3/4 B.Tech. SIXTH SEMESTER

ME6T3 **OPERATIONS RESEARCH** **Credits: 4**

Lecture:- 4 periods/week **Internal assessment: 30marks**
Practice: -1 periods/week **Semester end examination: 70 marks**

Objectives:

1. Mathematical skills for solving engineering and economic problems, determine optimal solutions to a variety of situations, and present managerial recommendations based on optimal solutions.
2. Impart the skills for solving real time problems, model it and solve it using numerical techniques.

Learning outcomes:

At the end of course the students 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 applying waiting line theory and maintain the inventory levels in the manufacturing organization.
4. solve practical problems by using integer, Dynamic programming and simulate real time problems.

Pre Requisites:

Mathematics, Numerical methods

UNIT-I

DEVELOPMENT–

Definition–Characteristics and Phases –Types of models –operation Research models–applications.

ALLOCATION: 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, unbalanced transportation problem, Degeneracy.

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

SEQUENCING: Introduction–Flow–Shop sequencing

n jobs through two machines, n jobs through three machines –Job shop sequencing– two jobs through 'm' machines.

UNIT–III

REPLACEMENT:

Introduction–Replacement of items that deteriorate with time–when money value is not counted and counted Replacement of items that fail completely, group replacement.

UNIT–IV

THEORY OF GAMES:

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

UNIT-V

WAITINGLINES:

Introduction, Single Channel Poisson arrivals, exponentiel service tîmes –

with infinité population, finite population models– Multi Channel –Poisson arrivals– exponentiel service tîmes with infinité population single Channel Poisson arrivals.

UNIT–VI

INVENTORY:

Introduction–Single item–Deterministic models, Purchase inventory models with one price break and multiple price breaks– shortages are not allowed– Stochastic models– demand maybe discrete variable or continuous variable– Instantaneous production. Instantaneous demand and continuous demand and no setup cost.

UNIT-VII

DYNAMIC PROGRAMMING:

Introduction –Bellman's Principle of optimality– Applications of dynamic programming-linear programming problem.

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

UNIT-VIII

INTEGER LINEAR PROGRAMMING:

Introduction, Importance of integer programming problem, definitions, Gomory's cutting plane method, Branch-and- bound method.

Learning resources

Text books:

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

Reference books:

1. Operations Research, (4th edition) by A.M.Natarajan,P.Balasubramani,A. Tamilarasi, 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.
5. Operation Research, (4th edition) by WayneL.Winston,": applications and algorithms", 2004, Cengage learning.
6. Introduction to Operation Research, (9th edition),by Hiller & Libermann , 2010, Mc graw hill publications.