

MT-225 Linear Algebra & Ordinary Differential Equations

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, basic concept of tensors, eigen value and eigen vectors of a matrix, Diagonalization, Cayley-Hamilton theorem. Applications of linear algebra in Engineering.

Euclidean Spaces and Transformation

Geometric representation of vector, norm of vector, Euclidean inner product, projections and orthogonal projections, Euclidean n spaces n properties Cauchy-Schwarz inequality, Euclidean transformations, apply geometric transformations to plane figure, composition of transformations.

1st Order Differential Equations

Basic concept; Formation of differential equations and solution of differential equations by direct integration and by separating the variables; Homogeneous equations and equations reducible to homogeneous form; Linear differential equations of the order and equations reducible to the linear form; Bernoulli's equations and orthogonal trajectories; Application in relevant Engineering.

2nd and Higher Orders Equations

Special types of n^{th} order differential equations with constant coefficients and their solutions; The operator D ; Inverse operator $1/D$; Solution of differential by operator D methods; Special cases, Cauchy's differential equations; Simultaneous differential equations; simple application of differential equations in relevant Engineering.

Laplace Integral & Transformation

Definition, Laplace transforms of some elementary functions, first translation or shifting theorem, second translation or shifting theorem, change of scale property, Laplace transform of the n^{th} order derivative, initial and final value theorem Laplace transform of integrals, Laplace transform of functions $t^n F(t)$ and $F(t)/t$, Laplace transform of periodic function, evaluation of integrals, definition of inverse Laplace transform and inverse transforms, convolution theorem, solutions of ordinary differential using Laplace transform.

Recommended Books

- | | | |
|--|-------------------|---------------|
| 1. Advance Engineering Mathematics | Erwin Kreyszig | Seven Edition |
| 2. Differential Equation A modeling
Perspective | Robert L. Barelli | 1998 |
| 3. Introduction to Differential Equation | J. Farlaw | 1994 |
| 4. Differential Equation | G. Zill | |
| 5. Elementary Equation | Howard Anton | Seven Ed. |
| 6. Elementary Linear Algebra | Bernald Kolman | Seven Ed. |