

**GUJARAT TECHNOLOGICAL UNIVERSITY****MCA - SEMESTER– III EXAMINATION – WINTER 2018****Subject Code: 630003****Date: 04-01-2019****Subject Name: Statistical Methods****Time: 10.30 am to 1.00 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)** Define briefly the following terms: **07**
- i) Mean
  - ii) Histogram
  - iii) Mutually exclusive events
  - iv) Judgment sampling method
  - v) Skewness
  - vi) Confidence interval
  - vii) Correlation
- (b)** Consider a sample with data values 27, 25, 20, 15, 30, 34, 28 and 25. Compute Mean, Median, Standard Deviation and Interquartile Range. **07**
- Q.2 (a)** For the following data obtain correlation coefficient. **07**
- |   |    |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|----|
| X | 12 | 14 | 15 | 13 | 15 | 16 | 18 | 12 | 14 | 16 |
| Y | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
- (b)** Given the probabilities of three events, A, B, and C, occurring are  $P(A) = 0.35$ ,  $P(B) = 0.45$ , and  $P(C) = 0.2$ . Assuming that A, B, or C has occurred, the probabilities of another event, X, occurring are  $P(X/A) = 0.8$ ,  $P(X/B) = 0.65$ , and  $P(X/C) = 0.3$ . Find  $P(A/X)$ ,  $P(B/X)$ , and  $P(C/X)$ . **07**
- OR**
- (b)** Explain briefly any four probabilistic sampling methods and three non-probabilistic sampling methods. **07**
- Q.3 (a)** Consider a sample with data values of 27, 25, 20, 15, 30, 34, 28 and 25. **07**
- (i) Provide the five number summaries for the data.
  - (ii) Show the Box Plot for the data.
- (b)** Passengers arrive randomly and independently at the passenger-screening facility at a major international airport. The mean arrival rate is 10 passengers per minute. Compute the probability of no arrivals in a 15 second period. **07**
- OR**
- Q.3 (a)** In a sample of 500 people from a village, 280 are found to be rice eaters and the rest are wheat eaters. Can we assume that both the food articles are equally popular? **07**
- (b)** The probability that a person has a mobile phone is 0.60, the probability that a person has a credit-card is 0.50 and the probability that a person has mobile phone and a credit card is 0.20. Find the probability that (1) The person has mobile phone but not credit card. (2) The person has at least one of them. **07**
- Q.4 (a)** The weights of items produced by a company are normally distributed with a mean of 45 gm and a standard deviation of 3 gm. What is the probability that a randomly selected item from the production will weigh at least 42 gm? **07**
- (b)** A TV-documentary on overeating claimed that Indians are about 10 pounds overweight on average. To test this claim, eighteen randomly selected individuals were examined; their average excess weight was found to be 12.4 **07**

pounds, and the standard deviation was 2.7 pounds. At a significance level of 0.01, is there any reason to doubt the validity of the claimed 10- pound value?

**OR**

- Q.4 (a)** A credit insurance organization has developed a new high-tech method of training new sales personnel. The company sampled 16 employees who were trained the original way and found average daily sales to be Rs.688 and the sample standard deviation was Rs.32.63. They also sampled 11 employees who were trained using the new method and found average daily sales to be Rs.706 and the sample standard deviation was Rs.24.84. At  $\alpha = 0.05$ , can the company conclude that average daily sales have increased under the new plan? **07**
- (b)** Give Difference between (i) One tailed and two tailed test (ii) Type-I and Type-II Error. **07**

- Q.5 (a)** Eleven sales executive trainees are assigned selling jobs right after their recruitment. After a fortnight they are withdrawn from their field duties and given a month's training for executive sales. Sales executed by them in thousands of rupees before and after the training, in the same period are listed below: **07**

Sales After training	14	15	17	18	14	19	20	23	24	25
Sales Before training	10	8	9	6	12	21	14	22	17	19

Test at 5% level of significance, Do these data indicate that the training has contributed to their performance?

- (b)** Two different areas of a large eastern city are being considered as sites for day-care centers. Of 200 households surveyed in one section, the proportion in which the mother worked full-time was 0.52. In another section, 40 percent of the 100 households surveyed had mothers working at full-time jobs. At the 0.04 level of significance, is there a significant difference in the proportions of working mothers in the two areas of the city? **07**

**OR**

- Q.5 (a)** Given the data for two variables x and y. **07**

X	2	4	6	8	10
Y	15	18	20	25	34

- a. Develop an estimated regression equation for these data.  
 b. Compute the residuals.  
 c. Develop a plot of the residuals against the independent variable x.  
 Do the assumptions about the error terms seem to be satisfied?

- (b)** From the given data below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment: **07**

	No. of patients		
	Favorable	Not favorable	Total
New	140	30	170
conventional	60	20	80
total	200	50	250

( Given for the d.o.f. = 1, chi square 5% = 3.84)

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