## NUMERICAL ANALYSIS

**Credit=03**

**Objective:** Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. The objective of this course is to acquaint students with various methods of Interpolation and approximations, evaluation of approximate eigen values eigenvectors and finding solution of boundary value problems in ordinary differential equations, so as to minimize the error and time required to solve the problem. This is a supplement to the existing numerical analysis course at undergraduate level.

**Expected Outcome:** After getting trained, a student can opt for the courses like Advanced numerical analysis and Numerical functional analysis. Use of good mathematical software will help in getting the required computing accuracy and the reliability of the numerical results, the effect of round off error or loss of significance.

**Unit- I**

Interpolations: Hermite interpolation, Piecewise and Spline interpolation.
Approximations: Least squares approximation, Chebychev polynomials, Chebychev approximation, Rational approximation.

**Unit-II**

Eigenvalues and eigenvectors, bounds of eigen values, numerical methods of finding eigen values and eigenvectors of symmetric matrices: Jacobi method, Givens Method, Rutishauser method for arbitrary matrices.

**Unit-III**

Boundary value problems:Shooting method for Linear second order differential equations, Non Linear second order differential equations.

**Unit-IV**

Finite difference methods: Linear second order differential equations ( local truncation error, derivative boundary conditions, solution of tridiagonal system)

**Recommended Book**

1. M.K. Jain, S.R.K Iyengar, R.K. Jain: Numerical Methods for Scientific and Engineering Computation, Willey Eastern Ltd. New Delhi (2007)

Unit-I: 4.5, 4.6, 4.8, 4.9,4.10(except Lanczos economization). 4.11
Unit-II: 3.5, 3.6, 3.7, 3.8, 3.9, 3.10
Unit-III: 7.1, 7.2(except convergence & Stability of finite difference schemes)

Unit-IV: 7.3

**Book for Reference**

K. E. Atkinson : An Intriduction to Numerical Analysis, Wiley, New York.

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