

16ME402 OPERATIONS RESEARCH

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HS	CS	SA	S	BS
45	15	-	40	20	15	10	-	5



Course Description and Objective:

This course deals with various management techniques including linear programming, sequencing, transportation and game theories. The objective of this course is to enable the students to apply linear programming, transportation, assignment and CPM techniques for various engineering applications.

Course Outcomes:

The student will be able to:

- understand the characteristics of different types of decision making environments.
- build and solve transportation and assignment models.
- improve decision making and develop critical thinking.
- design simple sequencing models.

SKILLS:

- ü Recognize the importance of Operations Research and mathematical modeling for solving practical problems in industries.
- ü Implement transportation and assignment solutions using appropriate optimization algorithms.
- ü Solve sequencing problems.
- ü Apply game and queuing theory appropriately to solve problems.
- ü Analyse and apply inventory control and management techniques.

UNIT - 1**L-9; T-3****DEFINITION:** Definition - Characteristics and phases; Applications of OR.**ALLOCATION MODELS:** Linear Programming Problem Formulation - Graphical solution - Simplex method - Artificial variables technique (i.e. Big M method only) - Duality principle; simple problems on dual formulation only.**UNIT - 2****L-9; T-3****TRANSPORTATION MODEL:** Formulation; IBFS-North West Corner method; LCEM; VAM; Unbalanced transportation problem; Optimality test by MODI method.**ASSIGNMENT MODEL:** Formulation - Optimal solution by Hungarian method – Unbalanced Assignment problem- Restricted case.**UNIT - 3****L-9; T-3****SEQUENCING:** Introduction – Assumptions in job sequencing; Johnson's algorithm; Optimal solution for processing 'n' jobs through two machines ; 'n' jobs through three machines ;'n' jobs through m machines.**REPLACEMENT MODEL:** Introduction - Replacement of resources that deteriorate with time - when money value is counted and not counted.**UNIT - 4****L-9; T-3****THEORY OF GAMES:** Introduction-classification of games- 2 person zero sum games- Assumptions -solution of games with saddle points - Rectangular games without saddle points; dominance principle - 2 X 2 games by Algebraic method; m X 2 and 2 X n games by graphical method.**WAITING LINE MODELS:** Introduction – Kendall's Lee notation- single channel with infinite population; Multichannel with infinite population.**UNIT - 5****L-9; T-3****INVENTORY MODELS:** Introduction - single item - Deterministic models- (i.e EOQ and EBQ) with shortages- Purchase inventory models with one price break and multi price break when shortages are not allowed.**SIMULATION:** Definition - types of simulation models – Simple problems.**TEXT BOOKS :**

1. Taha, "Introduction to Operations Research.", 8th edition, PHI Publications, 2008.
2. S.D. Sharma, "Operations Research", 8th edition, Kedarnath Publishers, 2007.

REFERENCE BOOKS :

1. Hiller and Libermann, "Introduction to Operations Research", 8th edition, Tata Mc Graw Hill, 2010.
2. D.S. Hira and R.K. Gupta, "Operations Research", 5th edition, S.Chand and Co., 2008.
3. P.K.Gupta and Manmohan, "Problems in Operations Research", 8th edition, S.Chand and Co., 2003.
4. Manohar Mahajan, "Operation Research", 1st edition, Dhanpat Rai and Co., 2008.