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Course Code: MAT330R01
Semester: IV

OPERATIONS RESEARCH

Course Objectives:

To help the learners understand the concepts of LPP, underlying principles of various techniques available to solve linear, nonlinear, network, inventory and queuing models.

Unit I **15 Periods**

Introduction to OR and LPP: Concept of optimization - Linear programming - formulation, solution by graphical and simplex methods (Primal - Penalty- big-M method), Special cases.

Unit II **10 Periods**

Transportation and Assignment problems: Transportation Problem - simple problems - NWCR, minimum cost and VAM, test for optimality (MODI method), degeneracy and its resolution. Assignment problems - Hungarian, test for optimality (MODI method), degeneracy & its resolution. CPM and PERT networks - Critical path scheduling - Sequencing models.

Unit III **10 Periods**

Inventory Control and Simulation: Inventory models - Economic order quantity models - Quantity discount models - Stochastic inventory models - Multi product models - Applications of simulation techniques in inventory control system.

Unit IV **10 Periods**

Queuing Theory: Queuing Theory - single and multi-channel models - Infinite number of customers and infinite calling source. Replacement Models - Individuals replacement Models (With and without time value of money) - Group Replacement Models. Applications of simulation techniques in queuing system.

TEXT BOOK:

1. H.A. Taha, Operations Research: An Introduction, 8th Edition, Pearson Inc, New Jersey, 2006

REFERENCE BOOKS:

1. K.G. Murthy, Linear Programming, Wiley, 1983.
2. G. Hadley, Linear Programming, Narosa Publishing House, 1994.
3. F.S. Hiller and G.J. Lieberman, Introduction to Operations Research, McGraw Hill, 9th Edition, 2011.

ONLINE MATERIALS

1. NPTEL - http://nptel.ac.in/courses/111104071/

UNITWISE LEARNING OUTCOMES

Upon successful completion of each unit, the learner will be able to

Unit I	have an understanding of the concepts and different methods of solution of linear programming problem
Unit II	apply different techniques to find the optimization from source to sink and solution of shortest path
Unit III	apply different techniques to find the inventory Control and Simulation models.
Unit IV	analyze different techniques involved in solving the Queuing Theory and Simulation models.

Course Learning Outcomes

Upon successful completion of the course, the learner will be able to:

- Learn efficient computational procedures to solve optimization problems.
- Cast engineering minima/maxima problems into optimization framework.
- Recognize the importance and value of Optimization Techniques in solving practical problems in industry
- Develop Optimization models and apply them to real life problems
- Design new models to improve decision making and develop critical thinking and objective analysis of decision problems