

Seat No.: _____

Enrollment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA – SEMESTER 2 • EXAMINATION – SUMMER 2019

Subject Code: 2820007

Date: 11/05/2019

Subject Name: Quantitative Analysis II (QA-II)

Time: 10:30 AM To 01:30 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q-1(A): Select the appropriate options from the given multiple choices: (6)

1. The method used for solving an assignment problem is called

- | | |
|---|--|
| A. Reduced matrix method | B. Modified Distribution Method (MODI) |
| C. Hungarian Approximation Method (HAM) | D. None of the above |

2. Which technique is used to intimate an operation prior to actual performance?

- | | |
|---------------------|--------------------------|
| A. Simulation | B. Markov Chain Analysis |
| C. Goal Programming | D. Network Model |

3. In linear programming graphical method can be applied when there is/are only _____ variable(s):

- | | |
|----------|---------|
| A. One | B. Two |
| C. Three | D. Four |

4. When total supply is equal to total demand in a transportation problem, the problem is said to be:

- | | |
|---------------|-----------------------|
| A. Balance | B. Unbalanced |
| C. Degenerate | D. None of the above. |

5. Customers enter the waiting line at a cafeteria on first come first serve basis. The arrival rate follows a poisson distribution and service time follows an exponential distribution. If the average number of arrivals is 8 per minute and average service rate of single server is 10 per minute, what is the value of utilizations parameter?

- | | |
|---------|---------|
| A. 0.6 | B. 0.90 |
| C. 1.67 | D. 0.80 |

6. While solving a LP model graphically, the area bounded by the constraints is called:

- | | |
|-----------------------|----------------------|
| A. Feasible region | B. Infeasible region |
| C. Unbounded solution | D. None of the above |

Q-1(B): Explain the following terms (4)

1. Unbounded Solution
2. Binary Variables
3. Equilibrium or Steady State
4. Constraints

Q-1(C) Write a note on Travelling Salesmanship Problem. (4)

Q-2(A) What is Integer Programming? Explain the various types of integer programming in detail. (7)

Q-2(B) Write the dual of the following LP problem: (7)

$$\text{Min } Z = 3X_1 - 2X_2 + 4X_3$$

Subject to constraints

$$3X_1 + 5X_2 + 4X_3 \geq 7$$

$$6X_1 + X_2 + 3X_3 \geq 4$$

$$7X_1 - 2X_2 - X_3 \leq 10$$

$$X_1 - 2X_2 + 5X_3 \geq 3$$

$$4X_1 + 7X_2 - 2X_3 \geq 2$$

$$X_1, X_2, X_3 \geq 0$$

OR

Q-2 (B) Write a note on following: i. Goal Programming and ii. Sensitivity Analysis (7)

Q-3 (A) What is Shortest Route Techniques? What is the various business situations where this technique can be applying? (7)

Q-3(B) A furniture manufacturer makes two products: chairs and tables. These products are processed using two machines – X and Y. One chair requires 2 hours on machine X and 6 hours on machine Y. One table requires 5 hours on machine X and no time on machine Y. There are 16 hours per day on machine X and 30 hours on machine Y. The profit gained by the manufacturer from chair is Rs. 200 and from table is Rs. 500. Solve graphically to find the daily production of each of the two products. (7)

OR

Q-3(A) What is Simulation? Write its merits and demerits. (7)

Q-3(B) In Ahmedabad market only two brands of toothpaste, A and B are sold. Given that people last purchased toothpaste A, there is 80% chance that they would buy the same brand in the next purchase, while if people purchased brand B, there is 90% chance that their next purchase would be brand B. Using this information, develop the transition probability matrix, Now Calculate: (7)

- i. The probability that if a customer is currently a brand A purchaser, they will purchase brand B two purchases from now.
- ii. The probability that if a customer is a brand B purchaser, they will purchase brand A three periods from now.
- iii. The probability that three periods from now, a customer shall buy brand B, given that the market share of two brands is as follows: Brand A–70% and Brand B–30%

Q-4(A) What is Queue? Explain the different type of Queuing structure applying in various businesses. (7)

Q-4(B) A company has four sales representatives who are to be assigned to four different sales territories. The monthly sales increase estimated for each sales representatives for different sales territories(in lakh rupees), is shown in the following table: (7)

Sales Representatives	Sales Territories			
	Rajkot	Ahmedabad	Surat	Baroda
S1	200	150	170	220
S2	160	120	150	140
S3	190	195	190	200
S4	180	175	160	190

Suggest optimal assignment and the total maximum sales increase per month.

OR

Q-4(A) Write a note on followings: (7)

- i. Brand Switching
- ii. Minimal Spanning Tree

Q-4(B) Customer in CCD arrive randomly following poisson process. The single attendant provide service to the customer at the rate of 10 customer per hours the service time being distributed exponentially the mean arrival rate 4 per minutes per customer. Being consultant appointed by the franchise give your comment about queuing system of CCD and interpreted the effectiveness of the system in the following areas: (7)

- i. Find Utilization Parameter.
- ii. What is the average length of queue that have atleast one customer.
- iii. Expected time of customer spend in CCD.

Q-5 Apply MODI method to obtain optimal solution of transportation problem using the data of following table. **(14)**

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

OR

Q-5 Case Study: **(14)**

The management of PQR company considering the question of marketing a new product. The fixed cost required in the project is Rs. 4,000. Three factors are uncertain, viz., the selling price, variable cost, and the annual sales volume. The product has a life of only one year. The management has the data on these three factors as under:

Selling Price(Rs.)	Probability	Variable Cost (Rs.)	Probability	Sales Volume(Units)	Probability
3	0.2	1	0.3	2,000	0.3
4	0.5	2	0.6	3,000	0.3
5	0.3	3	0.1	5,000	0.4

Considering the following sequence of thirty random numbers: 81, 32, 60, 04, 46, 31, 67, 25, 24, 10, 40, 02, 39, 68, 08, 59, 66, 90, 12, 64, 79, 31, 86, 68, 82, 89, 25, 11, 98, 16.

Using the sequence (First 3 random numbers for the first trial, etc.,) simulate the average profit for the above project on the basis of 10 trails.
