III B.TECH - II SEMESTER
OPERATIONS RESEARCH

Course Code: ME6T3 **Credits: 3**
Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period/week **Semester end examination: 70 marks**

COURSE OBJECTIVES:

The objective of the course is to enable students to

- Obtain mathematical skills for solving engineering and economic problems; determine optimal solutions to a variety of situations, and present managerial recommendations based on optimal solutions.
- Acquire the skills for solving real time problems, using numerical techniques.

COURSE OUTCOMES:

Upon completion of this course the student will be able to:

1. Formulate practical situations by using linear programming and solving problems such as transportation, allocation and sequencing of jobs.
2. Establish decisions about replacement of items that deteriorate with time and solve game theory problems.
3. Assess the utilization of facility by applying waiting line theory and solve inventory problems.
4. Solve practical problems by using integer, Dynamic programming and simulate real time problems.

UNIT I

INTRODUCTION TO 'OR'– Definition, Characteristics and Phases of OR, Operation Research models, applications.

LINEAR PROGRAMMING: Linear Programming Problem Formulation, Graphical solution Simplex method, artificial variables techniques-Two–phase method, Big-M method, Duality Principle.

UNIT II

TRANSPORTATION PROBLEM: Formulation, Optimal solution, U-V method, unbalanced transportation problems, Degeneracy.

ASSIGNMENT PROBLEM: Formulation, Optimal solution, Variants of Assignment Problem-Traveling Salesman problem.

SEQUENCING: Introduction, sequencing of n jobs through two machines, n jobs through three machines –two jobs through 'm' machines.

UNIT III

REPLACEMENT THEORY: Introduction, Replacement of items that deteriorate with time, when money Value is not counted and counted- Replacement of items that fail completely, group Replacement.

GAME THEORY: Introduction, Mini-max (maxi-min) Criterion and optimal Strategy Solution of games with saddle points Rectangular games without saddle point's - 2X2 games dominance principle–mX2 & 2Xn games-graphical method.

UNIT IV

QUEUEING THEORY: Introduction- parameters of queueing system-kendall's notation-single-server model-finite capacity queue system-multi-server model.

INVENTORY CONTROL: Introduction–Single item–Deterministic models- with and without shortages -Purchase inventory models with one price break and multiple price breaks– probabilistic models–Demand maybe discrete variable or continuous variable–Instantaneous production.

UNIT V

DYNAMIC PROGRAMMING: Introduction, Bellman's Principle of optimality, Applications of dynamic programming-simple problems.

SIMULATION: Definition, Types of simulation models, phases of simulation, applications of simulation, Queuing problems, Advantages and Disadvantages Simulation Languages.

Learning Resources:

Text Books:

1. Operations Research, by S.D.Sharma, Kedarnath & Ramnath publications (15th edition),2013.
2. Introduction to Operations Research, by Taha, Pearson Education,New Delhi, (8^{th} edition), 2008.

Reference Books:

1. Operations Research, (4^{th} edition) by A.M .Natarajan, P. Balasubramani, ATamilarasi, Pearson Education, New Delhi, 2009.
2. Operations Research, (2nd edition) by R.Pannerselvam, 2009,PHI Publications, Noida
3. Operations Research, (2nd edition) by Wagner, 2007, PHI Publications, Noida
4. Operation Research, (4th edition) by J.K.Sharma, 2009, MacMilan publishers, india Ltd. New Delhi.

web resources:

1. http://nptel.ac.in/courses/112106134/
2. http://nptel.ac.in/courses/112106131/