Seat No.: _____          Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY
## MCA - SEMESTER– III EXAMINATION – WINTER 2018

**Subject Code: 2630003**                                        **Date: 04-01-2019**
**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.**

| | | | |
|---|---|---|---|
| **Q1** | **A)** | What are applications of statistics in Business and Economics? | **07** |
| | **B)** | The prior probabilities for event A1 and A2 are P (A1) =0.40 and P (A2) =0.60. It is also known that P (A1∩A2) =0. Suppose P (B/A1) =0.20 and P (B/A2) =0.05 find | **04** |
| | |     a. Are A1 and A2 mutually exclusive | |
| | |     b. Compute (A1∩B) & (A2∩B) & P(B) | |
| | **C)** | Construct a stem & leaf display for the following data. Use a leaf unit of 10 | **03** |

          1161   1206   1478   1300   1604   1725   1361   1422
          1221   1378   1623   1426   1557   1730   1706   1689

| | | | |
|---|---|---|---|
| **Q2** | **A)** | Define sampling and methods of sampling? | **07** |
| | **B)** | Fifty percent of Americans believed the country was in a recession, even though technically the  economy had not shown two straight quarters of negative growth (*Business Week,* July 30, 2001).For a sample of 20 Americans, make the Following calculations. | **07** |

a. Compute the probability that exactly 12 people believed the country was in a recession.
b. Compute the probability that no more than five people believed the country was in a recession.
c. Compute the variance and standard deviation of the number of people who believed the country was in a recession.

**OR**

| | | | |
|---|---|---|---|
| | **B)** | Consider following observations: 123,250,352,143,112,324,256,235,412,156 | **07** |
| | |     A)  Prepare Five point summary | |
| | |     B)   Prepare Box & Whisker Plot | |

| | | | |
|---|---|---|---|
| **Q3** | **A)** | In San Francisco, 30% of workers take public transportation daily (*USA Today,* December21, 2005). | **07** |

      a. In a sample of 10 workers, what is the probability that exactly three workers take public transportation daily?
b. In a sample of 10 workers, what is the probability that at least three workers take public transportation daily?

| | | | |
|---|---|---|---|
| | **B)** | A department of transportation's study on driving speed and mileage for midsize automobiles in the Following data. | **07** |

| Driving Speed | 30 | 50 | 40 | 55 | 30 | 25 | 60 | 25 | 50 | 55 |
|---|---|---|---|---|---|---|---|---|---|---|
| Mileage | 28 | 25 | 25 | 23 | 30 | 32 | 21 | 35 | 26 | 25 |

Compute & interpret the sample of correlation coefficient

**OR**

| | | | |
|---|---|---|---|
| **Q3** | **A)** | A Population has a mean of 200 and a standard deviation of 50. Suppose a | **07** |

(1) What is the probability that the sample mean will be within ±5 of the population mean?
(2) What is the probability that the sample mean will be within ±10 of the population mean?

| | | | |
|---|---|---|---|
| | **B)** | Machines A, B, and C all produce the same two parts, X and Y. Of all the parts produced, machine A produces 60%, machine B produces 30%, and machine C produces 10%. In addition, 40% of the parts made by machine A are part X. 50% of the parts made by machine | **07** |

B are part X. 70% of the parts made by machine C are part X. A part produced by this company is randomly sampled and is determined to be an X part. With the knowledge that it is an X part, revise the probabilities that the part came from machine A, B, or C

**Q4 A)** Find following from binomial formula: **07**
(i) If n=4 , p=0.10 then find P(x=3)
(ii) If n=12 , p=0.45 then find P(x= greater than or equal 7 )

**B)** A population proportion is .40. A simple random sample of size 200 will be **07**
taken and the sample proportion will be used to estimate the population
Proportion.
a. What is the probability that the sample proportion will be within $\pm0.03$ of the population proportion?
b. What is the probability that the sample proportion will be within $\pm.05$ of the population proportion?

**OR**

**Q4 A)** A simple random sample of 50 items from a population with population s.d. 6 and sample **07**
mean of 32. Provide a 90%, 95% and 99% confidence intervals for the population mean.

**B)** A random sample of 112 item is taken, resulting in a sample mean 78695 and population **07**
standard deviation is 14530. Assume population means ($\mu$) is 74914 and consider 5 %
significance level. Check following hypothesis :
Null hypothesis : $\mu = 74914$
Alternative hypothesis : $\mu \neq 74914$

**Q5 A)** Consider following data **07**

| X | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Y | 3 | 7 | 5 | 11 | 14 |

Estimated regression equation for these data is $\hat{y} = 0.20 + 2.60 X$
Compute the Coefficient of Determination ($r^2$).

**B)** The time between arrivals of vehicles at a particular intersection follows an exponential **07**
probability distribution with a mean of 12 seconds.
   1) What is the probability that the arrival time between vehicles is 12 seconds or less?
   2) What is the probability that the arrival time between vehicles is 6 seconds or less?
   3) What is the probability of 30 or more seconds between vehicle arrivals?

**OR**

**Q5 A)** Consider following data **07**

| X | 3 | 12 | 6 | 20 | 14 |
|---|---|----|---|----|----|
| Y | 55 | 40 | 55 | 10 | 15 |

Estimated regression equation for these data is $\hat{y} = 68 - 3 X$
Compute the Coefficient of Determination ($r^2$).

**B)** Test the following hypotheses of the difference in population means by using the **07**
following data ($\alpha = .10$)

| | Sample1 | Sample 2 |
|---|---|---|
| **Sample mean** | 51.3 | 53.2 |
| **Population standard deviation** | 52 | 60 |
| **Sample size** | 31 | 32 |

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