

## **Advanced Engineering Mathematics (RP 4.1.1)**

**Non-linear Differential Equations** : Iterative, Variational and Perturbation Methods.

Integral Equations : Boundary value problems ; Boltzmann transport equation in EM. Field; Hilbert-Schmidt theory.

**Green's Functions** : Application to physical problems; Green's function by eigenfunction method; Solution of initial and boundary value problems in electromagnetic.

**Probability Theory** : Different probability spaces; Distribution functions and their decomposition; Expectation and its properties; Algebraic theory of Markov chains;

**Random numbers:** Fibonacci sequence of various techniques for the generation of random numbers. Random walk problem; Renewal theory; Two-stage Markov process; Queuing theory; Fokker-planck equation in continuous stochastic processes.

**Group Theory:** Group, Systematic group, Cyclic group, Sub group, Cosets, and Quotient group, Lagrange's theorem.

**Difference equation** : Difference operators, Recurrence relations, Linear and Non-linear difference equations: Methods of solution. Galois fields, prime fields and application to coding and information theory.

**Numerical Methods** : Solution of matrix equation by generalised inverse technique; Numerical evaluation of determinant; Computation of eigenvalues and eigenvectors; Matrix inversion by partitioning; Optimisation technique by conjugate gradient method and method of steepest descent. Monte Carlo tech, FEM, Fast-Fourier Transformation (FFT) algorithms; FFT of real functions; Convolution; Correlation and auto-correlation using FFT; Computation of Fourier integrals using FFT; Solution of boundary value problems by relaxation methods; Solution of integral equations by variational methods.