

**MODULE-I**

Idea of Engineering optimization problems, Classification of optimization algorithms, Modeling of problems and principle of modeling. Linear programming: Formulation of LPP, Graphical solution, Simplex method, Big-M method, Revised simplex method, Duality theory and its application, Dual simplex method, Sensitivity analysis in linear programming.

**MODULE -II**

Transportation problems: Finding an initial basic feasible solution by Northwest Corner rule, Least Cost rule, Vogel's approximation method, Degeneracy, Optimality test, MODI method, Stepping stone method  
Assignment problems: Hungarian method for solution of Assignment problems  
Integer Programming: Branch and Bound algorithm for solution of integer Programming Problems  
Queuing models: General characteristics, Markovian queuing model, M/M/1 model, Limited queue capacity, Multiple server, Finite sources, Queue discipline.

**MODULE -III**

Non-linear programming: Introduction to non-linear programming. Unconstraint optimization Fibonacci and Golden Section Search method. Constrained optimization with equality constraint Lagrange multiplier, Projected gradient method  
Constrained optimization with inequality constraint: Kuhn-Tucker condition, Quadratic programming  
Introduction to Genetic Algorithm.

**TEXT BOOKS**

- A. Ravindran, D. T. Philips, J. Solberg, "Operations Research- Principle and Practice", Second edition, Wiley India Pvt Ltd
- Kalyanmoy Deb, "Optimization for Engineering Design", PHI Learning Pvt Ltd
- Prabhakar Pai, Operation Research, Oxford University Press

**REFERENCE BOOKS:**

- Stephen G. Nash, A. Sofer, "Linear and Non-linear Programming", McGraw Hill
- A.Ravindran, K.M.Ragsdell, G.V.Reklaitis," Engineering Optimization", Second edition, Wiley India Pvt. Ltd
- H.A.Taha,A.M.Natarajan, P.Balasubramanie, A.Tamilarasi, "Operations Research", Eighth Edition, Pearson Education
- F.S.Hiller, G.J.Lieberman, "Operations Research", Eighth Edition, TMH.
- P.K.Gupta, D.S.Hira, "Operations Research", S.Chand and Company Ltd.