

**R13**

Code No: 812AK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**MCA II Semester Examinations, April/May - 2019****OPERATIONS RESEARCH****Time: 3 Hours****Max. Marks: 60****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have a, b, c as sub questions.

PART - A**5 × 4 Marks = 20**

- 1.a) What are the shadow prices? What is its significance in simplex method of solving LPP? [4]
- b) What is the difference between transportation problem and an assignment problem? [4]
- c) What are the conditions recommended for the replacement of a machine with a new one when you already have an old one? [4]
- d) Distinguish between the games with saddle points and games without saddle points. [4]
- e) What are the assumptions used in deriving EOQ formula? [4]

PART - B**5 × 8 Marks = 40**

2. Solve the following LPP using graphical method.

$$\begin{aligned} \text{Maximize } & Z = 10x_1 + 8x_2 \\ \text{Subject to } & x_1 + 2x_2 \leq 1000 \\ & x_1 \leq 300 \\ & x_2 \leq 500 \\ & \text{and } x_1, x_2 \geq 0 \end{aligned}$$

[8]

OR

3. A company wants to purchase at most 180 units of a product. There are two types of the product, M_1 and M_2 available. M_1 occupies 2 ft^3 , cost Rs. 12/- and the company makes a profit of Rs. 3/-. M_2 occupies 3 ft^3 , costs Rs. 15/- and the company makes a profit of Rs 4/- If the budget is Rs. 15,000/- and the warehouse has 3000 ft^3 for product. Formulate the problem as a linear programming model and solve the problem using simplex method. [8]

4. Solve the following transportation problem, i.e., find the optimal solution, where the entries are cost coefficients. [8]

| From Origins | To Destination | | | | Availability |
|-----------------|----------------|----|----|----|--------------|
| | | 1 | 2 | 3 | |
| | 1 | 15 | 0 | 20 | |
| | 2 | 15 | 8 | 11 | |
| | 3 | 0 | 16 | 14 | |
| Requirement | | 30 | 40 | 60 | 70 |
| | | | | | 200 |

OR

5. Four salesmen are to be assigned to four districts. Estimates of the sales revenue is hundred of Rs. for each salesmen are as follows: Give the assignment pattern that maximizes the sales revenue. [8]

| Salesmen | Districts | | | |
|----------|-----------|-----|-----|-----|
| | A | B | C | D |
| 1 | 320 | 350 | 400 | 280 |
| 2 | 400 | 250 | 300 | 220 |
| 3 | 420 | 270 | 340 | 300 |
| 4 | 250 | 390 | 410 | 350 |

6. Find the sequence that minimizes the total elapsed time (in hours) required to complete the following tasks. Each job is processed in the order ABC. [8]

| JOB | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------|----|---|---|----|---|---|---|
| Machine A | 12 | 6 | 5 | 11 | 5 | 7 | 6 |
| Machine B | 7 | 8 | 9 | 4 | 7 | 8 | 3 |
| Machine C | 3 | 4 | 1 | 5 | 2 | 3 | 4 |

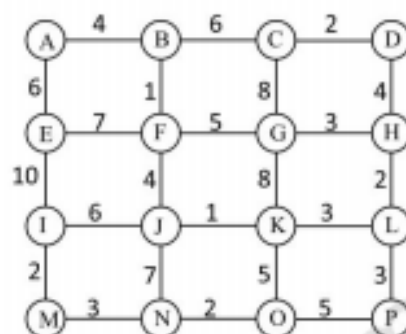
OR

7. The mortality rates as obtained for an electronic component are noted in the table below

| Month | 1 | 2 | 3 | 4 | 5 | 6 |
|--|---|----|----|----|----|-----|
| Percentage fails at the end of the month | 8 | 22 | 45 | 70 | 85 | 100 |

There are 1500 items in operation. It costs Rs. 20 to replace an individual item and Re.0.50 per item if all items are replaced simultaneously. It is decided to replace all items at fixed intervals and to continue replacing individual item as and when they fail. At what intervals should all items be replaced? [8]

8. The routes of an airline which connects 16 cities (A,B,...P) are shown in fig. below. Journey from one city to another is possible only along the lines (routes). Shown with the associated costs indicated on the path segments. If a person wants to travel from city A to City P with minimum costs, without any back tracking, determine the optimal path (route) using dynamic programming. [8]



OR

9. A and B play a game in which each has three coins a 5 paise, a 10 paise and a 20 paise. Each selects a coin without the knowledge of the others choice. If the sum of the coins is an odd amount, A wins B's coins. If the sum is even B wins A's coins. Find the best strategy for each player and the value of the game. [8]
10. The demand of an item is uniform at a rate of 20 units per month. The fixed cost is Rs. 10 each time a production run is made. The production cost is Rs 1 per item and the inventory carrying cost is Rs. 0.25 per item per month. If the shortage cost is Rs. 1.25 per item per month, determine how often to make a production run and of what size should it be? [8]
- OR
11. A T.V. repairman finds that the time spent on his jobs have an exponential distribution with mean of 30 minutes. If he repairs sets in the order in which they come in, and if the arrival of sets is approximately Poisson distribution with an average rate of 10 per 8 hour day, what is repairmen's expected idle time each day? How many jobs are ahead of the average set just brought in? [8]

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