

Soft Core	STS 455: OPERATIONS RESEARCH	No. of credits: 3
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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 describe the simulation process

CO5: To understand the inventory policies

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. (10 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

Simulation: Congruential generators, Seeding, Random Number Generation- Basic principles of Random number generation, Inversion method, Accept-reject method. Resampling Techniques - Gibbs sampler, Bootstrap sampling, Markov Chain Monte Carlo(MCMC) method. (12 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)


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