Operations Research

Course Objectives

The objective of this course is to acquaint the students with the scope and applications of operations research in business and industry problems. This course exposes the students to the use of various scientific tools and models in OR for business analysis and better managerial decision making. Use of software in solving problems is expected.

Syllabus

Introduction, development of OR, Linear programming problems, Allocation models such as transportation, assignment, and travelling salesman problems, Decision theory, Game theory, queuing theory, project management and introduction to simulation.

Expected Outcome

The successful completion of this course will enable the students to generate mathematical models of business scenarios and to analyze the business situations. The students will become able to use different mathematical models and the solution procedures.

References

1. Hillier, F S, et al. Introduction to Operations Research (9/e). Tata McGraw Hill, 2011.

2. Ravindran, A and Don T Phillips. Operations Research: Principles and Practice. John Wiley & Sons, 1987.

3. Sharma, J K. Operations Research: Theory and Applications (5/e). New Delhi: Laxmi Pub- lications, 2013.

4. Taha, Hamdy A. Operations Research: An Introduction (9/e). Prentice Hall, 2010.

5. Vohra, N D. Quantitative Techniques for Management. Tata McGraw Hill Education, 2015.

Course Plan

I Introduction to Operations Research: Origin and growth of OR, importance of OR in managerial decision making, scope & applications of OR, models and modelling in OR. Linear programming problems: Formulation of the problem, solution by graphical method & simplex algorithm, degeneracy in LPP. Case discussion

II Allocation Problem models: Transportation problems: formulation, methods of finding initial solution (North West Corner Rule, Least Cost Method and Vogel's Approximation Method), test for optimality (MODI Method), unbalanced transportation problems, maximization transportation problem. Assignment problems: formulation, methods of solution, Hungarian method, multiple optimal solutions, unbalanced problems, maximization problems. Case analysis

First Internal Examination

III Duality in LPP, revised simplex method, Sensitivity of optimal LP solutions, Integer programming problems, Gomory's cutting plane algorithm, introduction to branch and bound technique. Sequencing Problem: Johnson's Algorithm for n Jobs and Two machines, Two jobs and m - Machines Problems and n Jobs and m Machine problems.

IV Decision theory: Concepts of decision making, decision making environments, Decision making under uncertainty - Decision making under risk, decision tree analysis. Case discussion. Dynamic Programming - Concepts, forward and backward recursion, solution to LPP by dynamic programming method.

Second Internal Examination

IV Concepts of network analysis, project network models, Critical Path Method, PERT, project time-cost trade off, resource scheduling. Case discussion

V Game Theory: Two person zero-sum game, saddle point games, principle of dominance, graphical solution. Replacement analysis: items that deteriorate over time, items that fail suddenly, optimum replacement policies for both cases. Stochastic models: Markov process, queuing model structure, Kendall Lee notation - M/M/1 queues - standard problems.

Trimester Examination