Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA (INTEGRATED) - SEMESTER–III EXAMINATION – WINTER 2020

Subject Code:2638602   **Date:10/02/2021**
Subject Name:Basic Statistics
Time:10:30 AM TO 12:30 PM   **Total Marks: 56**

Instructions:
1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks**

Q1 **(a)** Define the following   **07**
    1) Sample Space
    2) Mutually exclusive events
    3) Stratified sampling
    4) Null Hypothesis
    5) Type I & Type 2 error
    6) Correlation
    7) Bar Chart

(b) A data set contains the following seven values.   **07**

    X: 6   2   4   9   1   3   5

    a) Find the mean absolute deviation.
    b) Find the population variance.
    c) Find the population standard deviation.
    d) Find the interquartile range.
    e) Coefficient of variation
    f) Q2 (second quartile)
    g) 50th percentile

Q2 **(a)** The prior probabilities for events A1, A2, and A3 are P(A1) = 0.20, P(A2) = 0.50,   **07**
    and P(A3) = 0.30. The conditional probabilities of event B given A1, A2, and A3
    are P(B/A1) = 0.50, P(B/A2) = 0.40, and P(B /A3) = 0.30. Use the tabular approach
    to applying Bayes' theorem to compute P(A1/B), P(A2/B) and P(A3/B).

(b) Suppose that IQ scores of students have a bell-shaped distribution with a mean of   **07**
    100 and a standard deviation of 15.
    1. What percentage of people should have an IQ score between 85 and 115?
    2. What percentage of people should have an IQ score between 70 and 130

Q3 **(a)** A 95% confidence interval for a population mean was reported to be 152 to 160.   **07**
    If $\sigma = 15$, what sample size was used in this study?

(b) Fifty percent of Indians believed the country was in a recession, due to COVID 19   **07**
    the economy had shown two straight quarters of negative growth. For a sample of
    20 Indians, make the following calculations.

a. Compute the probability that exactly 12 people believed the country was in a recession.

b. Compute the probability that no more than five people believed the country was in a recession.

c. How many people would you expect to say the country was in a recession?

Q4 **(a)**

	Northeast (D)	Southest (E)	Midwest (F)	West (G)	
Finance (A)	0.12	0.05	0.04	0.07	0.28
Manufacturing (B)	0.15	0.03	0.11	0.06	0.35
Communication (C)	0.14	0.09	0.06	0.08	0.37
	0.41	0.17	0.21	0.21	1.00

07

Find **a.** P (B / F)   **b.** P (G / C)

(b) The time between arrivals of vehicles at a particular intersection follows an exponential probability distribution with a mean of 12 seconds.

a. What is the probability that the arrival time between vehicles is 12 seconds or less?

b. What is the probability of 30 or more seconds between vehicle arrivals?

07

Q5 **(a)** Determine the value of the coefficient of determination, for the following data.   **07**

$$X :\ 1\ \ 2\ \ 3\ \ 4\ \ \ 5$$
$$Y :\ 3\ \ 7\ \ 5\ \ 11\ \ 14$$

(b) Explain Types of Sampling   **07**

Q6 **(a)** If a population proportion is 0.28 and if the sample size is 140, 30% of the time the sample proportion will be less than what value if you are taking random samples?   **07**

(b) A department of transportation's study on driving speed and miles per gallon for midsize automobiles resulted in the following data: **07**

Speed	30	50	40	55	30	25	60	25	50	55
Miles	28	25	25	23	30	32	21	35	26	25

Compute and interpret the sample correlation coefficient.

Q7 **(a)** A survey was taken of U.S. companies that do business with firms in India. One of the questions on the survey was: Approximately how many years has your company been trading with firms in India? A random sample of 44 responses to this question yielded a mean of 10.455 years. Suppose the population standard deviation for this question is 7.7 years. Using this information, construct a 90% confidence interval for the mean number of years that a company has been trading in India for the population of U.S. companies trading with firms in India.   **07**

(b) A random sample of size 20 is taken, resulting in a sample mean of 16.45 and a sample standard deviation of 3.59. Assume x is normally distributed and use this information and $\alpha = 0.5$ to test the following hypotheses.   **07**

$$Ho : \mu = 16 \qquad Ha: \mu \neq 16$$

Q8 **(a)** Bank customers arrive randomly on weekday afternoons at an average of 3.2 **07** customers every 4 minutes. What is the probability of having more than 7 customers in a 4-minute interval on a weekday afternoon?

(b) The following sample data are from a normal population: 10, 8, 12, 15, 13, 11, 6, **07** 5.

a. With 95% confidence, what is the margin of error for the estimation of the population mean?

b. What is the 95% confidence interval for the population mean?

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