20PMEEC100	Applied Mathematics	(4-0-0) 4

Contact Hours: 52

Course Learning Objectives (CLOs):

Learn the idea of random variable and probability distribution. To prepare the students to formulate and solve linear programming problem. Study Numerical methods to solve algebraic, transcendental equations. Learn to solve system of linear equations. Introducing students to the fundamental concepts of Graph theory and linear *algebra.*

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs(1 to 4)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	Learn the idea of random Variables(discrete/continuous) and probability distributions in analyzing the probability models arising in power system engineering.		1,2	
CO-2	Apply the concept of optimization to Solve system of linear and non-linear programming problems.		1,2	
CO-3	Learn the Concept of graph theory in engineering problems.		1,2	
CO-4	Employ numerical techniques in order to achieve more accurate values in the computation of roots of algebraic and non-linear equations		1,2	
CO-5	Apply standard iterative methods to compute Eigen values		1,2	

POs	PO1	PO2	PO3	PO4	PO5	PO6
Mapping Level	2.0	2.0				

Prerequisites: Differentiation, Matrices, vectors, Basic probability theory

Contents:

1)Probability Theory

Review of basic probability theory. Definitions of random variables and probability distributions, probability mass and density functions, expectation, moments, central moments, characteristic functions, probability generating and moment generating functions-illustrations. Binomial, Poisson, Exponential, Gaussian and Rayleigh distributions example. **10 Hrs.**

2) Linear and Nonlinear Programming

Formulation of LPP problem. Simplex Algorithm-Two Phase and BigM techniques – Duality theory- Dual Simplex method. Nonlinear Programming –Constrained extremal problems-Lagranges multiplier method- Kuhn-Tucker conditions and solutions. **12 Hrs.**

3) Graph Theory

Basic terminologies, types of graphs, sub graphs, graphs isomorphism, connected graphs-walks, paths, circuits, connected and disconnected graphs, operations on graphs, Eulerian paths and circuits, Hamiltonian paths and circuits, shortest path algorithms, applications of graphs. **10 Hrs.**

4) Numerical Methods

Solution of algebraic and transcendental equations- iterative methods based on second degree equation – Muller method (no derivation), Chebyshev method. Fixed point iteration method (first order), acceleration of convergence, Δ - Aitken's method. Bairstow's method, Graeffe's root squaring method. **10 Hrs.**

5) Linear Algebra

Computation of Eigen values and Eigen vectors of real symmetric matrices- Given's method. Orthogonal vectors and orthogonal bases. Gram-Schmidt orthogonalization process. QR decomposition, singular value decomposition, least square approximations**.** **10 Hrs.**

Reference Books:

1) M K Jain, S R K Iyengar and R K Jain, "Numerical Methods for Scientific and Engineering Computations", New Age International, 2004.
2) Dr. B.S. Grewal, "Higher Engineering Mathematics", 41stEdition, Khanna Publishers, 2011.
3) Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", PHI, 2012.
4) Kenneth Hoffman and Ray Kunze, "Linear Algebra", 2nd Edition, PHI, 2011.
5) *Richard Bronson, "*Schaum's Outlines of Theory and Problems of Matrix Operations*",* McGraw-Hill, 1988.