

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA – SEMESTER – III • EXAMINATION – SUMMER 2018

Subject Code: 630003

Date: 21-May-2018

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)** Explain with example: **07**
1. Stem and Leaf Display
 2. Mean, Median, Mode
 3. Percentiles, Quartiles
- (b)** State and explain with example Chebyshev's Theorem and its empirical rule for measures of distribution shape. **07**
- Q.2 (a)** One bag contains four white and two black balls and another bag contains three white and three black balls. A ball is drawn from each bag. What is the probability that one is white and another is black? **07**
- (b)** If $P(A)=0.25$, $P(B)=0.15$ and $P(A \cup B) = 0.30$ find the values of: **07**
1. $P(A \cap B)$
 2. $P(A \cap \bar{B})$
 3. $P(\bar{A} \cap B)$
 4. $P(\bar{A} \cap \bar{B})$
 5. $P(\bar{A} \cup \bar{B})$

OR

- (b)** An experiment succeeds two times out of three trials. Find the chances that in 6 trials, there will be at least 5 successes. [Hint: Use Binomial Distribution] **07**
- Q.3 (a)** The wages of a group of 5000 workers were found to be normally distributed with mean of Rs. 800 and standard deviation of Rs. 2000. Estimate: **07**
1. Percentage and number of workers getting wages below Rs.600.
 2. Percentage of workers getting wages between Rs. 600 and Rs. 700.
 3. Percentage and number of workers getting wages below Rs.900.
 4. Percentage of workers getting wages between Rs. 700 and Rs. 1000.
- (b)** Explain Stratified Random Sampling, Cluster Sampling, Systematic Sampling, Convenience Sampling, Judgment Sampling. **07**

OR

- Q.3 (a)** A simple random sample of size 100 has mean 15, the population variance being 25. Find an interval estimate of the population mean with a confidence level of 99% and 95%. **07**
- (b)** A simple random sample of size 65 was taken to estimate the mean annual income of 1,000 families and the mean and standard deviation were found to be Rs. 6,300 and Rs. 9.5 respectively. Find a 95% confidence interval for the population mean. **07**

- Q.4 (a)** Out of 20,000 customers' ledger accounts, a sample of 600 accounts was taken to set the accuracy of posting and balancing; 45 mistakes were found. Assign limits within which the number of defective cases can be expected at 5% level. (t=2.00) **07**

- (b)** A company claims that the length of life of its electric bulb is 2000 hours with standard deviation of 30 hours. A random sample of 25 showed an average life of 1940 hours with a standard deviation of 25 hours. At 5% level of significance can we conclude that the sample has come from a population with mean of 2000 hours? **07**

OR

- Q.4 (a)** A pharmaceutical company hypothesizes that the effect of a certain sedative is 13 hours with a known standard deviation of 2 hours. From a sample of 16 patients, it is found that the sample mean to be 12 hours. At 0.01 level of significance, should the company conclude that the average effect of the sedative is less than or equal to 13 hours. **07**

- (b)** Intelligence test on two groups of boys and girls gave the following results: **07**

	Mean	Standard Deviation	N
Girls	61	2	64
Boys	60	4	100

Is there a significant difference in the mean scores obtained by boys and girls at 5% level and at 1% level?

- Q.5 (a)** A machine produced 20 defective articles in a batch of 400. After overhauling it produced 10 defectives in a batch of 300. Has the machine improved? **07**

- (b)** In a sample of 400 parts manufactured by a company, the number of defective parts was found to be 30. The company, however, claimed that only 5% of their product is defective. Test at 5% level of significance whether the claim of the company is acceptable. **07**

OR

- Q.5 (a)** The following data related to advertising expenditure and sales follows: **07**

Advertising Expenditure (Rs. in lakhs)	1	2	3	4	5
Sales (Rs. in lakhs)	10	20	30	50	40

- Find out two Regression equations.
- Estimate the likely sales when advertising expenditure is Rs.7 lakhs.
- What should be the advertising expenditure if the firm wants to attain sales target of Rs. 80 lakhs?
- Calculate Coefficient of Correlation.

- (b)** The following data are the monthly salaries 'y' and the grade point averages 'x' for students who obtained a bachelor's degree in business administration with a major in information systems. The estimated regression equation for these data is $y = 1790.5 + 581.1x$. **07**

GPA (x)	2.6	3.4	3.6	3.2	3.5	2.9
Monthly Salary (y)	3300	3600	4000	3500	3900	3600

Develop a 95% confidence interval for the mean starting salary for all students with 3.0 GPA.

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