

**(EE511) OPTIMIZATION TECHNIQUES**  
(ELECTIVE - I)

***Objective of the course:***

*The ever-increasing demand on engineers to lower production costs, energy losses and to maximize operational reliability has prompted engineers to look for rigorous methods of decision making such as optimization techniques. The knowledge of optimization is needed in design and operation of electrical systems because these systems handle large power. This course contains static optimization methods of linear and non-linear systems and also the dynamic programming.*

**UNIT- I**

**Linear Programming:**

Introduction-objective function and constraints. Examples from real world. Simplex method, standard form of linear programming problem. Geometrical solution, System of linear equations, simplex algorithm, two phases of simplex method.

**UNIT- II**

Revised simplex method-primal dual relations, dual simplex method, post-optimality analysis. Transportation problem, Assignment problem, quadratic programming, examples.

**UNIT- III**

Nonlinear programming: Unconstrained optimization-direct methods: Powell's Method, conjugate direction, Rosen Brock's method. Indirect search methods: steepest descent, conjugate gradient, Newton's methods. Davidon-Fletcher-Powell method.

**UNIT- IV**

**Constrained optimization:**

Sequential linear programming, Methods of feasible directions, gradient projection method, generalized reduced gradient method, penalty function method, Augmented Lagrangian multipliers method. Kuhn-Tucker conditions.

**UNIT- V**

Dynamic programming: Multistage decision processes, Principle of optimality, computational procedure, linear programming as a case of dynamic program. All integer and mixed integer programming, Branch and Bound method. Introduction to Genetic Algorithms, optimization of fuzzy systems. Neural network- based optimization.

***REFERENCE BOOKS:***

1. S.S.Rao, "Engineering Optimization", revised 3<sup>rd</sup> ed., New Age international publishers.
2. Kalyanmoy Dev, "Optimization for Engineering Design" Printice-Hall of India, 2005
3. Ashok D. Bellegundu and T.R. ChandruPatla, "Optimization Concepts and Application in Engineering" Pearson Edition Asia, 2002