

4/4 B.Tech. SECOND SEMESTER

E85T4B

OPTIMIZATION TECHNIQUES (ELECTIVE – IV)

Credits : 4

Lecture : 4 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Objectives:

The study of Optimization Techniques emphasizes Mathematical Modeling problem solving and the effect of marginal change in parameters on the solution of the problem.

Learning outcomes:

1. Demonstrate knowledge and understanding of basic idea under laying optimization techniques
2. Understands most common standard optimization methods shows logical thinking in problem studying

Unit I Introduction to classical optimization techniques

Statement of an optimization problem -design vector -design constraints -constraint surface -objective function -objective function surfaces -classification of optimization problems

Unit II Classical optimization techniques

Single variable optimization -multi variable optimization without constraints -necessary and sufficient conditions for minimum / maximum - multivariable optimization with equality constraints. solution by method of Lagrange multipliers -multivariable optimization with inequality constraints -kuhn -tucker conditions

Unit III Linear programming

standard form of a linear programming problem -geometry of linear programming problem -definitions and theorems -solution of a system of linear simultaneous equations - pivotal reduction of a general system equations -motivation to the simplex method -Simplex Algorithm

Unit IV Transportation problem

Finding initial basic feasible solution by north - west corner rule , least cost method and Vogel's approximation method - testing for optimality of balance transportation problems

Unit V Unconstrained Nonlinear Programming

One-dimensional minimization methods: classification, Fibonacci method and quadratic interpolation method

Unit VI Unconstrained Optimization Techniques

Univariate method, Powell's method and steepest descent method

Unit VII Constrained Nonlinear Programming

characteristics of a constrained problem, classification, basic approach of penalty function method; basic approaches of interior and exterior penalty function methods. Introduction to convex programming problem.

Unit VIII Dynamic programming

dynamic programming multistage decision processes-types-concept of sub optimization and principle of optimality-computational procedure in dynamic programming-examples illustrating the calculus method of solution-examples illustrating the tabular method of solution.

Learning resources

Text books:

1. "Engineering optimization: Theory and practice"-by S.S.rao, new age international (p) limited, 3rd edition, 1998.
2. "Introductory operations research" by H.S.kasene & K.D.kumar, springer (india),pvt. ltd.

Reference books:

1. Optimization methods in operations research and systems analysis " -by K.V .mital and C.mohan,new age international (p) limited , publishers ,3rd edition ,1996 .
2. Operations research -by Dr.S.D.sharma .
3. Operations research : an introduction " - by H.A .taha , PHI pvt ltd ,6th edition
4. Linear programming -by G.Hadley