Seat No.: _____                                    Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY
## MCA Integrated- SEMESTER– III EXAMINATION – WINTER 2019

**Subject Code: 4430603**                              **Date: 30/11/2019**
**Subject Name: Statistical Methods**
**Time: 10:30 AM TO 01:00 PM**                         **Total Marks: 70**
   1. Attempt all questions.
   2. Make suitable assumptions wherever necessary.
   3. Figures to the right indicate full marks.

**Q.1** **(a)** Define the following terms.                              **07**
   1) Correlation
   2) Independent Events
   3) Confidence Intervals
   4) Null Hypothesis

**(b)** For the following data obtain five number summary and also draw box plot.     **07**
22,25,23,28,32,19,28,29,35,38,36,39,42,15,23,24,26,27,28

**Q.2** **(a)** Write different levels of Data Measurements in brief.     **07**
**(b)** Obtain correlation coefficient for the following data:           **07**

| X | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|----|----|----|----|----|----|----|----|----|----|
| Y | 25 | 24 | 26 | 28 | 20 | 29 | 24 | 26 | 28 | 30 |

**OR**

**(b)** In a study of job satisfaction, a series of tests was administered to 50 subjects.     **07**
The following data were obtained: higher scores represent greater
dissatisfaction. Construct a stem-and-leaf display for the data.

| 77 | 57 | 82 | 31 | 80 | 66 | 48 | 49 | 40 | 65 |
|----|----|----|----|----|----|----|----|----|----|
| 70 | 60 | 59 | 78 | 75 | 71 | 63 | 51 | 36 | 87 |
| 40 | 71 | 65 | 55 | 67 | 37 | 77 | 50 | 82 | 61 |
| 60 | 43 | 51 | 74 | 60 | 64 | 33 | 79 | 73 | 36 |
| 74 | 68 | 59 | 68 | 64 | 66 | 54 | 66 | 57 | 54 |

**Q.3** **(a)** For events A and B , P (A' ∩ B) = 0.1, P (A∩B') = 0.4 and P (A' U B') = 0.6     **07**
Find the (1) P (A) (2) P (B) (3) P (A U B) (4) P (A' U B)

**(b)** Define the normal distribution.                              **07**
Marks of large number of students are distribution normally with mean 55 and
standard
Deviation 13. If a student is selected at random what is the probability that his
marks will be Between (1) 43 and 67 (2) 35 and 75 (3) More then 60

**OR**

**Q.3** **(a)** Phone calls arrive at the rate of 36 per hour at the reservation desk for Regional     **07**
airways.
 (1) Compute the probability of receiving three calls in a three minute interval of
time.
 (2) Compute the probability of receiving exactly 5 calls in ten minutes.
 (3) If no calls are being processed, what is the probability that the agent can
take two minutes for personal time without being interrupted by a call?

**(b)** (1) A psychologist determined that the number of sessions required obtaining     **07**
the trust of patient is either 1, 2 or 3. Let X be a random variable indicating the
number of sessions required to gain patient's trust. For given probability

function f(x) = x/6) where x=1, 2 or 3; compute expected value and variance of X.

(2) For two mutually events A and B having P(A)=0.3 and P(B)=0.4, compute P(AUB) and P(A|B).

**Q.4** **(a)** 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? **a.** Greater than 52 **b.** Less than 51 **c.** Less than 47 **d.** Between 48.5 and 52.4 **e.** Between 50.6 and 51.3          07

**(b)** A random sample of size 39 is taken from a population of 200 members. The sample mean is 66 and the population standard deviation is 11. Construct a 95% confidence interval to estimate the population mean.  What is the point estimate of the population mean?          07

**OR**

**Q.4** **(a)** Write brief note for different types of Sampling Methods.          07

**(b)** Suppose the following data are selected randomly from a population of normally distributed values.          07

40, 51, 43, 48, 44, 57, 54, 39, 42, 48, 45, 39, 43

Construct a 95% confidence interval to estimate the population mean.

**Q.5** **(a)** According to a study several years ago by the Personal Communications Industry Association, the average wireless phone user earns $62,600 per year. Suppose a researcher believes that the average annual earnings of a wireless phone user are lower now, and he sets up a study in an attempt to prove his theory. He randomly samples 18 wireless phone users and finds out that the average annual salary for this sample is $58,974, with a population standard deviation of $7810. Use $\alpha$ = .01 to test the researcher's theory. Assume wages in this industry are normally distributed.          07

**(b)** For the Following Data          07

| X | 1 2 | 1 3 | 1 5 | 1 1 | 1 8 |
|---|---|---|---|---|---|
| Y | 2 5 | 3 5 | 3 0 | 4 0 | 2 6 |

Calculate

(1)Develop a Scatter diagram for this data.

(2)Compute the estimated regression equation.

(3)Compute SSE, SST AND SSR.

(4)Compute the coefficient of determination $r^2$ and   comment on the goodness of fit.

**OR**

**Q.5** **(a)** Explain type I and type II errors.          07

**(b)** Develop a one-way ANOVA on the following data.          07

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| 113 | 120 | 132 | 122 |
| 121 | 127 | 130 | 118 |
| 117 | 125 | 129 | 125 |
| 110 | 129 | 135 | 125 |

Determine the observed $F$ value. Compare it to the critical $F$ value and decide whether to reject the null hypothesis. Use a 1% level of significance.

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