Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
MBA – SEMESTER 02 – EXAMINATION – SUMMER 2017

Subject Code: 2820007   **Date: 12/06/2017**

Subject Name: Quantitative Analysis - 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) MCQ   06

1. 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

2. The right hand side constant of a constraint in a primal problem appears in the corresponding dual as
A. A coefficient in the objective function
B. A right-hand side constant of a constraint
C. An input-output coefficient
D. None of the above

3. In a mixed-integer programming problem
A. All of the decision variables require integer solutions
B. Few of the decision variables require integer solutions
C. Different objective functions are mixed together
D. None of the above

4. When total supply is equal to total demand in a transportation problem, the problem is said to be
A. Balanced
B. Unbalanced
C. Degenerate
D. none of the above

5. 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

6. The purpose of using simulation technique is to
A. Imitate a real world situation
B. Finding optimal solution
C. Finding alternate optimal solution
D. All of the above

(b) **Explain the following term**   **04**
1. Infeasibility
2. Redundancy
3. Simulation
4. Equilibrium or steady state

(C) Write the dual of the following LP problem   **04**
Min $Z = 3X_1 - 2X_2 + 4X_3$
Subject to
$3X_1 + 5X_2 + 4X_3 \geq 7$
$6X_1 + X_2 + 3X_3 \geq 4$
$7X_1 - 2X_2 - X_3 \leq 10$
$X_1 - 2X_2 + 5X_3 \geq 3$
$4X_1 + 7X_2 - 2X_3 \geq 2$
$X_1, X_2, X_3 \geq 0$

Q.2 **(a)** A furniture manufacturer makes two products: chairs and tables. These products   **07**
are processed using two machines – A and B. One chair requires 2 hours on
machine A and 6 hours on machine B. One table requires 5 hours on machine A
and no time on machine B. There are 16 hours per day on machine A and 30
hours on machine B. The profit gained by the manufacturer from a chair is Rs 2
and from a table is Rs 10. Solve graphically to find the daily production of each
of the two products.

(b) Define quantitative analysis and explain quantitative analysis approach.   **07**

OR

(b) Define & Explain Sensitivity Analysis.   **07**

Q.3 **(a)** ABC Company produces two products, printer and scanner. Both these products   **07**
require process involving wiring and assembly. It takes about 2 hours to wire
each printer and 3 hours to wire a scanner. Final assembly of printer and scanner
requires 6 and 5 hours respectively. The production capability is such that only
12 hours of wiring time and 30 hours of assembly time are available. If each
printer & scanner nets the firm Rs. 400 and Rs. 300 respectively. Formulate the
above as a goal programming problem with following goals:
Priority 1: Produce at least 4 printers and 3 scanners.
Priority 2: Limit overtime in the wiring department to 12 hours and in the
assembly department to 8 hours.
Priority 3: maximize profit.

(b) Discuss Integer programming problem. Give an example each of a pure and a   **07**
mixed integer programming problem

OR

Q.3 **(a)** Using the following cost matrix, determine optimal job assignment and the cost   **07**
of assignments.

Machinist	Job				
	1	**2**	**3**	**4**	**5**
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

(b) Define and explain goal programming problems.   **07**

Q.4 (a) The Anushka Corporation is considering the problem of marketing a new **07** Cadbury. The investment required in the project is Rs. 200000. There are two factors that are uncertain – annual demand & profit. The management has the past data regarding the possible level of two factors.

Annual Demand	Probability	Profit (per Unit)	Probability
1000	0.10	3	0.10
2000	0.20	5	0.20
3000	0.40	7	0.40
4000	0.20	9	0.20
5000	0.10	10	0.10

Using the Monte – Carlo Simulation and mentioned random numbers determine
1. Return on Investment
2. Average Profit
3. Average Demand

Demand Random No.	35	55	10	30	70	90	25	52	62	31
Profit Random No.	15	80	50	90	30	60	25	62	10	2

(b) In a city only two brands of cold drinks are sold: A and B. If a buyer bough brand **07** A last time, there is 0.75 chances that he would buy the same brand in the next purchase. Similarly, it is known that if a buyer bough brand B last time, the probability for him to buy the brand A next time is 0.4.
1. Using the information develop the transition probability matrix.
2. What are the projected market shares for these two brands in long run?

OR

Q.4 (a) A poultry breeding farm is planning to install a complete water system **07** connecting all of the various stables and barns. The location of facilities and the distances between them are given in the following diagram. Identify the least expensive way to provide water at each facility using minimum spanning tree technique.
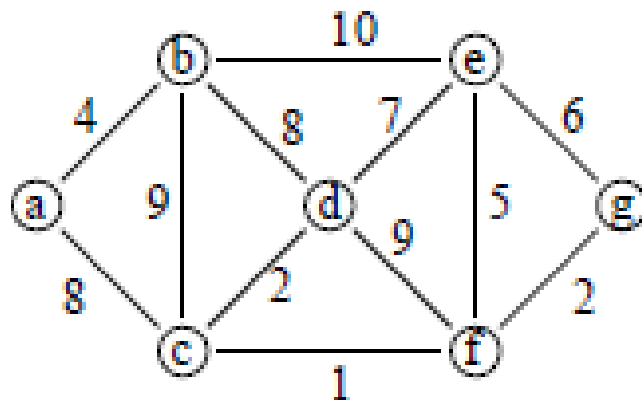
(b) A new shopping mall is considering setting up an information desk managed by **07** one employee. Based on information obtained from similar information desks, it is believed that people will arrive at the desk at the rate of 20 per hour. It takes an average of 2 minutes to answer a question. It is assumed that arrivals are Poisson and answer times are exponentially distributed.
(a) Find the probability that the employee is idle.
(b) Find the proportion of the time that the employee is busy.
(c) Find the average number of people receiving and waiting to receive information.
(d) Find the average number of people waiting in line to get information.
(e) Find the average time person seeking information spends at the desk.

        (f) Find the expected time a person spends just waiting in line to have a question answered.

Q.5 A Company has four factories manufacturing the same commodity, which are required to be transported to meet the demands in four warehouses. The supplies and demands as also the cost per transportation from factory to warehouses in rupees per unit of product are given in the following table. **14**

Factory	Warehouses				Supply (Unit)
	W	X	Y	Z	
A	25	55	40	60	**60**
B	35	30	50	40	**140**
C	36	45	26	66	**150**
D	35	30	41	50	**50**
Demand (Unit)	**90**	**100**	**120**	**140**	

Derive an optimal strategy of transportation of goods from factories to warehouses and access the optimal cost.

OR

Q.5 The expected times required to be taken by a salesman in travelling from one city to another are as follows. **14**

Times (in hours)					
From/To	**A**	**B**	**C**	**D**	**E**
A	-	10	13	11	-
B	10	-	12	10	12
C	14	13	-	13	11
D	11	10	14	-	10
E	12	11	12	10	-

How should the salesman plan his trip so that he covers each of these cities no more than once, and complete his trip in minimum possible time required for travelling.

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