

OPERATIONS RESEARCH

Course Code: 13ME1122

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Course Educational Objectives:

To make the student to

- ❖ Understand the various methods for optimization.
- ❖ Know how to control the inventory and when to replace the items.
- ❖ Understand the different strategies used to gain profit in a competitive market situation.
- ❖ Know how to sequence the jobs in different machines.

Course Outcomes:

The student will be able to

- ❖ Acquire knowledge in applying various optimization methods for any situation.
- ❖ Know different methods used to obtain optimum inventory.
- ❖ Find the replacement period for items.
- ❖ Acquire knowledge in sequencing the jobs in different machines.

UNIT-I

(12 Lectures)

Linear programming problem - Introduction to or, linear programming, mathematical formulation of the problem, graphical solution, general LPP, canonical and standard form of LPP.

Simple method: introduction, computational procedure, use of artificial variables, degeneracy in LPP

Transportation problem - Introduction, LP formulation of transportation problem, the transportation table, solution of transportation problem, finding IBFS: North-West corner rule, least – cost method and VAM, test for optimality, degeneracy in transportation problem, transportation algorithm.

UNIT-II**(12 Lectures)**

Assignment problem - Introduction, Mathematical formulation of the problem, Hungarian assignment method only, special cases in assignment problems, formulation of the travelling salesman problem.

Sequencing problem - Introduction, Problem of Sequencing, Processing n jobs through two machines. Processing n jobs through k - machines, Processing 2 jobs through two machines, maintenance crew scheduling

UNIT-III**(12 Lectures)**

Game theory - Introduction, Two person zero sum games, maximin - minimax principle, games without saddle points- mixed strategies, graphical solution of $2 \times n$, $m \times 2$ games, and dominance property.

UNIT-IV**(12 Lectures)**

Inventory control - Introduction, types of inventories, costs associated with inventories, the concept of EOQ, deterministic inventory problems with no shortages, with shortages.

Queuing theory - Introduction, queuing system, elements of queuing system operating characteristics of a queuing system, classification of queuing models.

UNIT-V**(12 Lectures)**

Replacement problem - Introduction, replacement of items that deteriorate gradually, replacement of items that fails suddenly.

Dynamic programming - Introduction, the recursive equation approach, dynamic programming algorithm, solution of discrete DPP

TEXT BOOK:

Kanthi Swarup, P.K.Gupta and Man Mohan, “*Operations Research*”, Sultan Chand and Sons New Delhi, Fourteenth Edition -2008.

REFERENCES:

1. Hamdy. A. Taha, “*Operations Research an Introduction*”, Pearson Education, 17th Edition, 2002.
2. S.D Sharma, “*Operation Research*”, Kedar Nath and Ram Nath - Meerut , 2008.

