GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. SEMESTER: V
MECHATRONICS ENGINEERING

Subject Name**: Quantitative Techniques in Management**
(Institute Elective-II)
Subject Code: **152005**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
4	2	0	6	70	30	50

Sr. No.	Course content
1.	**General concepts:** Introduction to O.R., Definitions of O.R.
2.	**Linear Programming:** (i) General Concepts / Definitions (ii) Assumptions in LP / Limitations in LP / Applications of LP. (iii) Formulation of LP Problems (iv) Solution Methods • Graphical method (maximization, minimization) • Simplex method (maximization, minimization) • Big M and Two Phase methods (v) Special issues in LP (Graphical & Simplex methods) • Infeasible solution • Unbounded solution • Degenerate solution • Alternate solution (vi) Duality & Sensitivity analysis • Duality in LP • Economic Interpretation of dual • Sensitivity analysis
3.	**Transportation Problems:** Balanced / Unbalanced Problems (i) General Concepts / Definitions (ii) Formulation of TT problems (iii) Solution Methods • NorthWest Corner Rule(NWCR) • Least Cost Rule (LCR) • Vogels Approximation Method(VAM)

	(iv) Optimality Tests • Stepping Stone Method (SSM) • Modified Distribution method (MODI) (v) Special issues in Transportation Problems • Resolving Degeneracy • Maximization case of Transportation Problems • Alternative solution • Prohibited Routes
4.	**Assignment Problems:** Balanced / Unbalanced Problems (i) General Concepts / Definitions (ii) Solution Methods • Hungarians Algorithm: (Concept of Opportunity costs), Minimization Case, Maximization Case. (iii) Special Issues in AP • Restricted routes / choice • Reserved routes / choice • Multiple Optimal Solutions
5.	**PERT and CPM:** (i) Introduction, Definitions, Terminology (ii) Types of Networks • CPM **:** Critical Path Method • PERT**:** Programme Evaluation Review Technique (iii) Drawing a network (iv) Network Calculations • Deterministic model**:** CPM • Probabilistic model**:** PERT Critical Path, Float / Slack, Significance of floats, Types of floats(Total Float (TF) , Free Float (FF), Independent Float (IF)) (v) Estimation of Project completion time (vi) Project Cost Analysis: Crashing, Project cost time trade-off (vii)Resource allocation and leveling.
6.	**Sequencing Problems:** (i) Introduction, Concepts, Definitions (ii) Assumptions, Limitations, Applications of Sequencing Problems (iii) Types of Sequencing problems and solution methods • N jobs 2 m/cs case • N jobs 3 m/cs case • N jobs M m/cs case • 2 jobs M m/cs case
7.	**Decision Theory (Analysis):** (i) Introduction, Definitions, Application (ii) Uncertainty and risk in Decision making (iii) Static Decisions • Payoff Tables • Expected value of perfect information (EVPI) and its interpretation (iv) Sequential Decisions and Decision Trees

8.	**Replacement Problems:** (i) Introduction, replacement cases and reasons for replacements (ii) Cases of Replacements • Replacements of items that deteriorate with time (Tabular method) • Replacements of items that fail completely
9.	**Queuing Models:** (i) Introduction, Concepts, Terminology (ii) General structure of queuing system (iii) Operating Characteristics of Queuing system (iv) Poisson-exponential single server model-infinite population (v) Poisson-exponential single server model-finite population

Reference Books:

1. N.D.Vohra, Quantitative Techniques in mgmt Tata McGraw-Hill.
2. F.M.Wilkes, Elements of Operational Research McGraw Hill.
3. Taha H. A., Operations Research (PHI).
4. D. S. Hira & P. K. Gupta, Operations Research (S Chand).
5. M Mahajan, Operations Research (Dhanpat rai).
6. A P Verma, Operations Research (Kataria).
7. J.K.Sharma, Quantitative Techniques (MACMILLAN).