R17

Code No: 842AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA II Semester Examinations, April/May - 2019
OPERATIONS RESEARCH

Time: 3hrs **Max.Marks:75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

5 × 5 Marks = 25

1.a) What are the applications of OR? Discuss how and why OR methods have been valuable in aiding executive decisions. [5]
b) What are the assumptions of job sequencing? [5]
c) Give the essential characteristics of the queuing process? State some of the important inter-arrival and service time distributions? [5]
d) What is an inventory system? Explain clearly the different costs that are involved in inventory problems with suitable examples. [5]
e) Explain Maxi-Min principle used in game theory? [5]

PART – B

5×10 Marks = 50

2. Solve following problems using Big – M method
Minimize $60X_1 + 80X_2$
Constraints: $20X_1+30X_2 \geq 900$ …….(1)
$40X_1+30X_2 \geq 1200$……(2)
$X_1, X_2 \geq 0$ [10]

OR

3. A company has three production facilities S1, S2 and S3 with production capacity of 7, 9 and 18 units (in 100s) per week of a product, respectively. These units are to be shipped to four warehouses D1, D2, D3 and D4 with requirement of 5, 6, 7 and 14 units (in 100s) per week, respectively. The transportation costs (in rupees) per unit between factories to warehouses are given in the table below.

	D_1	D_2	D_3	D_4	Capacity
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

Formulate this transportation problem as an LP model to minimize the total transportation cost. [10]

4. There are five jobs, each of which must go through the two machines A and B in the order AB. Processing times are given below:

Job	1	2	3	4	5
Time for A	5	1	9	3	10
Time for B	2	6	7	8	4

Determine a sequence for five jobs that will minimize the elapsed time T. [10]

OR

5. A milk plant is considering replacement of a machine whose cost price is Rs. 12,200 and the scrap value Rs. 200. The running (maintenance and operating) costs in Rs. are found from experience to be as follows:

Year:	1	2	3	4	5	6	7	8
Running Cost:	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced? [10]

6. In a railway marshaling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter arrival time follows an exponential distribution and the service time distribution is also exponential with an average of 36 minutes. Calculate the following:
a) The average no. of trains in the queue
b) The probability that the queue size exceeds 10
If the input of trains increases to an average 33 per day,
what will be change in (a) and (b) [10]

OR

7. A mechanic services 4 machines. For each machine, the mean time between service requirements is 10 hours and is assumed to be from an exponential distributions. The repair time tends to follow the same distribution with a mean of two hours. When a machine is down for repairs the time lost has a value of Rs.20 per hour. The mechanic costs Rs.50 per day.
Find:
a) What are the expected no.of machines in operation?
b) What is the expected down time cost per day?
c) Would it be desirable to provide two mechanics each to service only two machines? [10]

8. The annual demand of an item is 3200 units. The unit cost is Rs.6/- and inventory carrying charges 25% per annum. If the cost of one procurement is Rs.150/-, determine:
a) Economic order quantity
b) No. of orders per year
c) Time between two consecutive orders
d) The optimal cost [10]

OR

9. Consider the following data:
Unit cost = Rs.100, Order cost = rs.160, Inventory carrying cost = Rs.20, Back order cost (Stock out cost) = Rs.10, Annual demand = 1000 units. Compute the following:
a) Minimum cost order quantity
b) Time between orders
c) Minimum number of back orders
d) Maximum inventory level
e) Overall annual cost. [10]

10. Find the saddle point (or points) and hence solve the following game. [10]

		Player B		
		B1	B2	B3
Player A	A1	15	2	3
	A2	6	5	7
	A3	-7	4	0

OR

11. What is Dynamic programming and what sort of problems can be solved by it? State and establish Bellman's principle of optimality. [10]

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