

PAPER – M301T: LINEAR ALGEBRA
(4 Hrs. / week)

Recapitulation: Vector Spaces, Subspaces, Linear Combinations and Systems of Linear Equations, Linear dependence and independence, Basis and Dimension, Maximal linearly independence subsets, Direct sums, Linear transformation, Linear Operators.

Algebra of Linear transformations, Minimal polynomials, Regular and singular transformation, Range and rank of a transformation and its properties, characteristic roots and characteristic vectors.

The matrix representation of a linear transformation, Composition of a linear transformation and matrix multiplication, The change of coordinate matrix, transition matrix, The dual space.

Characteristic polynomials, Diagonalizability, Invariant subspaces, Cayley-Hamilton theorem.

26 Hrs.

Canonical Forms: Triangular canonical form, Nilpotent transformations, Jordan canonical form, The rational canonical form.

Inner Product Spaces, Orthogonal complements, Gram-Schmidt Orthonormalization process.

Positive Definite Matrices, Maxima, minima and saddle points, Tests for positive definiteness, Singular Value Decomposition and its applications.

Bilinear forms, symmetric and skew-symmetric bilinear forms, real quadratic forms, rank and signature, Sylvester's law of inertia.

26 Hrs.

TEXT BOOKS

1. K. Hoffman and R. Kunze, "Linear Algebra", Pearson Education, India, 2003. Prentice-Hall of India, 1991.
2. I. N. Herstein, "Topics in Algebra", Second edition, John Wiley & Sons, 2006.
3. G. Strang, "Linear Algebra and its Applications", Third edition, Brooks/Cole Ltd., New Delhi, 2003.
4. J. Gilbert and L. Gilbert, "Linear Algebra and Matrix theory", Academic Press, 1995.

REFERENCE BOOKS

1. S. Lang, "Linear Algebra", Springer-Verlag, New York, 1989.
2. M. Artin, "Algebra", Prentice Hall of India, 1994.
3. S. Freidberg A Insel, and L Spence, "Linear Algebra", Fourth Edition, Prentice Hall of India, 2009.
4. L. Hogben, "Handbook of Linear Algebra", Chapman and Hall CRC, 2006.

Pattern of Question Paper: Five full questions out of eight questions are to be answered.