

CE 433: OPTIMIZATION TECHNIQUES (3-0-0: 3)

Introduction

Optimization problem formulation, types of optimization problems, objective function, design variables, constraints and variable bounds.

Single variable optimization methods

Optimality criteria, necessary and sufficient conditions, bracketing methods, region elimination methods, gradient based methods.

Multivariable optimization methods

Optimality criteria, necessary and sufficient conditions, unidirectional search, direct search methods, gradient based methods.

Constrained optimization methods

Direct substitution techniques, transformation methods, Lagrange multipliers methods, Kuhn-Tucker conditions.

Linear programming problem

Graphical methods, simplex method, big M method, applications of linear programming problems.

Dynamic programming

Introduction to dynamic programming, Bellman's principle of optimality, applications of dynamic programming.

Genetic algorithms

Introduction to genetic algorithms, working principles of genetic algorithms, encoding of variables, selection, cross over and mutation, applications.

Text Books

1. K. Deb, "Optimization for Engineering Design", PHI Learning
2. S. S. Rao, "Engineering Optimization Theory and Practice", John Wiley and Sons

References:

1. J. S. Arora, "Introduction to Optimum Design", McGraw Hill Education
2. E. K. P. Chong and S. H. Zak, "An Introduction to Optimization", John Wiley and Sons.