PAPER NO- 6: OPERATIONS RESEARCH

1. Introduction to Operations Research
   - 1.1 Phases of O.R.
   - 1.2 Model building
   - 1.3 Various types of O.R. problems
2. Linear Programming Problem
   - 2.1 Linear Programming Models and their graphical solutions
   - 2.2 Simplex Method for solving L.P.P.
   - 2.3 Charne's M-technique for solving L.P.P. involving artificial variables
   - 2.4 Concept of duality in L.P.P.
   - 2.5 Dual simplex method
   - 2.6 Post-optimality analysis
3. Transportation Problem
   - 3.1 North West corner rule
   - 3.2 Least cost method
   - 3.3 Vogel's approximation method (VAM)
   - 3.4 MODI's method to find the optimal solution
4. The Assignment problem
5. Networking problems
6. Game Theory
   - 6.1 Rectangular games
   - 6.2 Minmax-Maxmin principle
   - 6.3 Solution to rectangular game using Graphical method
   - 6.4 Solution to rectangular game with mixed strategy
   - 6.5 Dominance and modified dominance property
7. Simulations
   - 7.1 Simulation models
   - 7.2 Event-type simulation
   - 7.3 Monte-Carlo simulation

WEEK-WISE DETAILS

Week 1-2: Introduction to Operations Research

- Taha, H. A. (2007): *Operations Research: An Introduction,* 8th Edition, Prentice Hall of India. pp. 1-9

Week 3-5: Linear Programming Problem

- Taha, H. A. (2007): *Operations Research: An Introduction,* 8th Edition, Prentice Hall of India. pp. 11-19, 81-84, 90-100, 103-106, 113-122, 151-176, 181-191

Week 6-8: Transportation Problem

- Taha, H. A. (2007): *Operations Research: An Introduction,* 8th Edition, Prentice Hall of India. pp. 171-180, 191-194.
- Kanti Swarup, Gupta, P.K. and Manmohan (2007): *Operations Research*, 13th Edition, Sultan Chand and Sons. pp. 273-274.

Week 8-9: The Assignment problem

- Kanti Swarup, Gupta, P.K. and Manmohan (2007): *Operations Research*, 13th Edition, Sultan Chand and Sons. pp. 295-298, 308

Week 9-10: Networking problems

- Taha, H.A. (1987): *Operations Research: An Introduction,* 4th Edition, Prentice Hall of India. pp.216-225

Week 10-11: Game Theory

- Taha, H.A. (2007): *Operations Research: An Introduction,* 8th Edition, Prentice Hall of India. pp. 520-526
- Kanti Swarup, Gupta, P.K. and Manmohan (2007): *Operations Research,* 13th Edition, Sultan Chand and Sons. pp. 457-458

Week 12: Simulations

- Kanti Swarup, Gupta, P.K. and Manmohan (2007): *Operations Research,* 13th Edition, Sultan Chand and Sons. pp. 639-646, 656

Practical/ Lab work

Using TORA/WINQSB/LINGO

LIST OF PRACTICALS

1. Graphical solution to a L.P.P.
2. Algebraic solution to L.P.P.
    a. Simplex method
    b. Charne's Big M method
3. Special cases in Simplex method
    a. Degenerate solution
    b. Unbounded solution
    c. Alternate solution
    d. Infeasible solution
4. Duality in L.P.P.
5. Post-optimality analysis
    a. Addition of constraint
    b. Change in requirement vector
    c. Addition of new activity
    d. Change in cost vector
6. Allocation problem using Transportation model
7. Allocation problem using Assignment model
8. Networking problem
    a. Minimal spanning tree problem
    b. Shortest route problem
9. Problems based on game problems
    a. Minmax-Maxmin principle
    b. Mixed strategy
    c. Graphical solution to mx2 / 2xn rectangular game
10. Simulating the data using Monte-Carlo technique and using it to solve
    a. Queuing problems
    b. Inventory problems