

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC SEMESTER : VII

MECHANICAL ENGINEERING

Subject Name: **OPERATION RESEARCH**

Sr. No.	Course Contents	Total Hrs
1.	BASICS OF OPERATION RESEARCH: Definition, characteristics, phases, scope and limitations of OR.	2
2.	LINEAR PROGRAMMING: Formulation, graphical method, Simplex method, Degeneracy, Big-M method, Two phase method, duality, sensitivity analysis.	7
3.	TRANSPORTATION MODEL: North-West Corner rule, Least-cost method, Vogel's approximation method, Degeneracy in transportation problem, stepping stone method, modified distribution method, unbalanced supply and demand, profit maximization problem, prohibited transportation routes, transshipment problems.	5
4.	ASSIGNMENT MODEL: Hungarian method for solution, non square matrix, restriction on assignments, Maximization problem, travelling salesman problem.	4
5.	GAMES THEORY : Terms used in game theory, Two person zero sum games, pure strategy, matrix reduction by dominance, mixed strategies(2×2 , $2 \times n$, $m \times 2$, 3×3 games), algebraic, arithmetic and graphical method.	4
6.	REPLACEMENT MODELS : Replacement of items whose maintenance and repair costs increase with time- ignoring changes in the value of money during the period and considering value of money changes with time, replacement of items that fail suddenly, group replacement policy, mortality and staffing problems.	4

7.	QUEUING MODELS : Terms used in queuing theory, Kendall's notation, classification of queuing models- model 1 (M/M/1) : (∞ /FCFS) single server unlimited queue, model 2, (M/M/1) : (∞ /SIRO), model 3 birth-death process-generalization of model (M/M/1) : (∞ /FCFS), model 4 (M/M/1) : (N/FCFS) single server finite queue, model 5 (M/M/C) : (∞ /FCFS) multi channel queuing model.	5
8.	INVENTORY MODELS: Objectives of inventory management, inventory classification, inventory costs, EOQ, inventory models with deterministic and probabilistic demand, ABC analysis.	4
9.	NETWORK ANALYSIS: Terms used in network analysis, Network or arrow diagram, Fulkerson's rule, Programme evaluation and review technique (PERT), Critical path method (CPM), Crashing of network.	4
10.	SIMULATION: Introduction, Monte Carlo Simulation, Generation of random numbers.	3
11.	DYNAMIC PROGRAMMING: Introduction, Bellman's principle of Optimality, solution of problems with finite number of stages, solution of LPP by dynamic programming.	3

Term Work:

The term work shall be based on the topics mentioned above.

Practical / Oral:

The candidate shall be examined on the basis of term-work.

Books:

1. Operation Research – P.K. Gupta & D.S. Hira, S.Chand & Company Ltd, New Delhi
2. Quantitative Techniques in Management – N.D. Vohra , Tata McGraw Hill, New Delhi
3. Operation research – P. Rama Murthy, New Age, New Delhi.
4. Operation Research – Hamdy A. Taha, Pearson Education.

Reference Books:

1. Operation Research- A.P. Verma , S.K. Kataria and Sons, New Delhi.
2. Operation Research- Rathindra P. Sen PHI Learning, New Delhi.
3. Operation Research- S. Kalavathy, Vikas publishing house, Noida.
4. Operation Research – C.Mohan & Kusum Deep, New Age, New Delhi.
5. Operation Research – Askhedkar & Kulkarni, Dhanpatrai & Sons
6. Operation Research – V. K . Kapoor, Sultan Chand & Sons, New Delhi.
7. Operation Research – D.S. Cheema , Laxmi publication, New Delhi
8. Operation Research – S.D.Sharma , Kedarnath publications New Delhi