# 1 Numerical Analysis

## 1.1 Numerical solution of linear systems

Solution of a system of linear equations by Gaussian elimination, Gauss Jordan, LU decomposition and Cholesky methods and their operational count. Solution of tri- diagonal linear systems. Determinant and Inverse of a matrix using Gauss-Jordan method. General iterative method and Error bound, Gauss Jacobi method, Gauss Seidel method and their convergence analysis. Residual correction, Necessary and sufficient conditions for convergence of iterative methods, the relaxation method (SOR & SUR), Ostrowski-Reich theorem. Condition number, Ill-conditioned and well-conditioned linear systems, Preconditioning, Conjugate gradient method for linear system.

## 1.2 Numerical solution of nonlinear systems

Fixed point iterative method, General iterative methods and its sufficient condition of convergence, Newton's method, Limiting Behavior of Newton's Method, Method of Steepest Descent and its convergence.

## 1.3 Numerical solution of eigenvalue problems

Determination of eigenvalues and eigenvectors by Power method, Convergence of Power method, Inverse Power method, Jacobi's method, Spectral radius, Gerschgorin's circle theorem , Brauer's theorem, Location of eigenvalues using circle theorem.

## 1.4 Numerical solution of integral equations

Approximate numerical solution of Fredholm equation by the method of successive approximations, degenerate kernels and quadrature methods, Numerical Approximation of Voltera equations.