Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA - SEMESTER–II • EXAMINATION – SUMMER 2013

Subject Code: 2820007 **Date: 27-05-2013**

Subject Name: Quantitative Analysis - II

Time: 10:30am – 01:30pm **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)** Define quantitative analysis and explain quantitative analysis approach. **07**

(b) The Electrocomp Corporation manufacturersô two electrical products: air conditioners and large fans. The assembly process for each is similar in that both require a certain amount of wiring and drilling. Each air conditioner takes 3 hours of wiring and 2 hours of drilling. Each fan must go through 2 hours of wiring and 1 hour of drilling. During the next production period, 240 hours of wiring time are available and up to 140 hours of drilling time may be used. Each air conditioner sold yields a profit of Rs. 25. Each fan assembled may be sold for Rs. 15 profit. Formulate and solve this LP production mix situation to find the best combination of air conditioners and fans that yields the highest profit. Solve the problem by using graphical method. **07**

Q.2 **(a)** Write the dual of the following linear programming problems: **07**

(a) Maximize $Z=10Y_1 + 8Y_2$ ï $6Y_3$

Subject to

$3Y_1 + Y_2$ ï $2Y_3$ Ò 10

$-2Y_1 + 3Y_2$ ï Y_3 Ó 12

Y_1, Y_2, Y_3 Ó 0

(b) Minimize $Z= -4X_1 + 3X_2$

Subject to

$X_1 - 2X_2$ Ò -4

$2X_1 + 3X_2$ Ó 13

$-X_1 + X_2$ Ò -4

X_1, X_2 Ó 0

(b) Define and explain sensitivity analysis. **07**

OR

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

Q.3 **(a)** A salesman has to visit five cities A, B, C, D and E, starting from his home city A and back to home city A. The inter-city distance are given as follows: **07**

From \ To	A	B	C	D	E
A	--	220	210	230	190
B	220	--	230	200	210
C	210	230	--	240	220
D	230	200	240	--	230
E	190	210	220	230	--

How should the salesman plan his tour so that the total distance travelled by him is the minimum?

(b) A firm owns facilities at six places. It has manufacturing plants at places A, B and C with daily production of 50, 40 and 60 units respectively. At point D, E and F it has three warehouses with demands of 20, 95 and 35 units respectively. Per unit shipping costs are given in the following table. If the firm wants to minimize its total transportation cost, how should it route its products? **07**

		Warehouse		
		D	E	F
Plant	A	6	4	1
	B	3	8	7
	C	4	4	2

Find the initial feasible solution by using N/W corner method, Least cost method and VAM method.

OR

Q.3 **(a)** The following information is available regarding four different jobs to be performed and about the clerks capable of performing jobs: **07**

		Jobs (Time taken in hours)			
		A	B	C	D
Clerks	I	4	7	5	6
	II	--	8	7	4
	III	3	--	5	3
	IV	6	6	4	2

Clerks II cannot be assigned to job A and clerk III cannot be assigned to job B. You are required to find out the optimal assignment schedule and the total time taken to perform the jobs. Also find whether the given problem has more than one optimal assignment schedule.

(b) A company has three plants and four warehouses. The supply and demand in units and the corresponding transportation costs are given. **07**
Below table shows initial solution of problem.

Plants	Warehouses				Supply
	I	II	III	IV	
1	5	10	4 [10]	5	10
2	6 [20]	8	7	2 [5]	25
3	4 [5]	2 [10]	5 [5]	7	20
Demand	25	10	15	5	55

Answer the following questions, giving brief reasons:

(a) Is this solution feasible?
(b) Is this solution degenerate?
(c) Is this solution optimal?
(d) Does this problem have more than one optimal solution? If so, show all of them.

Q.4 **(a)** A new shopping mall is considering setting up an information desk manned by 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. **07**

(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.

(b) What is Markov analysis? List the assumptions that are made in Markov analysis. **07**

OR

Q.4 **(a)** What is simulation? What are the advantages and limitations of simulation? **07**

(b) A Bajaj company manufactures around 150 bikes. Depending upon the availability of raw materials and other conditions, the daily production has been varying from 146 bikes to 154 bikes, whose probability distribution is as given below: **07**

Production/day	Probability
146	0.04
147	0.09
148	0.12
149	0.14
150	0.11
151	0.10
152	0.20
153	0.12
154	0.08

The finished bikes are transported in a specially designed lorry that can accommodate only 150 bikes. Using following random numbers 80, 81, 76, 75, 64, 43, 18, 26, 10, 12, 65, 68, 69, 61, 57 stimulate the process to find out

(a) What will be the average number of bikes waiting in the factory?

(b) What will be the average number of empty space on the lorry?

Q.5 **(a)** Hal has enough clay to make 24 small vases or 6 large vases. He only has enough of a special glazing compound to glaze 16 of the small vases or 8 of the large vases. Let X_1 = the number of small vases and X_2 = the number of large vases. The smaller vases sell for Rs.3 each, while the larger vases would bring Rs.9 each. **07**

Formulate the problem as linear programming problem.

(b) What is integer programming? List down three types of integer programming problems. **07**

OR

Q.5 **(a)** What is balance and unbalanced transportation problem? Describe the approach you would use to solve an unbalanced problem. **07**

(b) What is queuing problem? What are the basic characteristics of queuing system? **07**

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