

Vidyalankar

S.E. Sem. IV [EXTC]
Applied Mathematics - IV

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks

1. Bessel Function

1. Relation between Laplace and Bessel's differential equation, its solution by series method, Bessel function of first and second kind, Recurrence relations for,
2. Generating function of, Orthogonality of Bessel-Fourier series of a function.

2. Matrices

1. Eigen Values and Eigen vectors, Cayley Hamilton theorem (without proof), Similar Matrices, Orthogonally Similar Matrices
2. Functions of square Matrix, Derogatory and Nonderogatory Matrices.

3. Matrices and Complex Variables

1. Quadratic forms over real field, Reduction of Quadratic form to a diagonal canonical form, Rank, Index and Signature of quadratic form, Sylvester's law of Inertia
2. Value-class of a quadratic form-Definite, Semidefinite and indefinite.
3. Functions of a Complex variable, Analytic Functions, Cauchy-Riemann equations in Cartesian and polar co-ordinates. Harmonic functions, Analytical method and Milne Thomson method to find $f(z)$.

4. Complex Variables

1. Conformal Mappings and Bilinear transformations, Cross-Ratios, Fixed points of Bilinear Transformations.
2. Complex Integration, Complex line integral, Cauchy's Integral theorem for simply connected regions (with proof) and Cauchy's Integral formula (with proof).

5. Complex Variables

1. Taylor's and Laurent's development (without proof), Zeros, Singularities and poles of function, Residue theorem (with proof).
2. Real definite Integrals of the form.

6. Vector Integration

1. Line Integral, properties of Line Integrals, Conservative fields, Scalar potentials.
2. Green's theorem in a plane (Statement only), Surface Integrals. Divergence Theorem (statement only). Stoke's Theorem (statement only).

References :

1. Vector Analysis (*Murray R. Spiegel*) Schaum's Outline Series – McGraw Hill Publications
2. Complex Variables (*Murray R. Spiegel*) Schaum's Outline Series – McGraw Hill Publications.
3. Higher Engineering Mathematics (*Dr. B. S. Grewal*) Khanna Publications.
4. Mathematical Methods (*J. N. Sharma and R. K. Gupta*) Krishna Prakashan Mandir (P) Ltd.
5. Calculus (*Thomas, Finney*) 9th Edition, Pearson Education.
6. Linear Algebra and Applications (*Gilbert Strang*) 4th Edition, Thompson Books/Cole.
7. Matrices (*Shantinarayan*) S.Chand Publications
8. A text book of Applied Mathematics Vol. I & II (*P. N. Wartikar & J. N. Wartikar*) Pune Vidyarthi Griha Prakashan.

