GUJARAT TECHNOLOGICAL UNIVERSITY

MCA – SEMESTER II- EXAMINATION –SUMMER-2025

Subject Code: 629409   **Date: 05/06/2025**
Subject Name: Statistical Methods
Time:10:30 AM TO 01:00 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)**	**Answer following:**	**03**
		1. Define ogive.	
		2. _____ defines the amount of peakedness of a distribution.	
		3. Describe probability.	
	(b)	Explain inferential statistics and descriptive statistics.	**04**
	(c)	Determine the class midpoint, relative frequency and cumulative frequency for the following frequency distribution.	**07**

Class Interval	Frequency
20 – 25	8
25 – 30	6
30 – 35	5
35 – 40	12
40 – 45	15
45 – 50	7

Q.2	**(a)**	For Given data, solve following:

07

Class Interval	Frequency
18 - 24	17
24 - 30	22
30 - 36	26
36 - 42	35
42 - 48	33
48 - 54	30
54 - 60	32
60 - 66	21
66 - 72	15

        a.   Calculate the mean of data.
        b.   Calculate the mode.
        c.   Calculate the variance.
        d.   Calculate the standard deviation.

	(b)	Explain data measurement levels in brief.	**07**

<div align="center">OR</div>

	(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	**07**

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?

Q.3 **(a)** Discuss Poisson distribution with its characteristics. List out scenarios in which the **07** Poisson distribution is applicable.

(b) According to a study by Decision Analyst, 21% of the people who have credit cards **07** are very close to the total limit on the cards. Suppose a random sample of 600 credit card users is taken. What is the probability that more than 150 credit card users are very close to the total limit on their cards?

OR

Q.3 **(a)** Suppose a production facility purchases a particular component part in large lots from **07** a supplier. The production manager wants to estimate the proportion of defective parts received from this supplier. He believes the proportion defective is no more than .20 and wants to be within .02 of the true proportion of defective parts with a 90% level of confidence. How large a sample should he take?

(b) Describe sampling. Enlist and explain random sampling techniques. **07**

Q.4 **(a)** According to one report, the average weekly earnings of a production worker in 1997 **07** were $424.20. Suppose a labor researcher wants to test to determine whether this figure is still accurate today. The researcher randomly selects 54 production workers and obtains a representative earnings statement for one week from each. The resulting sample average is $432.69. Assuming a population standard deviation of $33.90, and a 5% level of significance, determine whether the mean weekly earnings of a production worker have changed.

(b) Explain type I and type II errors in detail. **07**

OR

Q.4 **(a)** Previous experience shows the variance of a given process to be 14. Researchers are **07** testing to determine whether this value has changed. They gather the following dozen measurements of the process. Use these data and $\alpha = 0.05$ to test the null hypothesis about the variance. Assume the measurements are normally distributed.

| 52 | 44 | 51 | 58 | 48 | 49 |
| 38 | 49 | 50 | 42 | 55 | 51 |

(b) Determine the equation of regression line for below data. **07**

x	15	8	19	12	5
y	47	36	56	44	21

Q.5 **(a)** Given $\hat{y} = 1.57 + .0407x$ and following data: **07**

x	61	63	67	69	70	74	76	81	86	91	95	97
y	4.28	4.08	4.42	4.17	4.48	4.3	4.82	4.7	5.11	5.13	5.64	5.56

Compute sum of squares of error and standard error of estimate.

(b) x is uniformly distributed over a range of values from 8 to 21. **07**

a. What is the value of f (x) for this distribution?

    b. Determine the mean and standard deviation of this distribution.

    c. Probability of $(10 \leq x < 17) = ?$

    d. Probability of $(x < 22) = ?$

    e. Probability of $(x \geq 7) = ?$

OR

Q.5 **(a)** Compute correlation coefficient for following data: **07**

X	4	6	7	11	14	17	21
Y	18	12	13	8	7	7	4

(b) A random sample of 15 items is taken, producing a sample mean of 2.364 with a **07** sample variance of .81. Assume x is normally distributed and construct a 90% confidence interval for the population mean.

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