III Year II Semester	L	Т	Р	С
Code: 20EE6644	4	0	0	4

APPLICATION OF OPTIMIZATION IN POWER SYSTEM

Preamble: This course provide exposure to optimization and solution techniques for the power system problems

Course Objectives

- 1. To familiarize the students with optimization techniques
- 2. To familiarize the students with Linear Programing and its duality
- 3. To understand the evolutionary and swarm based techniques
- 4. To implement optimization techniques in solving power system problem

Course Outcomes

- 1. The students will be able to make use of classical and advance techniques in optimization
- 2. The students will be able to apply the knowledge of optimization techniques in electrical power systems

CO – PO & CO – PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1		2		1				1				1	2	1
CO 2	1	1	1	2	1				1				1	2	1

1 - Weak, 2 - Moderate and 3 - Strong

Unit – I: Fundamentals of Optimization Techniques

Definition - classification of optimization problems-Unconstrained and constrained optimization - Optimality conditions - classical optimization techniques (Lamda Iteration method, Linear programming)

Unit – II: Lamda Iteration Method

Brief introduction to lamda iteration method, formulation of Lagrange function, Lamda iteration method to solve optimal dispatch problem

Unit – III: Linear Programming

Fundamentals of linear programming, simplex method I, weak and strong duality theorems, integer programming, network flow, develop a linear programming model from problem description

Unit – IV: Optimization Solvers

Introduction to Evolutionary computation, advantages and limitations of evolutionary computation, fundamentals of genetic algorithm, working principle, principles of genetic algorithm - genetic operators, selection, crossover and mutation fitness function, GA operators, similarities and differences between GA and traditional methods, unconstrained and constrained

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10 Hours

10 Hours

10 Hours

10 Hours

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optimization using Genetic Algorithm Principle, velocity updating, advanced operatorsparameter selection, hybrid approaches - binary, discrete and combinatorial

Unit – V: Applications to Power Systems

12 Hours

Applications to Power System Scheduling - algorithms and flow chart of various optimization techniques for solving economic load dispatch; Model Identification - Dynamic Load Modelling, Short-Term Load Forecasting; Distribution system applications - Network reconfiguration for loss reduction, Applications to system planning; Solving optimal power flow problems; etc.

Text Books:

- 1. S. S. Rao, Engineering Optimization Theory and Practice, John Wiley & Sons
- 2. S.N. Sivanandam, S. N. Deepa, Principles of Soft Computing, Wiley India Pvt. Ltd.

Reference Books:

- 1. K. Y. Lee and M.A. El-Sharkawi (eds.), Modern Heuristic Optimization Techniques with Applications to Power Systems, IEEE Press
- 2. D. E. Goldberg, Genetic Algorithm in Search, Optimization and Machine Learning, Wesley Longman Publishing Co., Inc. Boston, MA, USA