GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: ELECTRICAL ENGINEERING
SUBJECT NAME: MATHEMATICAL METHODS FOR POWER ENGINEERING
SUBJECT CODE: 3710719
M.E. 1st SEMESTER

Type of course: Programme Elective II

Prerequisite: Basic mathematics course

Rationale: Power systems are typically characterized by large size and complex nature. Therefore, its analysis for various purposes is extremely important. The analysis of power systems is done using sophisticated methods on computers using various mathematical techniques and methods. These mathematical methods help to analyze power systems in steady state and dynamical conditions. The problem of power system optimization under constraints, reliability, stability assessment etc are carried out using different mathematical methods.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Vector spaces, Linear transformations Matrix representation of linear transformation	**6**	15
2	Eigen values and Eigen vectors of linear operator	**6**	15
3	Linear Programming Problems Simplex Method Duality Non Linear Programming problems	**8**	20
4	Unconstrained Problems Search methods Constrained Problems	**8**	15
5	Lagrange method Kuhn-Tucker conditions Random Variables Distributions	**8**	20
6	Independent Random Variables Marginal and Conditional distributions Elements of stochastic processes	**8**	15

Reference Books:

1. Kenneth Hoffman and Ray Kunze, "Linear Algebra", 2nd Edition, PHI, 1992
2. Erwin Kreyszig, "Introductory Functional Analysis with Applications", John Wiley & Sons, 2004
3. Irwin Miller and Marylees Miller, John E. Freund's "Mathematical Statistics", 6th Edn, PHI, 2002
4. J. Medhi, "Stochastic Processes", New Age International, New Delhi., 1994
5. A Papoulis, "Probability, Random Variables and Stochastic Processes", 3rd Edition, McGraw Hill, 2002
6. John B Thomas, "An Introduction to Applied Probability and Random Processes", John Wiley,2000
7. Hillier F S and Liebermann G J, "Introduction to Operations Research", 7th Edition, McGraw Hill, 2001
8. Simmons D M, "Non Linear Programming for Operations Research", PHI, 1975

Course Outcome:

After learning the course the students should be able to:

1. Knowledge about vector spaces, linear transformation, eigenvalues and eigenvectors of linear operators
2. To learn about linear programming problems and understanding the simplex method for solving linear programming problems in various fields of science and technology
3.Acquire knowledge about nonlinear programming and various techniques used for solving constrained and unconstrained nonlinear programming problems
4.Understanding the concept of random variables, functions of random variable and their probability distribution
5. Understand stochastic processes and their classification

List of Experiments:

- Simulations/Practicals/Study shall be based on above topics

List of Open Source Software/learning website:

E-materials available at the website of NPTEL- http://nptel.ac.in/