

Enrolment No. /Seat No.: \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**MCA INTEGRATED – SEMESTER III- EXAMINATION –SUMMER-2025**

**Subject Code: 2638602**

**Date: 17/06/2025**

**Subject Name: Basic Statistics**

**Time:02:30 PM TO 05:00 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) Define: Statistics. Explain in detail different scales of measurement. **07**  
(b) For each class interval of the frequency distribution given, determine the class midpoint, the relative frequency and the cumulative frequency: **07**

Class	Frequency
0-under 5	6
5-under 10	8
10-under 15	17
15-under 20	23
20-under 25	18
25-under 30	10
30-under 35	4
Totals	86

- Q.2** (a) Find the value of the Coefficient of Correlation (r) for the following data: **07**

X	158	296	87	110	436
Y	349	510	301	322	550

- (b) The U.S. Energy Department states that 60% of all U.S. households have ceiling fans. In addition, 29% of all U.S. households have an outdoor grill. Suppose 13% of all U.S. households have both a ceiling fan and an outdoor grill. A U.S. household is randomly selected.
- a. What is the probability that the household has a ceiling fan or an outdoor grill?
  - b. What is the probability that the household has neither a ceiling fan nor an outdoor grill?
  - c. What is the probability that the household does not have a ceiling fan and does have an outdoor grill?
  - d. What is the probability that the household does have a ceiling fan and does not have an outdoor grill?

**OR**

- Q.2** (b) In a manufacturing plant, machine A produces 10% of a certain product, machine B produces 40% of this product and machine C produces 50% of this product. 5% of machine A products are defective, 12% of machine B products are defective and 8% of machine C products are defective. The company inspector has just sampled a product from this plant and has found

it to be defective. Determine the revised probabilities that the sampled product was produced by machine A, machine B or machine C.

- Q.3 (a)** An increasing number of consumers believe they have to look out for themselves in the marketplace. According to a survey conducted by the Yankelovich Partners for USA WEEKEND magazine, 60% of all consumers have called an 800 or 900 telephone number for information about some product. Suppose a random sample of 25 consumers is contacted and interviewed about their buying habits. **07**
- a. What is the probability that 15 or more of these consumers have called an 800 or 900 telephone number for information about some product?
- b. What is the probability that more than 20 of these consumers have called an 800 or 900 telephone number for information about some product?
- c. What is the probability that fewer than 10 of these consumers have called an 800 or 900 telephone number for information about some product?
- (b)** In a recent year, the average price of a Microsoft Windows Upgrade was \$90.28 according to PC Data. Assume that prices of the Microsoft Windows Upgrade that year were Normally Distributed, with a standard deviation of \$8.53. If a retailer of computer software was randomly selected that year: **07**
- a. What is the probability that the price of a Microsoft Windows Upgrade was below \$80?
- b. What is the probability that the price was above \$95?
- c. What is the probability that the price was between \$83 and \$87?

**OR**

- Q.3 (a)** A pen company averages 1.2 defective pens per carton produced (200 pens). The number of defects per carton is Poisson Distributed. **07**
- a. What is the probability of selecting a carton and finding no defective pens?
- b. What is the probability of finding eight or more defective pens in a carton?
- c. Suppose a purchaser of these pens will quit buying from the company if a carton contains more than three defective pens. What is the probability that a carton contains more than three defective pens?
- (b)** The average length of time between arrivals at a turnpike tollbooth is 23 seconds. Assume that the time between arrivals at the tollbooth is Exponentially Distributed. **07**
- a. What is the probability that a minute or more will elapse between arrivals?
- b. If a car has just passed through the tollbooth, what is the probability that no car will show up for at least 3 minutes?

- Q.4 (a)** A population is normally distributed, with a mean of 23.45 and a standard deviation of 3.8. What is the probability of each of the following? **07**
- a. Taking a sample of size 10 and obtaining a sample mean of 22 or more?
- b. Taking a sample of size 4 and getting a sample mean of more than 26?
- (b)(i)** For a random sample of 36 items and a sample mean of 211, compute a 95% confidence interval for  $\mu$  if the population standard deviation is 23. **04**
- (b)(ii)** A national beauty salon chain wants to estimate the number of times per year a woman has her hair done at a beauty salon if she uses one at least once a year. The chain's researcher estimates that, of those women who use a beauty salon at least once a year, the standard deviation of number of times of usage is approximately 6. The national chain wants the estimate to be within one time of the actual mean value. How large a sample should the researcher take to obtain a 98% confidence level? **03**

**OR**

- Q.4 (a)** According to a survey by Accountemps, 48% of executives believe that **07**

employees are most productive on Tuesdays. Suppose 200 executives are randomly surveyed.

- What is the probability that fewer than 90 of the executives believe employees are most productive on Tuesdays?
- What is the probability that more than 100 of the executives believe employees are most productive on Tuesdays?
- What is the probability that more than 80 of the executives believe employees are most productive on Tuesdays?

**(b)(i)** A national survey of insurance offices was taken, resulting in a random sample of 245 companies. Of these 245 companies, 189 responded that they were going to purchase new software for their offices in the next year. Construct a 90% confidence interval to estimate the population proportion of insurance offices that intend to purchase new software during the next year. **04**

**(b)(ii)** A research firm has been asked to determine the proportion of all restaurants in the state of Ohio that serve alcoholic beverages. The firm wants to be 98% confident of its results but has no idea of what the actual proportion is. The firm would like to report an error of no more than 0.05. How large a sample should it take? **03**

**Q.5 (a)(i)** Use the data given to test the following hypotheses. Assume the data are normally distributed in the population. **04**

$$H_0: \mu = 1200, H_a: \mu \geq 1200$$

$$\bar{x} = 1215, n = 113, \sigma = 100, \alpha = 0.10$$

**(a)(ii)** A random sample of 51 items is taken, with  $\bar{x} = 58.42$  and  $s^2 = 25.68$  and Use these data to test the following hypotheses, assuming you want to take only a 1% risk of committing a Type I error and that  $x$  is normally distributed. **03**

**(b)** Sketch a scatter plot from the following data and determine the equation of the regression line: **07**

x:	12	21	28	8	20
y:	17	15	22	19	24

**OR**

**Q.5 (a)(i)** Use the data given to test the following hypotheses. Assume the data are normally distributed in the population. **04**

$$H_0: \mu = 7.48, H_a: \mu < 7.48$$

$$\bar{x} = 6.91, n = 24, \sigma = 1.21, \alpha = 0.01$$

**(a)(ii)** 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  $\alpha = 0.05$  to test the following hypotheses. **03**

$$H_0: \mu = 16, H_a: \mu \neq 16$$

**(b)** Determine the equation of the least squares regression line to predict  $y$  from the following data and Determine the Coefficient of Determination ( $r^2$ ). **07**

x:	213	196	184	202	221	247
y:	76	65	62	68	71	75

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