

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA– SEMESTER –IV EXAMINATION –SUMMER-2019

Subject Code:4649302**Date: 16-05-2019****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)** Do as directed : **07**
- i) List applications of statistics in business and economics.
 - ii) Consider a sample with data values of 17, 15, 20, 25, 30, 34, 28 and 35, then what is 65th percentile?
 - iii) 'The middle 50% data lie in the inter quartile range.' - explain validity/invalidity of this statement.
 - iv) Find Standard deviation for binomial distribution if $n=10$ and $p=0.3$.
 - v) If $\sigma = 9.65$ and error is 2 then at 95% confidence level, then what will be the sample size? (You may take the critical value as 1.96).
 - vi) If 'A' and 'B' are mutually exclusive events, then what is the value of $P(A \cap B)$?
 - vii) Explain Type- II error.
- (b)**
- i) Consider a sample with data values 27, 25, 20, 15, 30, 34, 28 and 25. Compute the range, interquartile range, variance and standard deviation. **04**
 - ii) Explain Types of data measurement with appropriate example. **03**
- Q.2 (a)** A data firm records a large amount of data. Historically, 0.9% of the pages of data recorded by the firm contain errors. If 150 pages of data are randomly selected, **07**
- i) What is the probability that five or more pages contain errors?
 - ii) What is the probability that more than 10 pages contain errors?
 - iii) What is the probability that none of the pages contain errors?
 - iv) What is the probability that fewer than six pages contain errors?
- (b)**
- i) Write properties of binomial distribution. **04**
 - ii) Differentiate between discrete random variable and continuous random variable with example. **03**
- OR**
- (b)**
- i) Write Properties of Poisson distribution. **04**
 - ii) Write characteristics of the normal distribution. **03**
- Q.3 (a)** i) The following table provides a probability distribution for the random variable x . **04**

x	2	4	7	8
$f(x)$	0.20	0.30	0.40	0.10

Compute $E(x)$, $Var(x)$ and σ .

- ii) A population has a mean of 50 and a standard deviation of 10. If a random sample of 64 is taken, what is the probability that the sample mean is each of the following? **03**
- Greater than 52
 - Less than 51
 - Between 48.5 and 52.4

- (b) Use the following data to construct 90% and 95% confidence intervals to estimate the population variance. Assume the data come from a normally distributed population. **07**

212 229 217 216 223 219 208 214 232 219

OR

- Q.3 (a)** i) Assume that the test scores from a college admissions test are normally distributed, with a mean of 450 and a standard deviation of 100. **04**
- What percentage of the people taking the test score between 400 and 500 ?
 - If a particular university will not admit anyone scoring below 480, what percentage of the persons taking the test would be acceptable to the university?

- ii) A random sample of 100 items is taken, producing a sample mean of 49. The population standard deviation is 4.49. Construct a 90% confidence interval to estimate the population mean. **03**

- (b) Explain different sampling methods. **07**

- Q.4 (a)** A simple random sample with $n = 54$ provided a sample mean of 22.5 and a sample standard deviation of 4.4 **07**

- Develop a 90% confidence interval for the population mean.
- Develop a 95% confidence interval for the population mean.
- Develop a 99% confidence interval for the population mean.
- What happens to the margin of error and the confidence interval as the confidence level is increased?

- (b) The sales data of an items in 6 shops before and after a special promotional campaign are as under: **07**

Shop	1	2	3	4	5	6
Sales Before campaign	53	28	31	48	50	42
Sales After campaign	58	29	30	55	56	45

Use the 'paired t-test' and check whether the promotional campaign can be judged as a success (i.e. have the sales increased after the promotional campaign?). Use 5% level of significance.

OR

- Q.4 (a)** About 28% of private companies are owned by women (The Cincinnati Enquirer, January 26, 2006). Answer the following questions based on a sample of 240 private companies. **07**

- Show the sampling distribution of \bar{p} , the sample proportion of companies that are owned by women.
- What is the probability the sample proportion will be within ± 0.04 of the population proportion?
- What is the probability the sample proportion will be within ± 0.02 of the population proportion?

- (b) Two laboratories A and B carry out estimates of fat content in ice-cream made by a firm. A sample is taken from each batch, halved, and the separated halves sent to the two laboratories. The fat content obtained by laboratories is recorded below: 07

Batch No.	1	2	3	4	5	6	7	8	9	10
Lab A	7	8	7	3	8	6	9	4	7	8
Lab B	9	8	8	4	7	7	9	6	6	6

Is there a significant difference between the mean fat content obtained by the two laboratories A and B? Justify your answer.

- Q.5** (a) i) A drug is given to 10 patients and the increments in their blood pressure were recorded to be 3, 6, -2, 4, -3, 4, 6, 0, 0, 2. Is it reasonable to believe at 5% level of significance, that the drug has no effect on blood pressure? 03
- ii) Given are five observations for two variables, x and y. 04

x_i	1	2	3	4	5
y_i	3	7	5	11	14

- Develop a scatter diagram for these data.
- What does the scatter diagram developed in part (a) indicate about the relationship between the two variables?
- Develop the estimated regression equation by computing the values of b_0 and b_1 .
- Use the estimated regression equation to predict the value of y when $x=4$.

- (b) For the below given data on share prices of two companies, 07

Week	1	2	3	4	5	6	7	8	9	10
x (MUL)	10425	10220	9862	10367	9929	10595	11113	10922	11111	10306
y (M&M)	1387	1346	1333	1409	1395	1464	1527	1499	1516	1357

- Obtain the regression equation of variable 'y' dependent on variable 'x'.
- Obtain and comment on the goodness of the fit of the above equation.

OR

- Q.5** (a) i) The mean height obtained from a random sample of size 100 is 64 inches. The standard deviation of the distribution of height of the population is known to be 3 inches. Test the statement that the mean height of the population is 67 inches at 1% level of significance. 04

- ii) Consider following data.

X_i	3	12	6	20	14
Y_i	55	40	55	10	15

The estimated regression equation for these data is $\hat{y} = 68 - 3x$.
Compute SSE, SST, and SSR. 03

- (b) Given the data for two variables x and y 07

x_i	6	11	15	18	20
y_i	6	8	12	20	30

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