

**GUJARAT TECHNOLOGICAL UNIVERSITY****MCA – SEMESTER-IV EXAMINATION –SUMMER-2020****Subject Code:4649302****Date:05-11-2020****Subject Name:Statistical Methods (SM)****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.**

- Q.1 (a)** Answer the following.
- (i) If Standard deviation = 8 and Coefficient of variation = 64% then compute mean. **02**
- (ii) Define (1) Mutually Exclusive Events (2) Exhaustive Events. **02**
- (iii) Assume that you have a binomial experiment with  $p = 0.8$  and a sample size of 100. What is the value of variance of this distribution? **01**
- (iv) List applications of statistics in business and economics. **02**
- (b)(i)** Consider a sample with data values 5, 9, 16, 17 and 18. Compute variance And standard deviation. **04**
- (ii)** Explain Types of data measurement with appropriate example. **03**

- Q.2 (a)(i)** The following data show the number of hours worked by 400 statistics students. **04**

Number of Hours	Frequency
0 - 9	20
10 - 19	80
20 - 29	200
30 - 39	100

Referring above data Find:

1. The number of students working 19 hours or less.
  2. The percentage of students who work at least 10 hours per week.
  3. The cumulative relative frequency for the class of 20 – 29.
  4. The midpoint of the last class.
- (ii)** An MCA applies for job in two companies X and Y. The probability of his being selected in company X is 0.7 and being rejected at Y is 0.5. The probability of at least one of his applications being rejected is 0.6. What is the probability that he will be selected in one of the companies? **03**
- (b)** A department of transportation's study on driving speed(X) and mileage(Y) for midsize automobiles resulted in the following data: **07**

X	30	50	40	55	30	25	60	25	50	55
Y	28	25	25	23	30	32	21	35	26	25

Compute and interpret the correlation coefficient for the above data.

**OR**

- (b)** i) Write Properties of Poisson distribution. **04**
- ii) Write characteristics of the normal distribution. **03**

- Q.3 (a)** Ten percent of the screws produced by automatic machine are defective. **07**  
 A random sample of Twenty screws is selected.  
 (i) What is the probability that the sample contains exactly 3 defective?  
 (ii) What is the probability that the sample contains at most 4 defective?  
 (iii) What is the probability that the sample contains at least 5 defective?  
 (iv) What is the expected number of defective in the sample?
- (b)** Explain different sampling methods. **07**

**OR**

- Q.3 (a)** A study by the Parents' television Council showed that 80% of movie commercials aired on network television between 8 and 9 pm (the prime family viewing hours) were for R-rated films. Answer the following questions: **07**  
 (i). Find the probability that in 10 commercials during this time slot, at least 9 will be R-rated films.  
 (ii). Find the probability that in 10 commercials during this time slot, at most 8 will be R-rated films.

- (b)** A survey was taken of U.S. companies that do business with firms in India. **07**  
 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.

- Q.4 (a)** A U.S. car rental firm wants to estimate the average number of miles traveled per day by each of its cars rented in California. A random sample of 20 cars rented in California reveals that the sample mean travel distance per day is 85.5 miles, with a population standard deviation of 19.3 miles. Compute a 99% confidence interval to estimate  $\mu$ . **07**

- (b)** (i) Describe Type I and Type II errors. **03**  
 (ii) A new brand of chocolate bar is being market tested. Four hundred of the new chocolate bars were given to consumers to try. The consumers were asked whether they liked or disliked the chocolate bar. You are given their responses below. **04**

Response	Frequency
Liked	300
Disliked	100

Construct a 98% confidence interval for the true proportion of people who liked the chocolate bar.

**OR**

- Q.4 (a)** The monthly starting salaries for a sample of 12 graduates are given as: **07**  
 3310,3355,3450,3480,3480,3490,3520,3540,3550,3650,3730,3925.  
 (i) Provide a Five - Number Summary.  
 (ii) Show a box plot.  
 (iii) Is there any outlier?

- (b) A survey of CPAs across the United States found that the average net income for sole proprietor CPAs is \$74,914. Because this survey is now more than ten years old, an accounting researcher wants to test this figure by taking a random sample of 112 sole proprietor accountants in the United States to determine whether the net income figure changed. CPAs who respond produce a sample mean of \$78,695. The researcher could use hypothesis testing to do so. Assume the population standard deviation of net incomes for sole proprietor CPAs is \$14,530. (use  $\alpha=0.5$ ) **07**

- Q.5 (a)** 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. (use critical  $t_{.025,19} = \pm 2.093$ ) **07**

$$H_0: \mu = 16$$

$$H_a: \mu \neq 16$$

- (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)** Assume you have noted the following prices for books and the number of pages that each book contains. **07**

Book	A	B	C	D	E	F	G
Pages (x)	500	700	750	590	540	650	480
Price (y) (in \$)	7	7.5	9	6.5	7.5	7	4.5

- (i) Use the method of least squares to compute an estimated regression line between the price and the number of pages. **07**
- (ii) Compute SST, SSR, and SSE.
- (iii) Compute the coefficient of determination.
- (b) Use the following sample information to construct a 90% confidence interval for the difference in the two population means.

Sample 1

$$n_1 = 32$$

$$\bar{x}_1 = 70.4$$

$$\sigma_1 = 5.76$$

Sample 2

$$n_2 = 31$$

$$\bar{x}_2 = 68.7$$

$$\sigma_2 = 6.1$$

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