

GUJARAT TECHNOLOGICAL UNIVERSITY
MBA - SEMESTER-II • EXAMINATION – WINTER • 2014

Subject Code: 2820007

Date: 31-12-2014

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

Time: 02.30 pm - 05.30 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) Discuss the limitation of graphical method for solving LPP. **02**

(b) A firm uses lathes, milling and grinding machines to produce two parts. **12**
Following table represents the machining times required for each part, available machine time on different machines and the profit values:

Machine Type	Required Machine time (Min)		Maximum time available per week (Min)
	Part - I	Part - II	
Lathes	12	6	3000
Milling Machines	4	10	2000
Grinding Machines	2	3	900
Profit per Unit (Rs)	40/-	100/-	

Formulate this as LPP and find the number of parts I and II to be produced per week to maximize the profit using graphical method.

Q.2 (a) Discuss three types of integer programming problems with application. **07**

(b) Develop the dual for the following Linear programming problem: **07**

$$\text{Minimize } Z = 10X_1 + 20X_2$$

$$\text{Subject to } 3X_1 + 2X_2 \geq 18$$

$$X_1 + 3X_2 \geq 8$$

$$2X_1 - X_2 \leq 6$$

$$\text{Where } X_1, X_2 \geq 0$$

OR

(b) Depict your understanding for Linear Programming Program. Discuss the application of LPP in Operations Research. **07**

Q.3 (a) What do you understand by degeneracy in transportation problem? How can it be handled to get optimal solution? **04**

- (b) In a production unit four new machines M1, M2, M3 and M4 are to be installed in a machine shop. There are five vacant places A, B, C, D and E available. Because of limited space, machine M2 cannot be placed at C and M3 cannot be placed at A. The cost of locating a machine at a place in thousands of rupees is as under: **10**

	A	B	C	D	E
M1	4	6	10	5	6
M2	7	4	-	5	4
M3	-	6	9	6	2
M4	9	3	7	2	3

Find the optimal assignment schedule.

OR

- Q.3** (a) Discuss goal programming problem with its applications. **04**
- (b) A product is produced by four factories A, B, C, and D. Per unit production costs are Rs. 2, Rs. 3, Rs. 1 and Rs. 5 respectively. The production capacities of A, B, C and D are 50, 70, 30 and 50 units respectively. These factories supply the product to four stores I, II, III and IV with a demand of 25, 35, 105, and 20 units respectively. Per unit transportation cost in rupees are given in the table below: **10**

	Stores			
	I	II	III	IV
Factory A	2	4	6	11
Factory B	10	8	7	5
Factory C	13	3	9	12
Factory D	4	6	8	3

Determine the extent of deliveries from each of the factories to each of the stores so that the total cost (production and transportation cost) is minimum.

- Q.4** (a) Discuss various structures of Queuing system with real life examples. **07**
- (b) A branch of Punjab National Bank has only one typist. Since the typing work varies in the length, the typing rates are approximately Poisson distributed with a mean service rate of 8 letters per hour. The letters arrive at a rate of 5 per hour during the entire 8-hour work day. If the type writer is valued at Rs. 1.5 per hour, determine **07**
1. Equipment utilization,
 2. The percent time that an arriving letter has to wait,
 3. Average system time
 4. Average cost due to waiting on the part of the typewriter i.e. he remaining idle.

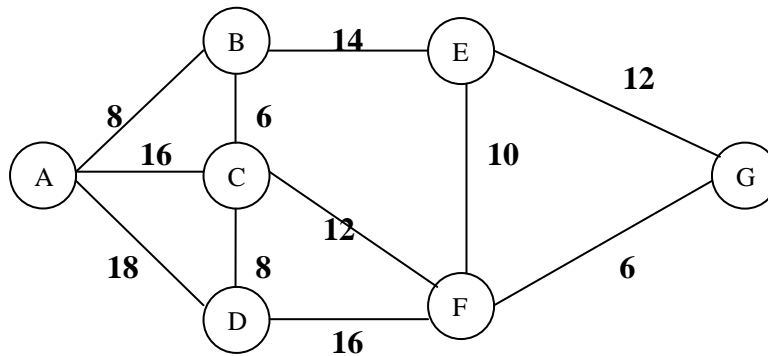
OR

- Q.4 (a)** In a certain market only two brands of Ghee A and B are available. Every time a customer purchases, he may buy the same brand or switch to another brand. The transition probability matrix is as under: **07**

	To	
	A	B
From A	0.80	0.20
From B	0.60	0.40

At present it is estimated that 60% of the people buy Brand A and 40% buy brand B. Determine the market share of these two brands in long run (steady State market share).

- (b)** Discuss various assumptions underlying the Markov Chain analysis. **07**
- Q.5 (a)** Discuss the application of minimum spanning tree technique. **07**
- (b)** Using the shortest route technique, find the shortest way to reach from city 'A' to city 'G' in the following network diagram with distances in kilometers: **07**



OR

- Q.5** A manufacturer produces 30 units of an item per day. The sales of these item depend upon the demand, having following probabilities: **14**

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

The production cost and sale price of each unit are Rs. 40 and Rs. 50, respectively. Any unsold unit is to be disposed off at a loss of Rs. 15 per unit. There is a penalty of Rs 5 per unit if the demand is not met. Simulate using the random numbers 10, 99, 65, 99, 95, 01, 79, 11, 16, and 20, and estimate the total profit / loss for the company for next 10 days.
