

R15
Code No: 721CN
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MBA II Semester Examinations, December - 2018
QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS
Time: 3 hours
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) Elucidate the scope of OR in management. [5]
- b) A small scale industry manufactures two products I and II. These products are processed on three machines A, B and C. One unit of product I require 2 hours on machine A, 1 on machine B and 6 on machine C, while one unit of product II requires respectively 2 hours, 5 hours and 2 hours on machines A, B and C. In a given period, there are 24 hours available on machine A, 44 on machine B and 60 on machine C. The profit per unit on product I is Rs.6 and on product II is Rs.9. Given that the machines are available when required, Using graphical method, how many units of each product should be made during the period in order to maximize the total profit? [5]
- c) Write the algorithm for solving Assignment problem. [5]
- d) Elucidate the various steps in decision theory approach. [5]
- e) How can you apply queuing model in business? [5]

PART - B
5 × 10 Marks = 50

2. Explain the different business applications of Operations Research. [10]
- OR**
3. Elucidate the opportunities and shortcomings of using OR model. [10]
- OR**
4. The number of man hours available per week at the machine centres I and II are 60 and 48 respectively. Product A requires 4 and 2 man hours and product B requires 2 and 4 man hours at the machine centres I and II respectively per product. The profit per product of A is Rs.8 and product B is Rs.6. Using simplex method, find the optimum production for maximum profit. [10]
- OR**
5. Three factories producing 100, 125 and 75 units of goods respectively supply five distribution centers which demand 100, 60, 40, 75 and 25 units of the goods respectively. The cost of transporting these goods is given by the following matrix C, where the element C_{ij} represents the cost of transporting one unit of goods from the i^{th} factory to the j^{th} distribution Centre.

3	2	3	4	1
4	1	2	4	2
1	0	5	3	2

Determine the number of units of goods to be transported from each of the three factories to the various distribution centres so that the total transportation cost will be a minimum. [10]

6. A project work consists of four major jobs for which four contractors have submitted tenders. The tender amounts quoted in the thousands of rupees are given in the matrix as:

		Jobs			
		J1	J2	J3	J4
Contractors	C1	15	29	35	20
	C2	21	27	33	17
	C3	17	25	37	15
	C4	14	31	39	21

Find the assignment which minimizes the total cost of the project. Each contractor has to be assigned one job. [10]

OR

7. A salesmen has to visit five cities A,B,C,D and E. The distances (in hundred km) between the five cities are given in the following table. If the salesmen starts from city A and has to come back to city A, which route should he select so that the total distance travelled by him is minimized? [10]

		To				
		A	B	C	D	E
From	A	-	4	7	3	4
	B	4	-	6	3	4
	C	7	6	-	7	5
	D	3	3	7	-	7
	E	4	4	5	7	-

8. A client asks an estate agent to sell three properties. A, B and C for him and agrees to pay him 5% commission on each sale. He specifies certain conditions. The estate agent must sell property A first, and this he must do within 60 days. If and when A is sold the agent receives his 5% commission in that sale. He can then either back out at this stage or nominate and try to sell one of the remaining two properties within 60 days. If he does not succeed in selling the nominated property in that period, he is given the opportunity to sell the third property on the same conditions. The following table summarises the prices, selling costs (incurred by the estate agent whenever a sale is made) and the estate agent's estimated probability of making a sale.

Property	Price of Property	Selling costs	Probability of sale
A	12,000	400	0.7
B	25,000	225	0.6
C	50,000	450	0.5

a) Draw up an appropriate decision tree for the estate agent.

b) What is the estate agent's best strategy under EMV approach? [10]

OR

9. The following matrix given the payoff of different strategies S1, S2, S3 against different conditions N1, N2, N3 and N4.

	N1	N2	N3	N4
S1	4000	-100	6000	18000
S2	20,000	5,000	400	0
S3	20,000	15,000	-2,000	1,000

Indicate the decision taken under the following approach a) pessimistic b) Optimistic c) Regret and d) Equal Probability. [10]

10. In a reservation counter with a single server, customers arrive with the inter arrival time as the exponential distribution with mean 10 minutes. The service time is also assumed to be exponential with mean 8 minutes. Find (a) idle time of the server (b) the average length of the queue (c) the expected time that a customer spends in the system. [10]

OR

11. Goods trains are coming in a yard at the rate of 30 trains per day. The inter-arrival time follows exponential distribution. The service rate follows an exponential distribution with an average of 36 minutes. The yard can admit 9 trains at a time (there being 10 lines, one of which is reserved for shunting purposes). What is the probability that the yard is empty and find the average queue length? [10]

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