

Seat No.:

Enrolment No:

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**MBA Semester – 2 – Examination – Summer - 2018**

Subject Code : 2820007

Date: 28/05/2018

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) Multiple Choice Questions**

- 1 In linear programming graphical method can be applied when there is/are only \_\_\_\_\_ variable(s).  
A. One B. Two C. Three D. Four
- 2 Customers enters the waiting line at a cafeteria on first come first serve basis. The arrival rate follows a poison 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. 1.25 B. 1.33 C. 0.80 D. 0.60
- 3 In the matrix of transition probabilities,  
A. The sum of probability in each column equals to 1  
B. The sum of probability in each row equals to 1  
C. There must be one zero in each row  
D. There must be one zero in each column
- 4 Which technique is used to imitate an operation prior to actual performance?  
A. Simulation B. Markov Chain Analysis C. Goal Programming D. Network Model
- 5 People possess varying abilities for performing different jobs and the cost of performing those jobs by different people are different. Which operation research technique would be applied to solve the problem?  
A. Queuing Theory B. Integer Programming C. Transportation Problem D. Assignment Problem
- 6 If particular transportation problem having five rows and four column, then number of feasible solutions are  
A. 9 B. 20 C. 8 D. 19

**B Explain the meaning of the following terms:**

1. Constraints
2. Unbalanced Transportation Problem
3. Feasible Region
4. Unbounded solution

**C Write a note on travelling salesman problems.****Q.2 (a) What is Integer programming? Explain the various types of integer programming in detail.****(b) Develop the dual for the following Linear programming problem:**Minimize  $Z = 10X_1 + 20X_2$ 

With Subject to condition

- $3X_1 + 2X_2 \geq 18$
- $X_1 + 3X_2 \geq 8$
- $2X_1 - X_2 \leq 6$
- Where  $X_1, X_2 \geq 0$

**OR****Q.2 (b) Explain basic concepts of sensitivity analysis. What are different factors affecting given solutions and how do we resolve them? Give a brief comment on each of them.**

- Q.3** (a) What are assignment problems? Write a note on Hungarian Method.
- Q.3** (b) How many air-conditioners to transport from each factory to each wholesaler on a monthly basis in order to minimize the total cost of transportation?

Data :

Factory	Supply	Wholesaler	Demand
1	150	A	200
2	175	B	100
3	275	C	300
Total - 600 ACs		Total - 600 ACs	

Transport cost from factory to wholesaler (Rs./AC)

Factory	A	B	C
1	6	8	10
2	7	11	11
3	4	5	12

Find initial feasible solution by using Vogels approximation method.

**OR**

- Q.3** (a) What is goal programming? How it is different than Linear programming.
- (b) ABC company is engaged in manufacturing 5 brands of packed snacks. It is having five manufacturing setups, each capable of manufacturing any of its brands one at a time. The cost to make a brand on these setups vary according to the table below:

	S1	S2	S3	S4	S5
B1	4	6	7	5	11
B2	7	3	6	9	5
B3	8	5	4	6	9
B4	9	12	7	11	10
B5	7	5	9	8	11

Find the optimum assignment of products on these setups resulting in the minimum cost.

- Q.4** (a) What is Simulations? Explain the Monte Carlo method of simulation. Also state the merits and the demerits of the same.
- (b) Explain the meaning of following terms with respect to Markov chain analysis.
- Brand switching
  - Steady state condition
  - Business applications

**OR**

- Q.4** (a) Write a note on:
- Shortest Route
  - Minimal Spanning Tree
- Q.4** (B) A bakery keeps stock of a popular brand of cakes. Previous experience shows the daily demand pattern for the item with associated probabilities, as given:

Daily demand (Nos.)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 days. Also find out the average demand per day.

Random numbers : 25, 39, 65, 76, 12, 05, 73, 89, 19, 49

**Q.5**

Recently Maruti Limited launched new plant in Gujarat near Ahmedabad. In the new plant of company, they produce two types of cars: Maruti Swift and Maruti Baleno. The production manager of the plant shares the following information regarding the worker/technocrat, assembly time and finishing time for Swift and Baleno.

	Worker/Technocrat	Assembly Line	Finishing Line
<b>Swift</b>	<b>12</b>	<b>3</b>	<b>8</b>
<b>Baleno</b>	<b>12</b>	<b>6</b>	<b>4</b>

In this plant of Maruti, currently 840 Worker/technocrat provide the service and not more than 300 hours of assembly time and 480 hours of the finishing time available. CEO of Maruti Ltd is confident about profit of new Swift 50,000 Rs and Baleno 70,000 Rs.

Give the answer of the following questions with suitable quantitative tools:

1. How many Swift and Baleno car company should produce in order to generate maximum profit? Solve by graphical method and interpret your answer.
2. Derive the binding and non binding constraints of the problems and interpret each of them.

**OR**

Customers for TGB bakery arrived randomly following poisson process. The single salesman can attend customers at an average rate of 10 customers per hour (6 minutes per customer) the service time being distributed exponentially. The mean arrival rate is 10 minutes per customers. Find the answers of the following questions:

1. The utilization parameter
2. The average time that salesman is free on a 10 hour working day.
3. What is the expected number of customers in the TGB Bakery?
4. What is the expected number of customers waiting for salesman service?
5. What is the average length of the queues that have at least 1 customer?
6. How much time should customer expect to spend in the queue?
7. What is the expected time a customer would spend in TGB Bakery?

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