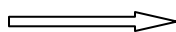


M.A/M.Sc Mathematics Semester 1st

Effective from academic session 2010



Repetition for 2012 with minor change

METHODS OF APPLIED MATHEMATICS-I

Course No. MM-CP-104

UNIT-I(Matrix Theory)

Eigen values and eigen vectors of a matrix and their determination. Similarity of matrices. Two similar matrices have the same eigen values. Algebraic and geometric multiplicity of a characteristic root. Necessary and sufficient condition for a square matrix of order n to be similar to a diagonal matrix. Orthogonal reduction of real matrices, Schur's theorem. Normal matrices, Necessary and sufficient condition for a square matrix to be unitarily similar to a diagonal matrix.

Quadratic forms: The Kroneckers and Lagranges reduction .Reduction by orthogonal transformation of real quadratic forms .Necessary and sufficient condition for a quadratic form to be positive definite. Rank , Index and signature of a quadratic form. If $A = [a_{ij}]$ is a positive definite matrix of order n , then $|A| \leq a_{11}a_{22} \cdots a_{nn}$. Gram matrices. The Gram matrix $B'B$ is always positive definite or positive semi-definite. Hadmard's inequality. If $B = [b_{ij}]$ is an arbitrary non- singular real square matrix of

order n , then $|B| \leq \prod_{i=1}^n \left[\sum_{k=1}^n b_{ik} \right]$.

UNIT-II

(Numerical Analysis)

Numerical solutions of algebraic equations, Method of iteration and Newton-Raphson method, Rate of convergence, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, Finite differences, Lagrange, interpolation, Numerical differentiation and integration, Numerical solutions of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods.

(Theory of Probability)

UNIT- III

The probability set functions, its properties, probability density function, the distribution function and its properties. Mathematical Expectations, some special mathematical expectations, Inequalities of Makov, Chebyshev and Jensen.

UNIT-IV

Conditional probability, independent events, Baye's theorem, Distribution of two and more random variables, Marginal and conditional distributions, conditional means and variances, Correlation coefficient, stochastic independence and its various criteria.

Recommended Books:

- 1 Introduction to Matrix Analysis by Richard Bellman , McGraw Hill Book Company.
- 2 Introduction to Numerical Analysis by K.E. Atkinson
- 3 Hogg and Craig : An Introduction to the Mathematical Statistics

Suggested Readings:

1. Elementary Matrix Algebra by Franz E. Hohn, American Publishing company Pvt.ltd.
2. A Text Book of Matrices by Shanti Narayan, S. Chand and company Ltd.
3. Introduction to Methods of Numerical Analysis by S.S.Sastry.
- 4 Mood and Grayball : An Introduction to the Mathematical Statistics