OPTIMIZATION TECHNIQUES

Course Code:13EE2205 **L P C**
4 0 3

Pre requisites: Basic Concepts of Partial Differentiation, Matrix Analysis.

Course Outcomes:
After the completion of the course, the student will be able to
CO1: Determine and solve the mathematical model of a non linear system using classical methods.
CO2: Reproduce the concepts of linear programming and integer programming.
CO3: Design and produce optimized products and systems both economically and efficiently.
CO4: Solve non linear problems without constraints by using one dimensional minimization methods and univariate methods.
CO5: Solve non linear problems with constraints by using penalty methods.

UNIT-I
INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUES: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems – 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-II
A. LINEAR PROGRAMMING: Standard form of a linear programming problem – geometry of linear programming problems– motivation to the simplex method–simplex algorithm, dual LP.
B. INTEGER PROGRAMMING:
Gomory's cutting plane method, Branch and bound method.

UNIT-III

TRANSPORTATION PROBLEM:

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

UNIT-IV

UNCONSTRAINED NONLINEAR PROGRAMMING: One – dimensional minimization methods:Classification, Fibonacci method and Quadratic interpolation method, Univariate method, Powell's method, steepest descent method, Davidon-Fletcher-Powell method.

UNIT-V

CONSTRAINED NON LINEAR 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.

TEXT BOOK:

1. S.S.Rao,"*Engineering optimization: Theory and practice*", 4th edition, New Age International (P) Limited, 2009.

REFERENCE BOOKS:

1. K.V. Mital and C. Mohan " *Optimization Methods in Operations Research and systems Analysis*" , 3rd edition, New Age International (P) Limited Publishers, 1996.
2. KanthiSwarup, P.K.Gupta and Man Mohan "*Operations Research*", 15th Edition, Sultan Chand & Sons New Delhi, 2010.
3. S.D. Sharma, "*Operations Research*", 15th Edition, published by Kedarnath Ramnath, 2009.
4. G. Hadley, "*Linear Programming*", 1st edition Narosa publishing house 1997.