M.Tech. Power System Engineering

Applied Mathematics

Course Code: 18PMAC100 **CIE Marks: 50**
Contact Hours/Week: 04 **SEE Marks: 100**
Total Hours: 52 **Exam Hours: 03**
Semester: I **Credits: 04**

Contact Hours: 52

Course Learning Objectives:
Study Numerical methods to solve algebraic, transcendental equations. Learn to solve system of linear equations. Learn the idea of random variable and probability distribution. To prepare the students to formulate and solve linear programming problem.Introducing students to the fundamental concepts of Graph theory, linear algebra culminating in abstract vector spaces and *linear transformations*
Prerequisites: Knowledge of Elementary concepts of Algebra, Basic Probability theory, Basics of matrices.
Description of the course outcomes the student will be able to

CO-1	Use Numerical methods to solve algebraic, transcendental equations and Calculate Eigen values and Eigen vectors of real symmetric matrices.
CO-2	Solve system of linear and non-linear equation.
CO-3	Learn the idea of random variables (discrete/continuous) and probability distributions in analyzing the probability models.
CO-4	Learn the Concept of graph theory and apply for Engineering problems.
CO-5	Compute rank, Nullity of linear transformation and represent through matrices.

Contents:

CHAPTER-I

Numerical Methods

Solution of algebraic and transcendental equations Muller method (no derivation), Chebyshev method, polynomial equations Birge –Vieta method and Bairstow's method.

Eigen value problems

Gerschgorian circle, Eigen values and Eigen vectors of real symmetric matrices –Jacobi method, Givens method. **10 Hrs.**

CHAPTER-II

Linear and Non Linear Programming

Linear programming- formulation of the problem, graphical method, simplex method, artificial variable technique -M-method. Non Linear Programming –Constrained extremal problems- Lagranges multiplier method- Kuhn-Tucker conditions and solutions. **10Hrs.**

CHAPTER-III

Probability

Review of basic probability theory. Definitions of random variables and probability distributions, probability mass and density functions, expectation, characteristic functions Binomial, Poisson, Exponential examples, Marginal and conditional distribution, Elements of stochastic processes. **12Hrs**.

CHAPTER-IV

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, applications of graphs..

1**0 Hrs.**

CHAPTER-V

Linear Algebra: Vector spaces, linear dependent, independence, basis and dimension, elementary properties, examples.

Linear Transformations: Definition, properties, range and nullspace,
rank and nullity, algebra of linear transformations- invertible, singular and non-singular transformations, representation of transformations by matrices. **10Hrs.**

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. NarsinghDeo, "Graph Theory with Applications to Engineering and Computer Science", PHI, 2012.
4. Kenneth Hoffman and Ray Kunze, "Linear Algebra", 2ndEdition, PHI, 2011.

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 3 and mention any additional POs)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Use Numerical methods to solve algebraic, transcendental equations and Calculate Eigen values and Eigen vectors of real symmetric matrices.	1		2
CO-2	Solve system of linear and non-linear equation.	1		2
CO-3	Solve linear and non-linear equation.	1	3	2
CO-4	Learn the idea of random variables (discrete/continuous) and probability distributions in analyzing the probability models.	1		2
CO-5	Learn the Concept of graph theory in engineering problems.	1	3	2
CO-6	Compute rank, Nullity of linear transformation and represent through matrices.	1	3	2

POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11
Mapping Level	3	1	2								