

2012-13

PVP SIDDHARTHA INSTITUTE OF TECHNOLOGY
(COURSE STRUCTURE FOR AUTONOMOUS SCHEME)

I Year M. Tech. (Machine Design) M.E.

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MEMD2T1 - ADVANCED OPTIMIZATION TECHNIQUES

UNIT - I

Linear programming: Two-phase simplex method, Big-M method, duality, interpretation, dual simplex method, applications.

UNIT - II

Assignment problem: Hungarian's algorithm, applications, unbalanced problems, traveling salesman problem.

UNIT - III

Classical optimization techniques: Single variable optimization without constraints, Multi variable optimization without constraints, multivariable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions.

UNIT - IV

Numerical methods for optimization: Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method, types of penalty methods for handling constraints.

UNIT - V

Genetic algorithm (GA) : Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA

UNIT – VI

Genetic Programming (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

UNIT – VII

Dynamic programming (D.P): Multistage decision processes. Concepts of sub optimization, computational procedure in dynamic programming calculus method and tabular methods. Linear programming as a case of D.P and Continuous D.P.

UNIT VIII

Applications of Optimization in Design and Manufacturing systems: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

Text Books:

1. Optimal design – Jasbir Arora, Mc Graw Hill (International) Publishers
2. Optimization for Engineering Design – Kalyanmoy Deb, PHI Publishers
3. Engineering Optimization – S.S.Rao, New Age Publishers

References:

1. Genetic algorithms in Search, Optimization, and Machine learning – D.E.Goldberg, Addison-Wesley Publishers
2. Multi objective Genetic algorithms - Kalyanmoy Deb, PHI Publishers

