

IV B.Tech I Semester

15AME52-OPERATIONS RESEARCH

L T P C
3103**Course Objective:**

The subject should enable the students to the nature and scope of various decision making situations within business contexts, understand and apply operation research techniques to industrial applications, To make the student capable of Formulating the various real life decision making problems as Mathematical programming problems. Students to learn the fundamental Techniques of Operations Research and to choose a suitable OR technique to solve problem on hand.

UNIT I

Introduction To Or And Linear Programming – 1: OR definition- Classification of Models - Types of Operations Research models; Linear Programming- Problem Formulation, Graphical Method, Simplex Method, Two-Phase Simplex Method, Big-M Method, Special Cases of LP- Degeneracy, Infeasibility and Multiple Optimal Solutions;

Learning Outcome & Suggested Student Activities:

At the end of the Unit, the student will be able to create mathematical models of the real life situations and capable of obtaining best solution using Graphical Method and Simplex Method.

(The student must refer to any of the text books and practice solving several problems as it is very common to make mistakes while solving due to lack of practice). The student should take up a real life problem and formulate it as a mathematical programming problem.

UNIT II

Linear Programming-2: Duality- Principle, Economic Interpretation of Duality, Dual Simplex Method, Transportation Problem - Formulation; Different Methods of Obtaining Initial Basic Feasible Solution- North-West Corner Rule, Least Cost Method, Vogel's Approximation Method; Optimality Methods-Stepping Stone Method and Modified Distribution (MODI) Method; Special Cases -Unbalanced Transportation Problem, Degenerate Problem; Assignment Problem - Formulation; Optimal Solution -Traveling Salesman problem.

Learning Outcome & Suggested Student Activities:

At the end of this Unit, the student must be able to implement the theory of duality for simplifying the solution procedure for certain LPPs, and solve the special cases of LPP such as Transportation and Assignment problems. A large number of problems are to be solved by the student in order to gain much required capability of handling the problems without mistakes.

UNIT III

Game Theory: Introduction - Minimax (Maximin) Criterion and Optimal Strategy, Saddle Point, Solution of Games with Pure Strategy -Games with Mixed Strategies - 2 X 2 Games – Dominance, Principle- Solution by Graphical Method of $m \times 2$ & $2 \times n$ games

Queuing Theory: Introduction -Terminology, Service Channel, Arrival Pattern, Population, Departure Pattern(Service Pattern), Queue Discipline, Birth & Death Process, Balking, Reneging, Jockeying; Single Channel Models with Poisson Arrivals, Exponential Service Times with finite queue length and non-finite queue length; Multichannel Models with Poisson Arrivals,

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Exponential Service Times with finite queue length and non finite queue length.

Learning Outcome & Suggested Student Activities:

At the end of this Unit, the student will have knowledge of choosing the best strategy out of the available strategies which is an essential skill for any business manager to successfully face the competition.

UNIT IV

Sequencing: Assumptions-n-jobs-2 Machines model, n-jobs-3-machines models.

PERT & CPM: Introduction to Project Management, Activities, Events, Predecessor Relationships, AOA Diagram, Early Start, Early Finish, Late Start & Late Finish Times, Earliest Occurrence and Latest Occurrence of the Event, Total Float, Free Float, Independent Float- CPM-Deterministic Model- Critical Path, Crashing, Optimal Project Duration, Least Possible Project Duration- PERT- Probabilistic Model- Various types of Activity Time Estimates, Standard Deviation and Variance of the Activities and Projects, and Probability of Completing the Project within scheduled time

Learning Outcome & Suggested Student Activities:

At the end of this Unit, student will be able to represent any project in the form of a network and estimate the parameters like Project Completion Time, Project Costs, and Optimum Duration of the Project, Probabilities of completing Projects as per schedule etc by applying either CPM or PERT technique as per the suitability.

UNIT V

Dynamic Programming : Introduction - Bellman's Principle of Optimality - Applications of Dynamic Programming- Capital Budgeting Problem - Shortest Path Problem - Solution of Linear Programming Problem by DP

Replacement And Maintenance Analysis: Introduction - Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, and Simple Probabilistic Model for Items which completely fail-Individual Replacement Model, Group Replacement Model.

Learning Outcome & Suggested Student Activities:

At the end of this Unit, the student will be aware of applying Dynamic Programming technique to solve the complex problems by breaking them into a series of sub-problems.

TEXT BOOKS:

1. Introduction to Operations Research, H.A.Taha, PHI, 9th edition, 2013.
2. Introduction to Operations Research Frederick K. Hiller, Bodhibrata Nag, Preetam Basu, Gerald J. Lieberman, TMH, 9th edition, 2011.

REFERENCE BOOKS:

1. Operations Research by R Panneerselvam, PHI, 2nd edition, 2012. ed
2. Operations Research, Wagner, PHI Publications, 2 edition.
3. Operation Research, J.K.Sharma, MacMilan, 5th edition, 2013.
4. Linear Programming, Susy Phillipose, PHI
5. Operations Research, A.M.Natarajan, P.Balasubramani, A. Tamilarasi, Pearson Education, 8th edition, 2011.
6. Operations Research: Methods & Problems, Maurice Saseini, Arthur Yaspán & Lawrence Friedman

7. Operations Research, Dr.C.Nadhamuni Reddy & Sri Gopal Krishna, Kurnool Publishers

Web References:

- <http://www2.informs.org/Resources/>
- <http://www.mit.edu/~orc/>
- <http://www.ieor.columbia.edu/>
- <http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm>
- <http://www.wolfram.com/solutions/OperationsResearch/>
- <http://nptel.iitm.ac.in/video.php?subjectId=112106134>
- http://www.youtube.com/watch?feature=player_detailpage&v=ug7O1ISZyg0
- <http://www2.ensc.sfu.ca/undergrad/courses/ENSC201/Unit09/lecture9.html>
- <http://pakaccountants.com/what-is-depreciated-replacement-cost/>
- http://www.youtube.com/watch?feature=player_detailpage&v=H58TPQNr2kM
- http://www.youtube.com/watch?feature=player_detailpage&v=h0bdo06qNVw
- http://www.youtube.com/watch?feature=player_detailpage&v=xGkpXk-AnWU#t=104s
- [http://nptel.iitm.ac.in/video.php?subjectId=112106134,](http://nptel.iitm.ac.in/video.php?subjectId=112106134)
- [http://www. Math.harvard.edu/archive/20_spring_05/handouts](http://www.Math.harvard.edu/archive/20_spring_05/handouts)

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