SEE QUESTION PAPER

PG

Global Academy of Technology, Bengaluru

(Autonomous Institution, Affiliated to VTU)

Master of Business Administration			**Semester End Examination**
Course	**Quantitative Techniques for Managers**	**Course Code**	**20MBAC14**
Time: 3 hr.	**Note:** **1. Answer any 4 full questions from Q. No. 1 to Q. No. 7.** **2. Q. No. 8 is compulsory.** **3. Use of Statistical tables are permitted.** **4. Graph Sheets would be provided.**		**Max. Marks: 100**

Q. No.		Questions	Marks
1	**a**	Discuss the importance of Statistics in Business and Management Decisions.	**5**
	b	The mean marks of 100 students were found to be 40. Later on it was discovered that a score of 53 was misread as 83. Find the correct mean to the correct score.	**5**
	c	The annual salary of a group of employees are given as follows. Calculate the mean and the standard deviation of the group. **Salary (Rs. 000)** | **45-50** | **50-55** | **55-60** | **60-65** | **65-70** | **70-75** **No. of employees** | **3** | **5** | **8** | **7** | **9** | **7**	**10**
2.	**a**	Distinguish between the measures of central tendency and measures of dispersion, indicating the significance of dispersion in business decisions	**5**
	b	There are 100 students in the first semester BBA. On an average, the institution found that 20 students secured grade A, 25 students secured grade B, 20 students secured grade C and 35 students secured grade D. Find the probability of selecting a student who has - **i.** Either grade A or grade B **ii.** Either grade C or grade D	**5**
	c	Spectrum Light bulb company went for mass production of colour bulbs before Diwali. Five bulbs, one of each colour, were packed in each of the boxes which were to be sold as a unit item to the customers. Due to shortage of time, quality was compromised and it was estimated that 20% of the bulbs were defective. When the customer purchases such a box of bulbs, what is the probability that the box will have – i. No defective bulbs ii. 2 defective bulbs iii. At least 1 defective bulbs iv. At most 1 defective bulb v. All defective bulbs	**10**

3.	**a**	What is a binomial distribution function and where can it be applied in business management decisions? Explain with an example.	**5**
	b	The probability of dialing a wrong number is 0.05. Then, find the probability of dialing exactly 3 wrong numbers in 100 dials?	**5**
	c	A farmer has 100 acre farm. He can sell all tomatoes, lettuce or radishes. He gets Re. 1.00 per kg of tomatoes, Rs. 0.75 for one lettuce and Rs. 2.00 per kg of radishes. The average yield per acre is 2000 kg of tomatoes, 3000 heads of lettuce and 1000 kgs of radish. Fertilizer is available at Rs. 0.50 per kg, per acre for 100 kgs each of tomatoes and lettuce and 50 kgs for radishes. Labour required for sowing, cultivating and harvesting per acre is 5 man days for tomatoes and radishes and 6 man days for lettuce. A total of 400 man days of labour are available at Rs. 20 per man day. Formulate this problem as a linear programming model to maximize the farmer's total profit. Solve using the graphical method.	**10**
4	**a**	How is the analysis of time series useful in business and industry? Describe briefly, the phases of a business cycle.	**6**
	b	Four cards are drawn at random from a pack of 52 cards. Find the probability that **i.** They are a king, a queen, a jack and an ace. **ii.** Two are kings and two are aces. **iii.** All are diamonds. **iv.** Two are red and two are black. **v.** There is one card of each suit. **vi.** There are two cards of clubs and two cards of diamonds.	**6**
	c	A factory has 2 machines. Machine 1 produces 30% of the items as output and machine 2 produces 70% of the items as output. It was seen that 5% of the items produced by machine 1 were defective while only 1% produced by machine 2 were found to be defective. If a defective item is drawn at random, what is the probability that the defective item was produced by machine 1 or machine 2	**8**
5	**a**	What is an optimal decision? How does statistical decision theory help in arriving at an optimal decision?	**5**
	b	What is 'Decision Tree Analysis'? Describe the various types of decision trees.	**5**

	c	A company is contemplating the introduction of a new product with new packing to replace the existing product at much higher Price (P1) or a moderate change in the composition of the existing product with a new packaging at a small increase in price (P2) or a small change in the composition of the existing product except the word "new" with a very small increase in price (P3). The three possible states of nature are: **i.** High increase in sales (N1), **ii.** No change in sales (N2), and **iii.** Decrease in sales (N3). The marketing department of the company calculated the payoffs in terms of yearly net profits from each of the strategies (expected sales). This is represented in the following table: Which strategy should the concerned executive choose on the basis of (i) Maximin criterion, (ii) Laplace criterion?	**10**
6	a	What is the significance of random numbers in simulation models?	**4**
	b	A travelling salesman has to visit 5 cities. He wishes to start from a particular city, visit each city once and then return to his starting point. The travelling cost (in '000 Rs) of each city from a particular city is given below: What should be the route of the salesman so that the cost of his travel is minimized?	**8**
	c	Using random numbers to simulate a sample, find the probability that a packet of 6 products does not contain any defective products, when the production line produces 10 percent defective products. Compare your answer with the expected probability.	**8**
7	**a**	"A transportation problem is a special type of LP problem which can be effectively applied in different areas of management". Discuss the areas of its specific application.	**5**
	b	For the following payoff matrix Determine the optimal strategies for players A and B and the value of the game. Is this game i) Fair, ii) Strictly determinable?	

	States of Nature		
Strategies	**N1**	**N2**	**N3**
P1	**7000**	**3000**	**1500**
P2	**5000**	**4500**	**0**
P3	**3000**	**3000**	**3000**

From City \ **To City**	**A**	**B**	**C**	**D**	**E**
A	**9**	**2**	**5**	**7**	**1**
B	**6**	**9**	**3**	**8**	**2**
C	**8**	**7**	**9**	**4**	**7**
D	**12**	**4**	**6**	**9**	**5**
E	**1**	**3**	**2**	**8**	**9**

	Player B		
Player A	**B1**	**B2**	**B3**
A1	**-1**	**2**	**-2**
A2	**6**	**4**	**-6**

	c	Compute the seasonal averages, and seasonal indices for the following time-series.	**10**

Month	1994	1995	1996	Month	1994	1995	1996
Jan	15	23	25	Jul	20	22	30
Feb	16	22	25	Aug	28	28	34
March	18	28	35	Sep	29	32	38
April	18	27	36	Oct	33	37	47
May	23	31	36	Nov	33	34	41
June	23	28	30	Dec	38	44	53

[**Hint.** Use Method of Simple Averages.]

Part B – Compulsory Question

8 **20**

A dairy firm has 3 plants located in a state. The daily milk production at each plant is as follows;

Plant 1: 6 million litre

Plant 2: 1 million litre

Plant 3: 10 million litre

Each day, the firm must fulfill the needs of its 4 distribution centers. The minimum requirement of each center is as follows:

Distribution center 1: 7 million litre

Distribution centre 2: 5 million litre

Distribution centre 3: 3 million litre

Distribution centre 4: 2 million litre.

The cost (in Rs. '00s) of shipping one million litre from each plant to each distribution centre is given in the following table:

		Distribution Centre			
		D1	D2	D3	D4
Plant	P1	2	3	11	7
	P2	1	0	6	1
	P3	5	8	15	9

Find the initial basic solution for the given problem by using following methods:

i. North-West Corner Rule Method
ii. Least Cost Method
iii. Vogel's Approximation Method