Model Question Paper

Fourth Semester M.Sc Degree Examination (CSS)

ST4E02 - OPERATIONS RESEARCH

Time: 3 hours | Total Weights: 30

Part A

(***Answer any five questions. Weightage 1 for each question.***)

1. Write down the mathematical model for assignment problem. How is it related to transportation problem?
2. Find the solution of the game with pay off matrix $P = \begin{bmatrix} 2 & 0 \\ 0 & 4 \end{bmatrix}$.
3. Discuss the various costs involved in inventory problems with suitable examples.
4. What is lead time? Why is it important in the analysis of inventory problems?
5. Discuss Bellmann's principle of optimality.
6. Write the Kuhn-Tucker conditions for the problem.
   Minimize $f = (x_1 - 2)^2 + x_2^2$
   subject to $x_1^2 + x_2 - 1 \leq 0$,
   $x_1 \geq 0, x_2 \geq 0$.
7. What is Traveling salesman problem? Write down its mathematical model.
8. What is critical path? Why is it important?

Part B

(***Answer any* five *questions. Weightage 2 for each question.***)

9. Explain transportation problem. Give its mathematical model. Give an algorithm to solve it.
10. Describe the concept of maximin - minimax principle of game theory.
11. Discuss EOQ problems with price breaks. Analyse the inventory model with two price breaks.
12. Explain "Newspaper boy type" problems. How do you analyse such problems.
13. Using dynamic programming find the minimum value of $Z = y_1^2 + y_2^2 + \cdots + y_n^2$ subject to the constraints $y_1 y_2 \ldots y_n = C, y_1 \geq 0, y_2 \geq 0, \ldots, y_n \geq 0$.
14. Explain Beale's method for solving quadratic programming problem.

15. What is PERT? What information is revealed by PERT analysis.

16. Describe sequencing problems. Give an algorithm to determine the optimal sequence for processing n jobs through three machines.

Part C

(*Answer any* three *questions. Weightage* 5 *for each question.*)

17. Describe an Assignment problem. How is it related to Transportation problem? Discuss Hungarian method to solve an Assignment problem.

18. Prove that for an $m \times n$ matrix game both $\overset{\max}{X} \; \overset{\min}{Y} \; E(X,Y)$ and $\overset{\min}{Y} \; \overset{\max}{X} \; E(X,Y)$ exist and are equal.

19. Consider an inventory model in which the cost of holding one unit in the inventory for a specified period is C_1 and the cost of shortage per unit is C_2. Also suppose the demand follows a known continuous probability distribution. Determine the optimum inventory level at the beginning of the period.

20. Use dynamic programming to show that $\sum_{i=1}^{n} p_i \log p_i$ subject to the constraint $\sum_{i=1}^{n} p_i = 1$ and $p_i > 0$ is minimum when $p_i = \frac{1}{n}$ for $i = 1, 2, ..., n$.

21. Explain Quadratic programming. Derive Kuhn-Tucker conditions.

22. Explain the various basic steps in PERT/CPM techniques.