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Question Paper Code: CMB011



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

MBA III Semester End Examinations (Supplementary) - May/June, 2018

Regulation: IARE-R16

## Quantitative Analysis for Business Decisions

Time: 3 Hours

(MBA)

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

### UNIT – I

1. (a) Define operations research. Discuss the process of operations research. [7M]
- (b) Explain any five models of operations research in detail. [7M]
2. (a) Describe the managerial applications of operations research. [7M]
- (b) Explain the nature and scope of operations research in detail. [7M]

### UNIT – II

3. (a) A person requires 10, 12 and 12 units chemicals of A, B and C respectively for his garden. A liquid product contains 5, 2 and 1 units of A,B and C respectively per jar. A dry product contains 1,2 and 4 units of A,B and C per carton. If the liquid product sells for Rs.3 per jar and the dry product sells for Rs.2 per carton, how many of each should be purchased, in order to minimize the cost and meet the requirements? [7M]
- (b) A product is produced by 4 factories F1, F2, F3 and F4. Their unit production cost are Rs.2, 3, 1 and 5 only. Production capacity of the factories are 50, 70, 40 and 50 units respectively. The product is supplied to 4 stores S1, S2, S3 and S4. The requirements of which are 25, 35, 105 and 20 respectively. Unit cost of transportation are given below. [7M]

	S1	S2	S3	S4
F1	2	4	6	11
F2	10	8	7	5
F3	13	3	9	12
F4	4	6	8	3

Find the optimal transportation plan such that total production and transportation cost is minimum.

4. (a) Solve the following LPP by graphical method. Minimize  $Z = 20X_1 + 40X_2$  Subject to constraints [7M]

$$36X_1 + 6X_2 \geq 108$$

$$3X_1 + 12X_2 \geq 36$$

$$20X_1 + 10X_2 \geq 100$$

$$X_1, X_2 \geq 0$$

- (b) Write the Dual of the following LPP [7M]  
 Min  $Z = 4X_1 + 5X_2 - 3X_3$   
 Subject to constraints,  
 $X_1 + X_2 + X_3 = 22$   
 $3X_1 + 5X_2 - 2X_3 < 65$   
 $X_1 + 7X_2 + 4X_3 > 120$   
 $X_1, X_2 > 0$  and  $X_3$  is unrestricted

**UNIT – III**

5. (a) What are the applications of assignment problem with an algorithm. [7M]  
 (b) Solve the following traveling salesman problem. Salesman has to return to the origin after visiting all the cities. [7M]

From/to	A	B	C	D	E
A	$\infty$	4	7	3	4
B	4	$\infty$	6	3	4
C	7	6	$\infty$	7	5
D	3	3	7	$\infty$	7
E	4	4	5	7	$\infty$

6. (a) Explain the various steps in Hungarian method? How do you solve the unbalanced assignment problem. [7M]  
 (b) A company has taken the third floor of a multi-storied building for rent with a view to locate one of their zonal offices. There are five main rooms in this to be assigned to five managers. Each room has its own advantages and disadvantages. Some have windows, some are closer to the wash rooms or to the canteen or secretarial pool. The rooms are of all different sizes and shapes. Each of the five managers were asked to rank their room preference amongst the rooms 301, 302, 303, 304 and 305. Their preferences were recorded in a table as indicated below [7M]

M1	M2	M3	M4	M5
302	302	303	302	301
303	304	301	305	302
304	305	304	304	304
	301	305	303	
		302		

Most of the managers did not list all the five rooms since they were not satisfied with some of these rooms and they have left these from the list. Assuming that their preferences can be quantified by numbers, find out as to which manager should be assigned to which room so that their total preference ranking is a minimum.

#### UNIT – IV

7. (a) What is Decision Tree Analysis? Explain the step by step procedure of decision tree analysis. [7M]
- (b) Explain the different types of Decision-Making Environments with suitable examples [7M]
8. (a) Discuss the various steps in decision analysis. Explain how managerial applications help decision making [7M]
- (b) What are the ingredients of decision problems. [7M]

#### UNIT – V

9. (a) Explain the various characteristics of queuing models. [7M]
- (b) At a service counter of fast-food joint, the customers arrive at the average interval of six minutes whereas the counter clerk takes on an average 5 minutes for preparation of bill and delivery of the item. Calculate the following
- i. Counter utilization level
  - ii. Average waiting time of the customers at the fast food joint
  - iii. Expected average waiting time in the line
  - iv. Average number of customers in the service counter area
  - v. Average number of customer in the line
  - vi. Probability that the counter clerk is idle
  - vii. Probability of finding the clerk busy
10. (a) Explain the various applications of Queuing models. [7M]
- (b) A warehouse has only one loading dock manned by a three person crew. Trucks arrive at the loading dock at an average rate of 4 trucks per hour and the arrival rate is Poisson distributed. The loading of a truck takes 10 minutes on an average and can be assumed to be exponentially distributed . The operating cost of a truck is Rs.20 per hour and the members of the crew are paid @ Rs.6 each per hour. Would you advise the truck owner to add another crew of three persons? [7M]