

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 $P(A1 \cap A2) = 0$. Suppose $P(B/A1) = 0.20$ and $P(B/A2) = 0.05$ find **04**
- a. Are A1 and A2 mutually exclusive
 - b. Compute $(A1 \cap B)$ & $(A2 \cap B)$ & $P(B)$
- 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*, December 21, 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 $P(x = \text{greater than or equal } 7)$
- B)** A population proportion is .40. A simple random sample of size 200 will be taken and the sample proportion will be used to estimate the population Proportion. **07**
 a. What is the probability that the sample proportion will be within ± 0.03 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 mean of 32. Provide a 90%, 95% and 99% confidence intervals for the population mean. **07**
- B)** A random sample of 112 item is taken, resulting in a sample mean 78695 and population standard deviation is 14530. Assume population means (μ) is 74914 and consider 5 % significance level. Check following hypothesis : **07**
 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 probability distribution with a mean of 12 seconds. **07**
 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 following data ($\alpha = .10$) **07**

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