Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**MBA – SEMESTER 2 – EXAMINATION – WINTER 2018**

**Subject Code:2820007** **Date: 28/12/ 2018**

**Subject Name: Quantitative Analysis II**

**Time:02:30 to 05:30** **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)** Choose the correct option from the following questions: **06**

1. Which technique is used in finding a solution for optimizing a given objective, such as profit maximization or cost minimization under certain constraints?
   A. Queuing Theory B. Waiting Line Theory
   C. Both A & B D. Linear Programming
2. Every LPP is associated with certain limitations/conditions which is called as - - - - - - - - - - - - - - - - - -
   A. Limiting Factor B. Key Factor
   C. Constraints D None of the above
3. A feasible solution is called a basic feasible solution if the number of non- negative allocations is equal to - - - - - -
   A. m- n+1 B. m- n- 1
   C. m+n- 1 D. None of the above
4. From the following which constraint is not a constraint if the problem is of a maximization type?
   A. $2x1 + 3x2 \leq 60$ B. $4x1 + 3x2 \leq 96$
   C. $6x1 + 4x2 = 150$ D. $5x1 + 2x2 \leq 106$
5. If Optimal Solution is x1=60 and x2=40 what would be the value of slack for constraint 2x1 + 4x2 = 400?
   A. 120 B. 150
   C. 280 D. 180
6. In - - - - - - - - - - models one can estimate randomly demand, sales, profit, cost etc by running random numbers.
   A. Simulation B. Markov Chain
   C. Symbolic D. None

**Q.1 (b)** Briefly explain the following terms. **04**

1. Degeneracy in Transportation Problem
2. Maximization in Linear Programming
3. Infeasibility
4. Unbounded Solution

**Q.1 (c)** Explain the concept of Infeasibility with respect to graphical solution of a LPP **04**

**Q.2** **(a)** Obtain graphically the solution to the following LPP: **07**

Maximize Z = x1 + 3x2

Subject to

$x1 + 2x2 \leq 9$

$x1 + 4x2 \leq 11$

$x1 - x2 \geq 2$

$x1, x2 \geq 0$

**(b)** Explain Minimum-Spanning tree, Maximal Flow and Shortest Route models **07**

**OR**

**(b)** Discuss the concept of Brand Switching with an example. What is steady state condition in Markov Analysis? **07**

**Q.3** **(a)** 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 **07**

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 N/W corner method, Least cost method and VAM method.

**(b)** A salesman has to visit four cities A, B, C, and D. The inter-city distances are given as follows: **07**

| From/To | A | B | C | D |
|---|---|---|---|---|
| A | - | 4 | 7 | 3 |
| B | 4 | - | 6 | 3 |
| C | 7 | 6 | - | 7 |
| D | 3 | 3 | 7 | - |

If the salesman starts from city A and has to back to city A, which route should he select so that the total distance travelled by him is the minimum?

**OR**

**Q.3** **(a)** 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: **07**

| | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_5$ |
|---|---|---|---|---|---|
| $B_1$ | 4 | 6 | 7 | 5 | 11 |
| $B_2$ | 7 | 3 | 6 | 9 | 5 |
| $B_3$ | 8 | 5 | 4 | 6 | 9 |
| $B_4$ | 9 | 12 | 7 | 11 | 10 |
| $B_5$ | 7 | 5 | 9 | 8 | 11 |

Find the optimum assignment resulting in the minimum cost.

**(b)** Explain the concept of Goal Programming. Explain preemptive and non-preemptive goal programming. **07**

**Q.4** **(a)** What is queuing theory? In what type of problem situation can it be applied successfully? Discuss giving examples **07**

**(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: **07**

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

Us 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

**OR**

**Q.4** **(a)** What is simulation? Discuss Monte Carlo simulation with example. State its advantages **07**

**(b)** In a certain market, only two brands of lipsticks A and B are sold. Given that a lady last purchased lipstick A, there is 80% chance that she would but the same brand in the next purchase, while if a lady purchased brand B, there is 90% chance that her next purchase would be brand B. using this information, develop transition probability matrix. **07**
Calculate:
a) the probability that if a customer is currently a brand A purchaser, she will purchase brand B two purchases from now;
b) the steady state probabilities.

**Q.5** **(a)** What do you understand by Markov process? In what areas of management can it be applied successfully? **07**

**(b)** What is an unbalanced assignment problem? How is the Hungarian Assignment Method applied in respect of such problem? **07**

**OR**

**Q.5** **(a)** What is degeneracy? How does the problem of degeneracy arise in a transportation problem? How can we deal with this problem? **07**

**(b)** Explain the concept of Integer Programming problem. Explain types of IPP. **07**

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