Interdisciplinary Course II

Introduction to Operations Research

Teaching Scheme
Lectures: 2 hrs/week

Examination Scheme
100 marks: Continuous evaluation- Assignments /Quiz/T1/T2 - 40 Marks,
End Sem Exam- 60 marks

Course Outcomes:

Students will be able to

- Develop a general understanding of the Operational Research (OR) approach to decision making
- Develop network planning procedures for solving logistic and scheduling problems.
- Formulate inventory and queuing problems and generate optimal solutions.
- Identify best techniques to solve a specific problem.

Syllabus Contents:

Unit I **(7 hrs)**

Introduction: Operations Research: Development, history, definitions, objectives, characteristics, limitations, phases, and applications. Optimization models and their classifications.

Linear Programming: Formulation of LP problem, Simplex method (minimization / maximization cases). Degeneracy in LP, Duality in LP, Sensitivity analysis.

Unit II **(7 hrs)**

Transportation: Introduction. Methods for finding initial solution. Test of optimality Maximization Transportation problem. Degeneracy.

Assignment Problem: Introduction. Solution methods. Variations of the assignment problem. Traveling Salesman Problem.

Unit III **(7 hrs)**

Sequencing Models: Scheduling and sequencing. Assumptions in sequencing models. Processing “n” jobs on “m” machines. Graphical Method.

Inventory Control System (Quantitative Approach): Introduction. Meaning of Inventory Control. Functional classifications of Inventories. Advantages of Inventory Control. Deterministic Inventory Models: economic lot size with instantaneous replenishment with and without shortage costs, economic lot size models with quantity discount.

Unit IV **(7 hrs)**

Queuing Theory: Queuing Systems: Introduction, cost associated with, Classification of queuing models. Kendall’s notations. Models: {(M/M/1): (α / FSFS)}. Single server models.

Simulation: Introduction to discrete event Simulation. Monte -Carlo Simulation. Problems related to Monte-Carlo Simulation.

Unit V **(7hrs)**

Network Models: Introduction to PERT / CPM. Concepts and construction of network diagrams. Critical path and project duration, floats, network crashing, optimum project duration and cost, PERT activity, time estimate, probability of completion of a project on before specified time, minimal Spanning tree.

Text Books:

- Gupta P. K. and Hira D. S.: Operations Research, S Chand & Company Ltd.
- Sharma S. D., Kedar Nath: Operations Research, Ram Nath& Co.

References Books:

- Sharma J. K.: Mathematical Models in Operations Research, Tata McGraw – Hill Publishing Company Limited.
- Taha H. A.: Operations Research - An Introduction, Prentice Hall of India Pvt. Ltd.
- Wagner H. N.: Principles of Operations Research with applications to Managerial Decisions, Prentice Hall of India Pvt. Ltd.
- R. Panneerselvam: Operations Research, Prentice Hall of India Pvt. Ltd.
- Wiest J. D. & Levy F. K.: Managerial Guide to PERT/CPM, Prentice Hall of India Pvt. Ltd.
- Srinath L.S “PERT & CPM principles & Applications” Affiliate East West Press (P) Ltd., New Delhi, 1975.