Soft Core	STS552: Operations Research	No. of credits: 3

Course Outcomes:

CO1: To apply the theorems on duality to problems appropriately.

CO2: To explain the concept of complementary slackness and its role in solving primal / dual problem pairs.

CO3: To be able to modify a Primal Problem, and use the Fundamental Insight of Linear Programming to identify the new solution, or use the Dual Simplex Method to restore feasibility.

CO4: To solve the problems related to linear programming

Unit I

Linear Programming Problem (LPP) – definition, formulation, simplex method – canonical form, improving nonoptimal basic feasible solution (b.f.s), conditions for optimality, conditions for unboundedness. Two phase method, Big M method. Convex sets, geometry of simplex method- extreme point and b.f.s., existence of b.f.s., existence of optimal b.f.s. (12 hrs)

Unit II

Duality theory of LPP – weak duality theorem and its properties, the fundamental duality theorem, complementary slackness theorem. Dual simplex method. Sensitivity analysis. Integer programming-cutting plane technique, Gomory's algorithm for pure integer program. (10 hrs)

Unit III

Dynamic Programming - Multistage decision making problems, Bellman's principle of optimality, recursive nature of computation, applications of dynamic programming, probabilistic dynamic programming. (8 hrs)

Unit IV

Inventory theory – nature of inventory problem, motives for carrying inventory, deterministic inventory model with decay, finite horizon model with variable demand rate. Probabilistic inventory models – continuous review and periodic review systems, (s, S) policy, heuristic solution of lot size reorder point model [(Q, r) policy]. (10 hrs)

References:

1. D.Gross and C.M.Harris (1985): Fundamentals of Queuing Theory, 2nd Ed., John Wiley.
2. G. Hadley (1975): Linear Programming, Addison Wesley.
3. Katta G. Murthy (1976): Linear and Combinatorial Programming, John Wiley & Sons.
4. N.S. Kambo (1991): Mathematical Programming Techniques, Affiliated East-West Press.
5. H. A. Taha (2001): Operations Research – An Introduction (6th Edition), Prentice-Hall, India.
6. B.D. Sivazlian and L.E. Stanfel (1975): Analysis of Systems in Operations Research, Prentice-Hall.
7. H.G.Daeallenbach & John A.George(1978): Introduction to Operations Research Techniques, Allyn & BaconInc.

Practical's on STS 552: Operations Research

1. Simplex Method
2. Two phase method
3. Big M method
4. Dual LPP and Dual Simplex method.
5. Integer Programming