15 MAMC 105   LINEAR ALGEBRA   (3-1-0)

Module-I (14-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 (13-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 (13-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.