VIII: Boundary Value Problems: Numerical solution of ordinary differential equations by Finite difference method. Numerical solution of partial differential equations: Classification of PDE of second order-finite difference approximations to partial derivatives, solution of Laplace equation: Gauss Seidal method, Jacobi method, computer programs

- TEXT BOOKS: 1. “Computer oriented numerical methods” by P.Thangaraj, PHI publications
2. “Numerical methods for scientific and engineering computation” by M.K.Jain, S.R.K. Iyenger new age International Publications, Fourth Edition.
3. “Numerical methods with programming in c” by veerarajan .T, Ramachandran. T Second edition Tata Mc Graw Hill publications

- REFERENCES: 1. Numerical recipes in c” by William H.Press, Cambridge publications
2. “Numerical methods with c programs” by P.S.Subramanyam, B.S. Publications
3. “Introduction to numerical analysis” by J.Stoear, R.Bulirsch, Springer publications