SEMESTER: V

Total Marks: 100 **Paper Code: BMHCR2151**

QUANTITATIVE TECHNIQUES FOR MANAGEMENT

Course Objectives:

To apprise students with the construction of mathematical models for managerial decision situations and to use spreadsheets or computer software packages to obtain a solution wherever applicable. The emphasis is on understanding the concepts, formulation and interpretation.

Learning Outcomes:

1. Identify, formulate and solve Linear Programming Problems graphically, mathematically.
2. Solve optimization problems like transportation and assignment problem mathematically.
3. Develop critical thinking and use PERT and CPM techniques to improve decision making.
4. Identify different types of decision-making environments and choose the appropriate decision making approaches for each.

Detailed Syllabus:

Unit 1: **(15L)**

- Linear Programming: Formulation of L.P. Problems, Graphical Solutions (Special Cases: Multiple optimal solution, infeasibility, unbounded solution);

- Simplex Methods (Special cases: Multiple optimal solution, infeasibility, degeneracy, unbounded solution) Big-M method and Two-phase method; Duality and Sensitivity (emphasis on formulation & economic interpretation); Formulation of Integer programming, Zero-one programming, Goal Programming.

Unit 2: **(15L)**

- Elementary Transportation: Formulation of Transport Problem, Solution by N.W. Corner Rule, Least Cost method, Vogel's Approximation Method (VAM), Modified Distribution Method. (Special cases: Multiple Solutions, Maximization case, Unbalanced case, prohibited routes)

- Elementary Assignment: Hungarian Method, (Special cases: Multiple Solutions, Maximization case, unbalanced case, Restrictions on assignment.)

Unit 3: **(10L)**

- Network Analysis: Construction of the Network diagram, Critical Path- float and slack analysis (Total float, free float, independent float), PERT, Project Time Crashing. Queuing Theory: Arrival pattern, Service pattern, Traffic intensity, Queuing model.

Unit 4: **(20L)**

- Decision Theory: Pay off Table, Opportunity Loss Table, Expected Monetary Value, Expected Opportunity Loss, Expected Value of Perfect Information and Sample

- Information Markov Chains: Predicting Future Market Shares, Equilibrium Conditions (Questions based on Markov analysis) Limiting probabilities, Chapman Kolmogrov equation.

- Introduction to Game Theory: Pay off Matrix- Two person Zero-Sum game, Pure strategy, Saddle point; Dominance Rule, Mixed strategy, Reduction of m x n game and solution of 2x2, 2 x s, and r x 2 cases by Graphical and Algebraic methods; Introduction to Simulation: Monte Carlo Simulation.

References:

1. N. D. Vohra: Quantitative Management. Tata McGraw Hill
2. P. K. Gupta, Man Mohan, Kanti Swarup: Operation Research, Sultan Chand.
3. V. K. Kapoor: Operations research, Sultan Chand & Sons.
4. J. K. Sharma: Operations Research Theory & Applications, Macmillan India Limited.
5. S. Kalavathy: Operations Research, Vikas Publishing House.
6. P. K. Gupta, D S Hira: Operation Research, Sultan Chand.