

**Department of Industrial and Systems Engineering**

**Sub: Operations Research (IM41082) (3-1-0)**

**Lecture - Mon - 11:00-11:55, Tue - 08:00-09:55**

**Syllabus:**

Introduction to Operations Research (OR), art of modelling and linear programming - Maximizing, Minimizing with constraints, (LP) formulation, Graphical solution procedure, corner-points of the solution space, basic feasible and optimal solutions. Algebraic approach, Standard form of LP, Slack and Surplus variables, active constraints, Simplex method in the tabular form, concept of artificial variables, Big M and Two phase method, Special cases in simplex- degeneracy, unbounded and cycling, Revised simplex method, concept of duality, sensitivity analysis, dual simplex, Transportation as a special case of general LP problem, Application of transportation problems, balanced and unbalanced problems, Solutions procedure by stepping stone, VAM and MODI methods, Degeneracy and its resolution, Transshipment problem, Assignment as a special case of transportation, equal and unequal number of sources and destination, Hungarian method, Application of Assignment problem, crew scheduling, Inter-arrival and waiting time distribution, Poisson process, Markov property, Single server under finite and infinite waiting room and with finite and infinite population, Expressions for  $P_0, L, L_q, W$  and  $W_q$ , multiple server model, cost model.

**Books:**

1. Operations Research: An Introduction by Hamdy A. Taha, PHI Publication Taha 5,15,6  
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2. Introduction to Operations Research by Fredrick S. Hiller, Gerald J Lieberman, TMH Publication. Ch 1-7
3. Operations Research: Principles and Practices by Ravindran, Phillips and Solberg, Wiley India Edition.
4. Linear Programming 1: Introduction by George B. Dantzig and Mukund N. Thapa, Springer Series in Operations Research.