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 method, Exceptional cases in LP, Duality theory, Dual simplex method, Sensitivity analysis, Parametric linear programming.

Integer Programming: Branch and bound technique.

Transportation and Assignment Problem: Initial basic feasible solutions of balanced and unbalanced transportation/assignment problems, Optimal solutions.

Network Analysis: Shortest path problem, Dijkastra's algorithm, Minimum spanning tree problem, Maximum flow problem.

Project Management: Construction of networks, Network computations, Floats (free floats and total floats), Red flagging rule, Critical path method (CPM), Crashing.

Nonlinear Programming: Concept of convexity and concavity, Maxima and minima of functions of n-variables, Lagrange multipliers, Kuhn-Tucker conditions for constrained optimization, One dimensional search methods, Fibonacci, Gradient methods for unconstrained problems.

Text Books:

1) *Chandra, S., Jayadeva, Mehra, A., Numerical Optimization and Applications, Narosa Publishing House, (2013).*
2) *Taha H.A., Operations Research-An Introduction, PHI (2007).*

Recommended Books:

1) *Bazaarra Mokhtar S., Jarvis John J. and Shirali Hanif D., Linear Programming and Network flows, John Wiley and Sons (1990).*
2) *Swarup, K., Gupta, P. K., Mammohan, Operations Research, Sultan Chand & Sons, (2010).*
3) *Pant J. C., Introduction to optimization: Operations Research, Jain Brothers (2004).*