Maths –II

LINEAR ALGEBRA

- Solving Ax = b
- Elimination with matrices
- Multiplication and inverse matrices
- Factorization into A = LU
- Transposes, vector spaces
- Column space and null-space
- Independence, basis, and dimension
- Orthogonal vectors and subspaces
- Projection matrices and least squares
- Orthogonal matrices and Gram-Schmidt
- Properties of determinants
- Determinant formulas and cofactors
- Cramer's rule, inverse matrix
- Eigenvalues and eigenvectors
- Symmetric matrices and positive definiteness
- Positive definite matrices
- Singular value decomposition
- Linear transformations and their matrices

IMPROPER INTEGRALS

- Introduction
- Integration of unbounded functions with finite limits of integration
- Infinite range of integration
- Integrand as a product of functions (Convergence at ∞)
- Gamma and Beta functions and their properties

FUNCTIONS OF SINGLE AND SEVERAL VARIABLES, MULTIPLE INTEGRALS

- Mean Value Theorems
- Rolle's Theorem
- Lagrange's mean value theorem
- Cauchy's mean value theorem, Generalized mean value theorem
- Introduction to functions of several variables
- Multiple integrals and Applications

VECTOR CALCULUS

- Gradient, divergence, curl and their related properties.
- Laplacian operator
- Line integral, work done, surface integrals, volume integral .
- Vector integral theorems.
- Gauss divergence theorem and related problems.

COMPLEX ANALYSIS

- Limits, Continuity and Derivative of Complex functions. Differentiation rules.
- Analytic Functions, Cauchy-Riemann Equations, Theorems on Cauchy-Riemann equations. Laplace's Equation, Harmonic Functions. Finding harmonic conjugates
- Complex Integration: Line Integral in the Complex Plane. Dependence on path. ML-Inequality, Cauchy's Integral theorem, Independence of Path, Principle of Deformation of Path, Existence of indefinite integral. Cauchy's Theorem for Multiply Connected domains.
- Power Series, Taylor Series: Sequences, Series and Convergence Tests. Power series, Convergence of Power series. Radius of Convergence. Taylor series and Maclaurin Series.
- Laurent Series, Singularities, Poles, Simple Poles, Zeros, Infinity, Analytic or Singular at Infinity.
- Residue Integration Method, Residue theorem, Evaluation of Real Integrals.

1) Kreyszig Ervin, Advanced Engineering Mathematics,10th Edition, New Jersy, John Wiley & Sons.

2) B S Grewal (2012), Higher Engineering Mathematics, 42nd Edition, New Delhi, Khanna Publishers.

3) Mathematical Analysis, 5th Edition, S C Malik and Savita Arora.

4) Introduction to Linear Algebra, Fifth Edition (2016)

5) Vector Analysis by Murray Spiegel 2nd Ed