

**GUJARAT TECHNOLOGICAL UNIVERSITY****MCA - SEMESTER-IV • EXAMINATION – SUMMER • 2019****Subject Code: 3640001****Date: 14/05/2019****Subject Name: Basic Statistics****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.

- Q.1 a.** 1. Define the terms: 1. Inter Quartile Range, 2. Histogram, 3. Hypothesis 3  
 2. Write True/False with justification 4
1.  $r$  is negative when both the variables are decreasing.
  2. The normal distribution with  $X=0$  and  $\sigma=1$  is known as standard normal distribution.
  3. Type I error is an error committed by the test in accepting a true null hypothesis.
  4. Degrees of freedom in case of two samples of sizes 50 and 60 are 108.

- b.** 1. Construct a Stem-and-leaf display for following data. 4

|    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|
| 70 | 72 | 75 | 64 | 58 | 83 | 80 | 82 |
| 76 | 75 | 68 | 65 | 57 | 48 | 85 | 72 |

Construct a frequency distribution.

2. Consider a sample with data values of 10, 20, 21, 17, 16 and 12 compute the mean and median. 3  
**Q.2 a.** Use the following information to construct the confidence interval specified to estimate  $\mu$ . 7

| Confidence | Sample mean | Standard deviation | Size      |          |
|------------|-------------|--------------------|-----------|----------|
| 95%        | 25          | $\sigma = 3.5$     | $n = 60$  |          |
| 98%        | 119.6       | $s = 23.89$        | $n = 75$  |          |
| 90%        | 3.419       | $s = 0.974$        | $N = 500$ | $n = 47$ |

- b.** For the following data draw Box and Whisker Plot. 7

|    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|
| 71 | 87 | 82 | 64 | 72 | 75 | 81 | 69 |
| 76 | 79 | 65 | 68 | 80 | 73 | 85 | 71 |
| 70 | 79 | 63 | 62 | 81 | 84 | 77 | 73 |
| 82 | 74 | 74 | 73 | 84 | 72 | 81 | 65 |
| 74 | 62 | 64 | 68 | 73 | 82 | 69 | 71 |

**OR**

- b.** A sample of 12 small accounting firms reveals the following numbers of professionals per office. 7

|   |    |   |    |    |   |
|---|----|---|----|----|---|
| 7 | 10 | 9 | 14 | 11 | 8 |
| 5 | 12 | 8 | 3  | 13 | 6 |

1. Determine the variance.
2. Determine the standard deviation.
3. Determine the interquartile range.
4. What is the z score for the firm that has six professionals?
5. What is the coefficient of variation for this sample?

- Q.3 a.** 1. Bring out the fallacy, if any, in the following statements: 3

The mean of a Binomial Distribution is 15 and its standard deviation is 5.

2. Eight coins are thrown simultaneously. Find the chance of obtaining. 4

1. At least 6 heads
2. No heads
3. All heads

- b.** As a result of tests on 2,000 electric bulbs manufactured by a company it was found that the life time of the bulbs was normally distributed with an average life of 2,040 hours and standard deviation of 60 hours. On the basis of the information, estimate the number of the bulbs that are expected to burn for 1. More than 2,150 hours 2. Less than 1,960 hours. 7

**OR**

- Q.3 a.** 1. A bag contains 6 white, 4 red and 10 black balls. Two balls are drawn at random. Find the probability that they will both be black. 3  
 2. The probability that a man fishing at a particular place will catch 1, 2, 3, 4 fishes are 0.4, 0.3, 0.2, and 0.1 respectively. What is the expected number of fish caught? 4
- b.** Suppose that a manufactured product has 2 defects per unit of product inspected. Using poisson distribution, calculate the probabilities of finding a product without any defect, 3 defects and 4 defects. 7
- Q.4 a.** 1. List properties of point estimator. Explain any one in detail. 3  
 2. Determine the sample size needed to estimate mean with a margin of error of 2 or less than with 0.95 probability when the population standard deviation equals 11. 4
- b.** 1. Eighty five people in a random sample of 100 favored candidate A. compute 95% and 90% interval estimate for population proportion of people in favors of candidate A. 4  
 2. List properties of Normal Distribution. 3

**OR**

- Q.4 a.** Determine the sample size necessary to estimate p for the following information: 7

| Error of estimation    | Proportion             | Confidence level |
|------------------------|------------------------|------------------|
| E = 0.02               | p is approximately 0.4 | 96%              |
| E is to be within 0.04 | p is unknown           | 95%              |
| E is to be within 5%   | p is approximately 55% | 90%              |

- b.** Suppose you are testing  $H_0: p = 0.45$  and  $H_a: p > 0.45$ . A random sample of 310 people produces a value of sample proportion is 0.465. Use  $\alpha = 0.05$  to test this hypothesis. 7

- Q.5 a.** Given are the five observations for two variables x and y. 7

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| X | 2 | 4 | 5 | 7 | 8 |
| Y | 2 | 3 | 2 | 6 | 4 |

- a) Develop the estimated regression equation for these data.  
 b) use the estimated regression equation to predict the value of y when  $x=4$ .  
 c) Compute SST, SSE, and SSR.
- b.** Business week reported that 56% of the households in the United States have internet access. Use the population proportion  $p=0.56$  and assume that a sample of 300 households will be selected. 7
- a) Show the sampling distribution of sample proportion of households have internet access.  
 b) What is the probability that the sample proportion will be within  $\pm 0.03$  of the population proportion?

**OR**

- Q.5 a.** Sales of major appliances vary with the new housing market. A trade association compiled the following data on major appliances sale and housing market. 7

|                 |   |   |   |   |   |    |
|-----------------|---|---|---|---|---|----|
| Housing Market  | 2 | 3 | 4 | 4 | 5 | 5  |
| Appliance sales | 5 | 6 | 7 | 8 | 9 | 10 |

Develop an equation for relation between appliance sales (in thousands) and housing market (in thousands). Fit a suitable regression line.

- 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: 7

| 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?

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