GUJARAT TECHNOLOGICAL UNIVERSITY
MBA– SEMESTER –I-EXAMINATION – WINTER-2023

Subject Code:4519207   **Date: 24-01-2024**
Subject Name: Business Statistics
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.
4. Use of simple calculators and non-programmable scientific calculators are permitted.

Q.1 (a) Give definition of following terms: **14**

1. Leptokurtic
2. Inverse Probability
3. Substantive hypothesis
4. Paired T test
5. Bivariate test
6. Multicollinearity
7. Coefficient of variation

Q.2 (a) The ages of a sample of the students attending XYZ Community college this semester are: **07**

19	17	15	20	23	41	33	21	18	20
18	33	32	29	24	19	18	20	17	22
55	19	22	25	28	30	44	19	20	39

a. Construct a frequency distribution with intervals 15-19, 20-24, 25-29, 30-34, and 35 & older.

b. Calculate the mode and mean of above data. Compare answers of mean and mode and comment on which of the two is the better measure of the central tendency of these data and why.

(b) Southeastern Stereos, a wholesaler, was contemplating becoming the supplier to three retailers, but inventory shortages have forced Southeastern to select only one. Southeastern's credit manager is evaluating the credit record of these three retailers. Over the past 5 years, these retailers' accounts receivable have been outstanding for the following average number of days as seen in the below table. The credit manager feels that consistency, in addition to lowest average, is important. Based on relative dispersion, which retailer would make the best customer?   **07**

Lee	62.2	61.8	63.4	63.0	61.7
Forrest	62.5	61.9	62.8	63.0	60.7
Davis	62.0	61.9	63.0	63.9	61.5

OR

(b) Define and differentiate between mean, median, and mode. Discuss out of the above three, which one is the best method for measurement of central tendency   **07**

Q.3 (a) The latest nationwide political poll indicates that for Americans who are randomly   **07** selected, the probability that they are conservative is 0.55, the probability that they are liberal is 0.30, and the probability that they are middle of the road is 0.15. Assuming that these probabilities are accurate, answer the following questions pertaining to a randomly chosen group of 10 Americans. Use appropriate probability distribution table for the same.

    a. What is the probability that four are liberal?

    b. What is the probability that none are conservative?

    c. What is the probability that two are middle of the road?

    d. What is the probability that at least eight are liberal?

(b) A doctor has decided to prescribe two new drugs to 200 heart patients as follows: 50 get   **07** drug A, 50 get drug B, and 100 get both. The 200 patients were chosen so that each had an 80 percent chance of having a heart attack if given neither drug. Drug A reduces the probability of a heart attack by 35 percent, drug B reduces the probability by 20 percent, and the two drugs, when taken together, work independently. If a randomly selected patient in the program has a heart attack, what is the revised probability that the patient was given both drugs?

OR

Q.3 (a) A brand manager is concerned that her brand's share may be unevenly distributed   **07** throughout the country. In a survey in which the country was divided into four geographic regions, a random sampling of 100 consumers in each region was surveyed. Below table shows the observed and expected frequencies. At $\alpha = 0.05$, test whether brand share is the same across the four regions.

	Region				
	NE	NW	SE	SW	Total (Observed Frequencies
Purchasers					
Observed	40	55	45	50	190
Expected	47.5	47.5	47.5	47.5	-
Non Purchasers					
Observed	60	45	55	50	210
Expected	52.5	52.5	52.5	52.5	-
Total (Observed Frequencies)	100	100	100	100	400

(b) A large hospital hires most of its nurses from the two major universities in the area. Over   **07** the last year, they have been giving a test to the newly graduated nurses entering the

hospital to determine which school, if either, seems to educate its nurses better. Based on the following scores (out of 100 possible points), help the personnel office of the hospital determine whether the schools differ in quality. Use the Mann-Whitney U test with a 10 percent level of significance.

Test Scores

School A	97	69	73	84	76	92	90	88	84	87	93	-	-
School B	88	99	65	69	97	84	85	89	91	90	87	91	72

Q.4 (a) The following are ratings of aggressiveness (X) and amount of sales in the last year (Y) for eight salespeople. Is there a significant rank correlation between the two measures as per Spearman's rank correlation? Use the 0.10 significance level. **07**

X	30	17	35	28	42	25	19	29
Y	35	31	43	46	50	32	33	42

(b) The vice president of marketing brought to the attention of sales managers that most of the company's manufacturer representatives contacted clients and maintained client relationships in a disorganized, haphazard way. The sales managers brought the reps in for a three-day seminar and training session on how to use an organizer to schedule visits and recall pertinent information about each client more effectively. Sales reps were taught how to schedule visits most efficiently to maximize their efforts. Sales managers were given data on the number of site visits by sales reps on a randomly selected day both before and after the seminar. Use the following data to test whether significantly more site visits were made after the seminar ($\alpha = 0.05$). Assume the differences in the number of site visits are normally distributed. **07**

Before	After
2	4
4	5
1	3
3	3
4	3
2	5
2	6
3	4
1	5

OR

Q.4 (a) Explain difference between various bivariate tests and multivariate tests with proper examples. **07**

(b) Write short note on Multidimensional scaling. **07**

Q.5 It seems logical that restaurant chains with more units (restaurants) would have greater sales. This assumption is mitigated, however, by several possibilities: some units may be more profitable than others, some units may be larger, some units may serve more meals, **14**

and some units may serve more expensive meals, and so on. The data shown here were published by Technomic.

How strong is the relationship?

Sales(y)	Number of Units(x)
17.1	12.4
7.9	7.5
4.8	6.8
4.7	8.7
4.6	4.6
4.0	5.1
2.9	11.2
2.7	5.1
2.7	2.9

(a) Perform a simple regression analysis to predict a restaurant chain's sales by its number of units.

(b) Calculate Sum of squares of error.

OR

Q.5 (a) Calculate Standard error of estimate. 07

(b) Calculate coefficient of determination. 07

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