

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**MCA– SEMESTER –III EXAMINATION –SUMMER-2019**

**Subject Code:630003****Date: 17-05-2019****Subject Name: Statistical Methods****Time:02.30 pm to 5.00 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. The value which has half of the observations above it and half the observations below it is called \_\_\_\_\_.
  2. Mean and variance of \_\_\_\_\_ variate is same.
  3. The difference between the largest and the smallest data values is called \_\_\_\_\_.
  4. In general, higher confidence levels provide \_\_\_\_\_ confidence intervals.
  5. Arithmetic operations are appropriate for \_\_\_\_\_ data.
  6.  $P(A|B) = \text{_____}$  if events A and B are independent.
  7. Standard error of point estimate of population means is \_\_\_\_\_.
- (b)** Explain different types of sampling and its applications in detail. **07**
- Q.2 (a)** Using given marks of 8 students in a sample, compute mean, median, mode, standard deviation and coefficient of variation. **07**  
Marks: 93, 65, 80, 97, 85, 87, 97, 60
- (b)** The average number of calls received by a switchboard in a 30 minute period is 15. **07**
1. What is the probability that the switchboard will receive exactly 10 calls between 10:00 and 10:30?
  2. What is the probability that the switchboard will receive fewer than 3 calls between 10:00 and 10:15?
- OR**
- (b)** The monthly earnings of computer systems analysts are normally distributed with a mean of Rs.24,300. If only 5 percent of the systems analysts have a monthly income of more than Rs.26,140, what is the value of the standard deviation of the monthly earnings of the computer systems analysts? **07**
- Q.3 (a)** As a company manager for ABC Corporation, there is a 0.40 probability that you will be Promoted this year. There is a 0.72 probability that you will get either promotion or raise or both. The probability of getting both promotion and raise is 0.25. **07**
1. What is the probability that you will get a raise?
  2. If you get a promotion, what is the probability that you will also get a raise?
- (b)** A local health center noted that in a sample of 400 patients 80 were referred to them by the local hospital. **07**
1. Provide a 95% confidence interval for all the patients who are referred to the health center by the hospital.
  2. What size sample would be required to estimate the proportion of hospital referrals with a margin of error of 0.04 or less at 95% confidence?
- OR**
- Q.3 (a)** Define and Differentiate **03**
- (i) Type-I and Type-II errors **03**
  - (ii) Two-tailed and One-tailed tests **04**
- (b)** When a sample of 70 retail executives was surveyed regarding the poor November performance of the retail industry 66 percent believed that decreased sales were due to **07**

unreasonably warm temperatures, resulting in consumers delaying purchase of cold weather items. Construct a 95 percent confidence interval for the true proportion.

- Q.4 (a)**
- The time it takes a mechanic to change the oil in a car is exponentially distributed with a mean of 5 minutes. What is the probability that it will take a mechanic less than 6 minutes to change oil? [ 03 ]
  - Following information is obtained from a random sample of 6 observations. Assume the population has a normal distribution. Observations: 13, 14, 17, 14, 17, 15. What is the point estimate of  $\mu$ ? [04]

- (b)** An advertising firm is trying to determine the demographics for a new product. They have randomly selected 75 people in each 5 different age groups and introduced the product to them. The results of the survey are given below.

Future Activity	Age Group				
	18-29	30-39	40-49	50-59	60-69
Purchased Frequently	12	18	17	22	32
Seldom Purchase	18	25	29	24	30
Never Purchase	45	32	29	29	13

Develop a table of observed and expected frequencies, and calculate  $\chi^2$  value. For the level of significance is 0.01, should the null hypothesis be rejected?

**OR**

- Q.4 (a)**
- Determine the sample size needed to estimate mean with a margin of error of 2 or less with a .95 probability when the population standard deviation equals 11.
  - Eighty-five people in a random sample of 100 favoured Candidate A. Compute 95% and 90% interval estimate for population proportion of people in favour of candidate A.

- (b)** Explain the terms : Standard Error, Margin of error with example

- Q.5 (a)** The sales (in thousand Rs) data of an item in six shops before and after a special promotional campaign are as under:

Shops	A	B	C	D	E	F
Before campaign	55	25	35	50	50	40
After campaign	60	22	30	55	58	45

Did the campaign make any significant difference in sale? [ 07 ]

- (b)** From the following data calculate two equation of line of regression.

	X	Y
Mean	60	67.5
Standard Deviation	15	13.5

Correlation co-efficient between X and Y is 0.50 also estimate the value of Y for X = 72 Using the appropriate Regression equation

**OR**

- Q.5 (a)** Define and Differentiate
- Type-I and Type-II errors
  - Tow-tailed and One-tailed tests
- (b)** A person must score in the upper 2% of the population on an IQ test to qualify for membership in GTU-IQ-Club. If IQ scores are normally distributed with a mean of 100 and a standard deviation of 15, what score must a person have to qualify for GTU-IQ-Club?

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