MCPE2011 Operations Research (3-0-0)

Course Objectives:

1. To introduce students to the foundational concepts and techniques of operations research.
2. To develop problem-solving and analytical modelling skills.
3. To apply mathematical modelling and algorithms to optimize real-life computing and operational problems.

Module I (9 hours)
Linear Programming- Concept, Formulation, Graphical and Simplex Method, Artificial initial solution, special cases, Duality, Dual Simplex Method.

Module II: (8 hours)
Assignment Problem: Hungerian Method, **Transportation Problem**: Initial Basic solution using NWC rule, least cost and VAM, Optimal solution using MODI**. Integer Programming**-Cutting Plane, Branch & Bound.

Module-III(10 hours)
Dynamic Programming- Characteristics, Knapsack Problem, **Queuing Theory-** Basic Structure, Exponential distribution, Birth-and-Death Model, M/M/I Queue. **Game Theory**-Two-person Zero Sum game, saddle point determination, Dominance Property, Pure and mixed strategy, Solving 2x2, 2xn and mx2 games.

Module IV: (8 hours)
Sequencing- n jobs 1 machine, n-jobs 2machines, n-jobs m machines, two jobs m- machines, **Non-Linear** Programming: Unconstrained Optimization problem, Lagrange Multiplier method, Kuhn-Tucker conditions.

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1: Formulate and solve linear programming problems using graphical, simplex methods and dual simplex method.
CO2: Solve the specialized LP problems like transportation and assignment using optimization techniques.
CO3: Solve IPP and apply basics of queuing theory to understand the service system.
CO4: Analyze the real life conflict situations using Game Theory and Implement decision-making and Sequencing models using OR tools in various applications.

BOOKS:

1. 1.Operations Research: An Introduction, Author: Hamdy A. Taha, Publisher: Pearson Education, Edition: 10th Edition or latest
2. Introduction to Operations Research, Authors: Frederick S. Hillier and Gerald J. LiebermanPublisher: McGraw Hill Education, Edition: Latest
3. Operations Research, Author: Kanti Swarup, P.K. Gupta, and Man Mohan, Publisher: Sultan Chand & Sons
4. Operations Research: Principles and Practice, Authors: Ravindran, Phillips, and Solberg, Publisher: Wiley India,
5. Operations Research Theory and Applications, Author: J.K. Sharma, Publisher: Macmillan