FMCC 103Linear Algebra (3-0-0)

Module-I (10-hours)

Geometric interpretation of solution of system of equations in two and three variables; matrix notation; solution by elimination and back substitution; interpretation in terms of matrices, elimination using matrices; elementary matrices, properties of operations on matrices. Definition and uniqueness; non-existence in general: singular matrices; calculation of inverse using Gauss-Jordan elimination; existence of one sided inverse implies invertibility ; decomposition of a matrix as product of upper and lower triangular matrices. Vector spaces and Subspaces, Solving Ax=0 and Ax=b, Linear Independence, Basis and Dimension, The four fundamental Subspaces, graph and networks, Linear Transformations.

Module-II (10-hours)

Orthogonal Vectors and Subspaces, Cosines and Projections onto Lines, Projections and Least Squares, orthogonal Bases and Gram-Schmidt, The Faster Fourier Transform, Properties of the determinant, formulas for the determinant, Expansion of determinant of a matrix in Cofactors, Applications of Determinants.

Module-III (10-hours)

Eigen values and eigenvectors, Diagonalisation of a Matrix, Difference equations and powers A^k, Markov Matrices, Differential equations and e^{At}, stability of differential equation, complex Matrices, unitary Matrices, similarity transformations, Jordan Form, minima ,maxima and saddle points, tests for positive definiteness, Test for positive definiteness, singular value decomposition, minimum principles.

Text BooK:

1. Strang, Introduction to Linear Algebra, 4th ed., Wellesley Cambridge Press. Chapters-1-5, 6.1,6.2,6.3,6.4.

Reference

1. I.N. Herstein, Topics in algebra, 2nd edition, 1975.
2. M. Artin, Algebra, Prentice-Hall of India.
3. Hoffman and Kunze, Linear Algebra, 2nd ed., PHI.
4. S. Kumaresan, Linear Algebra, a geometric approach, PHI.
5. **Dummit** : Abstract Algebra , Wiley