

## UMA031 OPTIMIZATION TECHNIQUES

**Scope of Operations Research:** Introduction to linear and non-linear programming formulation of different models.

**Linear Programming:** Geometry of linear programming, Graphical method, Linear programming (LP) in standard form, Solution of LP by simplex and revised simplex methods, Exceptional cases in LP, Duality theory, Dual Simple method, Sensitivity analysis.

**Network Analysis:** Transportation problem (with transshipment), Assignment problem, Traveling-salesman problem, Shortest route problem, Minimal spanning tree, Maximum flow problem.

**Integer Programming:** Branch and bound algorithm, Traveling salesman problem.

**Dynamic programming:** Forward recursions, General problem, Reliability problem, Capital budgeting problem, Cargo-loading problem.

**CPM and PERT:** Drawing of networks, Removal of redundancy, Network computations, Free slack, Total slack, Crashing, Resource allocation.

**Non-Linear Programming:** Characteristics, Concepts of convexity, maxima and minima of functions of n-variables using Lagrange multipliers and Kuhn-Tucker conditions, One dimensional search methods, Fibonacci, golden section method and gradient methods for unconstrained problems.

**Software:** Introduction to software for optimization techniques (TORA).

### **Text Books**

1. Taha, H.A., *Operations Research: An Introduction, Prentice Hall of India (2007) 8<sup>th</sup> ed.*
2. Kasana, H.S., *Introductory Operation Research: Theory and Applications, Springer Verlag (2005).*

### **Reference Books**

1. Rardin, Ronald L., *Optimization in Operations research, Pearson Education (2005).*
2. Ravindran A, Phillips D.T. and Solberg J.J. *Operation Research: Principles and Practice, John Wiley (2007).*