Subject Code : RN1I1

SEMESTER I – PAPER I – MATHEMATICAL PHYSICS

UNIT I - INTERGRAL TRANSFORMS

Fourier Series – Dirichlet's Condition – Sine and Cosine series-Fourier transform-Faltung theorem – Laplace transform – solution of ordinary differential equations-convolution theorem.

UNIT II - MATRIX THEORY

Solution of linear algebraic equations rank of a matrix – Characteristic equation of amatrix – Eigen values and eigen vectors-Trace of a matrix – Cayley – Hamilton theorem – Reduction of amatrix to diagonal form – Hermitian and unitary matrices – Direct sum and products of matrices.

UNIT III - COMPUTER ORIENTED NUMERICAL METHODS

Bisection and Newton-Rapson method for finding roots of the equations-Solutions of simultaneous linear equation by Gauss elimination method-Solution of ordinary differential equation by Euler method and Runge-kutta second order and fourth order method- Evaluation of integrals by means of power series-Simpson's rule (one-third) – Error estimates.

UNIT IV - VECTOR FIELDS

Concept of Vector and Scalar fields – Gradient, divergence, Curl and Laplacian-Vector identities-Line integral and volume integral-Gauss theorem, Green's theorem, Stoke's theorem and applications-Orthogonal curvilinear coordinates-Expression for gradient, divergence, curl and Laplacian in cylindrical and spherical coordinates.

UNIT V - THE THEORY OF COMPLEX VARIABLES

Functions of a complex variable – The derivative and the Cauchy-Riemann differential equations-Line integrals of complex functions-Cauchy's integral theorem-Cauchy's integral formula-Taylor's series-Laurent's series-Residues-Cauchy's residue theorem.

BOOK FOR STUDY:

1. Mathematical Physics, B.S. Rajput Pragati Prakashan, Meerut (1996)
2. Mathematical Physics, B.D. Gupta Vani Educational Books, Vikas Publishing House Pvt. Ltd., U.P. (India) (1990)
3. Mathematical Physics, P.P. Gupta, R.P.S. Yadav, G.S. Malik, Kedarnath Ramanath Meerut, Delhi (1984)
4. Introductory methods of Numerical Analysis S.S.Sastry Prentice-Hall of India Pvt. Ltd. (Ind. Edition), New Delhi 1993.
5. Numerical methods by E. Balagurusamy Tata McGraw Hill, New Delhi (2000)
6. Numerical methods by P. Kandasamy, K. Thilagavathi, K. Gunavathy S. Chand and company, New Delhi (2000)