



Code No: 812AK

R13**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****MCA II Semester Examinations, June/July- 2018****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) Explain the structure of linear programming problems (LPPs) with an example. [4]
- b) Give the applications of transportation problem in industries. [4]
- c) Distinguish between gradual failures and sudden failures and their effects. [4]
- d) Explain the relevance of game theory to managerial problems. [4]
- e) What is selective inventory control? Why do you optimize this in large industries? [4]

PART - B**5 × 8 Marks = 40**

2. Use the two-phase simplex method to

Minimize $Z = 5x_1 + 6x_2$ Subject to $x_1 + x_2 \leq 5$ $3x_1 + x_2 = 10$ $x_1 + 3x_2 \geq 6$ and $x_1, x_2 \geq 0$

[8]

OR

3. An animal feed company must produce 200 kg of a mixture consisting of ingredients X_1 and X_2 daily. X_1 costs Rs. 3 per kg and X_2 costs Rs. 8 per kg. Not more than 80 kg of X_1 can be used and at least 60 kg of X_2 must be used. Find how much of the each ingredient should be used if the company wants to minimize the cost? Formulate the above problem and solve it by simplex method. [8]

- 4.a) What is the difference between transportation problem and an assignment problem?
- b) When does degeneracy occur in transportation problem? [4+4]

OR

5. There are five jobs to be assigned on each to 5 machines and associated cost matrix as follows.

Jobs	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	2	11	15

Find the optimum assignment and the associated cost using the assignment technique.[8]

6. There are six jobs, each of which must go through machines A,B and C. Processing time (in hours) are given in the following table. Find the sequence that minimizes the total elapsed time required to complete the following tasks [8]

Job	1	2	3	4	5	6
Machine A	12	10	9	14	7	9
Machine B	7	6	6	5	4	4
Machine C	6	5	6	4	2	4

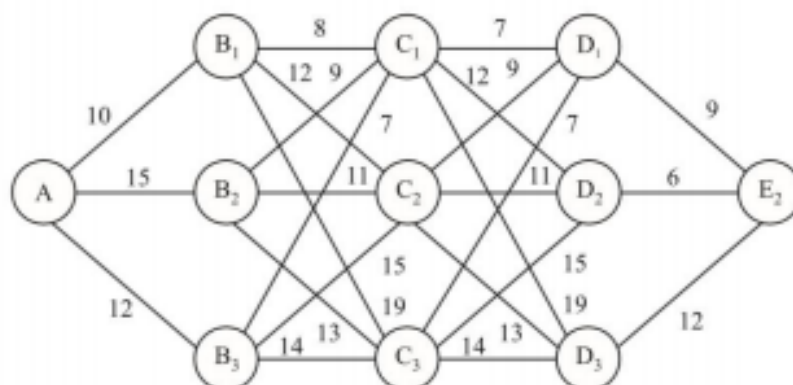
OR

7. 1000 bulbs are in use and it costs Rs 10 to replace an individual bulb which has burnt out. If all bulbs were replaced simultaneously it would cost Rs 4 per bulb. It is proposed to replace all bulbs at fixed intervals of time, whether or not they have burnt out and to continue replacing burnt out bulbs as and when they fail. The failure rates have been observed for certain type of light bulbs are as follows:

Week	1	2	3	4	5
Percent failing by the end of week	10	25	50	80	100

At what intervals all the bulbs should be replaced? At what group replacements price per bulb would a policy of strictly individual replacement become preferable to the adopted policy? [8]

8. Find the longest path between the towns A and E using the dynamic programming approach. [8]



OR

9. A company management and the labor union are negotiating a new three year settlement. Each of these has four strategies.

I: Hard and aggressive bargaining.

II: Reasoning and logical.

III: Legalistic strategy.

IV: Conciliatory approach.

The costs to the company are given for every pair of strategy choice.

		Company strategies			
		I	II	III	IV
Union strategies	I	20	15	12	35
	II	25	14	8	10
	III	40	2	10	5
	IV	- 5	4	11	0

What strategy will the two sides adopt? Also determine the value of the game. Use minimax - maximin rule and then verify your result with dominance rule. [8]

10. Monthly demand for an item is 200 units. Ordering cost is Rs. 350, inventory carrying charge is 24% of the purchase price per year. The purchase prices are P_1 =Rs. 10 for purchasing $Q_1 < 500$; P_2 = Rs. 9.25 for purchasing $500 \leq Q_2 < 750$ and P_3 = Rs. 8.75 for purchasing $750 < Q_3$. Determine optimum purchase quantity. If the order cost is reduced to Rs. 100 per order, compute the optimum purchase quantity. [8]

OR

11. Customers arrive at a box office window being managed by a single individual according to a Poisson input process with mean rate of 30 per hour the time required to serve a customer has an exponential distribution with a mean of 90 seconds. Find the average waiting time of a customer. Also determine the average number of customers in the system and average queue length. [8]

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