Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA - SEMESTER–II • EXAMINATION – WINTER 2013

Subject Code: 2820007 **Date: 30-12-2013**

Subject Name: Quantitative Analysis – II (QA–II)

Time: 2.30 pm – 5.30 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)** Cashewco has two grades of cashew nuts: Grade I – 750kg and Grade II – 1200 kg. these are to be mixed in two types of packages of one kg each- economy and special. The economy pack consists of grade I and grade II cashews in the proportion of 1:3, while the special pack combines the two in equal proportion. The profit margin on the economy and special packs is, respectively, Rs 5 and Rs 8 a pack. Formulate this as a linear programming problem and using graphical method find out number of packages of economy and special type to be made to maximize profit. **07**

(b) Write short note on Sensitivity analysis. **07**

Q.2 **(a)** Discuss the nature and steps of OR problem. **07**

(b) The Agriculture Research institute has suggested to a farmer to spread out at least 4800 kg of a special phosphate fertilizer and no less than 7200 kg of a special nitrogen fertilizer to raise productivity of crops in his fields. There are two sources for obtaining these mixtures A and B. both of these are available in bags weighting 100 kg each and they cost Rs 40 and Rs 24 respectively. Mixture A contains phosphate and nitrogen equivalent of 20 kg and 80 kg respectively, while mixture B contains these ingredients equivalent of 50 kg each. Use graphical method to find out optimal cost. **07**

(b) Discuss economic interpretation of Dual with example. **07**

Q.3 **(a)** Samarth inc. has three factories at locations A,B and C which supplies three warehouses located at D, E and F. monthly factory capabilities are 10, 80, 15 units, respectively. Monthly warehouse requirement are 75, 20 and 50 units respectively. Unit shipping costs are given in table. **07**

Warehouse			
Factory	D	E	F
A	5	1	7
B	6	4	6
C	3	2	5

The penalty costs for not satisfying demand at the warehouse are Rs, 5, 3 and 2 respectively. Determine the optimal distributor for the company.

(b) Write short note on Goal programming. **07**

Q.3 **(a)** A company is spending Rs. 1200 on transportation of its units from three plants to four distribution centers. The supply and demand of units with unit cost of transportation are given in table. What can be the maximum saving by optimal scheduling? **07**

Distribution center					
Plants	A	B	C	D	Supply
1	20	30	50	17	7
2	70	35	40	60	10
3	40	12	60	25	18
Demand	5	8	7	15	

(b) Write dual of the following LPP problem. **07**

Maximize $Z=8X_1 + 10X_2 + 5X_3$

$X_1 - X_3 \leq 4$
$2X_1 + 4X_2 \leq 12$
$X_1 + X_2 + X_3 \geq 2$
$3X_1 + 2X_2 - X_3 = 8$
$X_1, X_2, X_3 \geq 0$

Q.4 **(a)** A fast-food chain wants to build four stores. In the past, the chain has used six different construction companies, and satisfied with each, has invited them to bid on each job. The final bids (in lakhs of rupees) were as shown in the following table. **07**

	Construction companies					
	1	2	3	4	5	6
Store 1	85	88	87	82	89	86
Store 2	78	77	77	76	79	78
Store 3	82	81	82	80	83	81
Store 4	84	84	86	83	84	85

Since the fast-food chain wants to have each of the new stores ready as quickly as possible, it will award at most one job to one company. What assignment results in minimum total cost to the fast-food chain?

(b) What is Network analysis? Discuss briefly. **07**

Q.4 **(a)** A foreign bank is considering opening a drive-in window for customer service. Management estimates that customers will arrive for service at the rate of 12 per hour. The teller, whom it is considering to staff the window, can serve customers at the rate of one every three minutes. Assuming poisons arrivals and exponential service, find utilization of teller, average number in the system, average waiting time in the line and average waiting time in the system. **07**

Q.4 **(b)** Discuss the various methods of finding initial feasible solution of a transportation problem. **07**

Q.5 **(a)** Discuss the following assumptions in relation to the Markow chains. **07**

1) Finite states
2) First order process
3) Stationary of transition probabilities
4) Uniform time periods

(b) A company manufactures 30 units per day. The sales of these items depend upon demand which has the following distribution. **07**

Sales	27	28	29	30	31	32
Probability	0.10	0.15	0.20	0.35	0.15	0.05

The production cost and sales price of each unit are Rs. 40 and Rs. 50 respectively. Unsold product incurs loss of Rs. 15 per unit. There is a penalty of Rs. 5 per unit if the demand is not met. Using following random numbers estimate total profit/loss for the company for next 10 days. 10, 99, 65, 99, 95, 01, 79, 11, 16, 20.

Q.5 **(a)** What is simulation? Describe the simulation process. What are the advantages and limitations of simulation? **07**

(b) The purchase pattern of two brands of toothpaste can be expressed as Markow process with the following probabilities. **07**

	Brand X	Brand Y
Brand X	0.9	0.1
Brand Y	0.05	0.95

Which brand appears to have most loyal customers? Explain. What are the projected market share for the two brands?

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