

MT-272 Linear Algebra & Geometry

Linear algebra: linearity and linear dependence of vectors, basis, dimension of a vector space, field matrix and type of matrices (singular, non-singular, symmetric, non-symmetric, upper, lower, diagonal tri-diagonal matrix), rank of a matrix using row operations and special method, echelon and reduced echelon forms of a matrix, determination of consistency of a system of linear equation using rank, transition matrix, Euclidean spaces and transformation: geometric representation of vector, norm of vector, Euclidean inner product, projections and orthogonal projections, Euclidean n-spaces and properties: Cauchy-Schwarz inequality, Euclidean transformations, apply geometric transformations to plane figure, composition of transformations, application of linear algebra: Leontief economic models, electrical networks, scaling, translation, rotation, and projection etc, Eigen values & Eigen spaces: interpret eigenvectors and Eigen-values of a matrix in terms of transformation it represents, convert a transformation into a matrix Eigen value problem, find the Eigen values and eigenvectors of order not more than 3×3 matrices algebraically, determine the modal matrix for a given matrix, reduce a matrix to diagonal form and Jordan form, state the Cayley-Hamilton theorem and use it to find powers and the inverse of a matrix, understand a simple numerical method for finding the eigenvectors of a matrix, use appropriate software to compute the Eigen-values and eigenvectors of a matrix, define quadratic form and determine its nature using Eigen-values, solid geometry: coordinate systems in three dimensions, direction cosines and ratios, vector equation of a straight line, plane and sphere, curve tracing of a function of two and three variables, surfaces of revolutions, transformations (Cartesian to polar & cylindrical).

Recommended Books:

1. "Elementary Linear Algebra", Howard Anton, John Wiley & Sons, 10th Edition.
2. "Advanced Engineering Mathematics", Erwin Kreyszig, Wiley, 10th Edition, 2011.