IV Year – II SEMESTER **T P C**

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Mathematical Optimization

Course Objectives:

The student will learn about the mathematical modeling, Linear Programming, Simplex method, Transportation problem, assignment problems, processing jobs through several machines, queuing, Inventory management and management decision making, Project management techniques, simulation techniques, probability distributions and markov analysis.

Course Outcomes:

1. Concept of mathematical modeling and development of a model.
2. Use of graphical solution in solving LPP.
3. Determining minimum transportation costs.
4. Use of assignment models in business and industry.
5. Processing of jobs through different number of machines.
6. Solving queuing problems in single-channel and multiple-channel situations
7. Inventory management and management decision making
8. Project management and simulation techniques
9. Understand application of probability distributions and markov process in different situations.

Syllabus:

UNIT I:

Introduction to Operations Research: Definition, Features, types of OR models, Methodology, Tools, Limitations and applications of Linear Programming.

Linear Programming I: Introduction, Formulation of LPP, Assumptions for solving LPP, Applications of LPP, Graphical method of solving LPP.

UNIT II:

Linear Programming II: Introduction, steps in solving problems using simplex method, Principle of simplex method- Maximization and minimization problems, solution by simplex method, limitations of LPP simplex method.

Linear Programming III: Introduction, concept of primal dual relationship, formulation of the dual of the primal problem, solution of LP problems using duality.

UNIT III:

The Transportation Problem: Basics, Solution of Transportation problem with several methods, performing optimality test, degeneracy in transportation problem.

Assignment model: Definition, Formulation, Different methods of solutions, Hungarian assignment method, unbalanced assignment problems

UNIT IV:

The Sequencing problems: introduction, basics, types of sequencing problems, priority sequencing, sequencing n jobs through two machines, n jobs and m machines, two jobs 3 machines case.

Waiting Line(Queuing) Theory: introduction, objectives and models, benefits and limitations, single channel and multi-channel queuing models.

UNIT V:

Inventory Management: introduction, objectives, developing the model, EOQ, Selective inventory management.

Project management PERT & CPM: introduction, construction of networks, calculation of EST, LST, EFT and LFT, drawing of networks and calculation of timings

UNIT VI:

Simulation: introduction, applications, advantages and limitations, Monte Carlo simulation technique, steps involved in use of simulation, generating and using random system, simulation of queuing system, investment decisions using simulation.

Probability theory and markov analysis: Basics, law of probability, discre and continuous random variables, cumulative distribution function, frequency and probability distributions, mean and standard deviation, Binomial

probability distribution, Normal probability distribution. Markovian process- applications, Markovian decision problems.

TEXT BOOKS:

1. Operations research, 2ed, Col D S Cheema, University Science Press, Lakshmi Publications.
2. Hamdy H. Taha, "Operations Research -An Introduction" Pearson Education,2003
3. Taha Hamdy- Operations Research- An Introduction ,Prentice-Hall, 7th edition

REFERNCE BOOKS:

1. Operations Research, Panneer Selvan, Prentice Hall of India.
2. Banks, J, Carson II J. S., Nelson B.L., and Nicol D.M. Discrete – Event System Simulation. Pearson Education Asia, 3rd edition,
3. Principles of Operation Research (with applications to managerial decisions) – H.M Wagher, PHI, New Delhi

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Management Science

Unit I

Introduction to Management: Concept –nature and importance of