

**GUJARAT TECHNOLOGICAL UNIVERSITY****MCA – SEMESTER – III • EXAMINATION – SUMMER 2018****Subject Code: 2630003****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.** State whether the following statements are TRUE or FALSE. Give justification/reasons. 7
1. If correlation coefficient between two variables x and y is -0.8, it implies that there is good (sufficiently strong) correlation between x and y.
  2. For two events A and B, if  $P(A \cap B) = 0.47$ , it is possible that  $P(A \cup B) = 0.46$ .
  3. Standard Error will decreased when sample size increases.
  4. The mean of marks of 60 students is 56%. It will imply that Q1 will be half of 56%, i.e. 23%.
  5. If NULL Hypothesis is accepted when it is false, it will be Type I error.
  6. Distribution of sample mean (also called Sampling Distribution) for a set of large sample is Normal Distribution, even though the population is NOT Normally Distributed.
  7. (Algebraic) Sum of deviations from the mean can have a negative value.
- b.**
- (1) State Central Limit Theorem. What is it's importance? 2
  - (2) State Chebyshev's theorem. Use it to compute the percentage of data lying between 34 and 62 for a sample with mean as 48 and standard deviation as 7. 2
  - (3) What is meant by (i) Mutually Exclusive Events, (ii) Independent Event. Fortwo events A and B, write down the conditions for these events being Mutually Exclusive and these events being Independent. 3
- Q.2 a.**
- (i) Eight coins are thrown simultaneously. Find the chance of obtaining, 4
    1. At least six heads
    2. No heads
    3. All heads
  - (ii) Bring out the fallacy, if any, in the following statement: 3  
The mean of a Binomial Distributions 15 and it's standard deviation 5.
- b.** Prepare a frequency table with each class interval of 10 k.g. and first class interval as 40 – 50. Also find out the coefficient of variation: 7
- |    |     |     |    |     |     |    |    |    |    |
|----|-----|-----|----|-----|-----|----|----|----|----|
| 72 | 74  | 40  | 60 | 82  | 115 | 41 | 61 | 65 | 83 |
| 53 | 110 | 46  | 84 | 50  | 67  | 78 | 79 | 56 | 65 |
| 68 | 69  | 104 | 80 | 79  | 79  | 52 | 73 | 59 | 81 |
| 66 | 49  | 77  | 90 | 84  | 76  | 42 | 64 | 64 | 70 |
| 72 | 50  | 79  | 52 | 103 | 96  | 51 | 86 | 78 | 94 |

**OR**

- b. (i)** The following data represent the cost (in dollars) of a sample of 30 postal mailing by a company. Prepare stem and leaf display 4
- |      |       |      |      |      |      |
|------|-------|------|------|------|------|
| 3.67 | 2.75  | 9.15 | 5.11 | 3.32 | 2.09 |
| 1.83 | 10.94 | 1.93 | 3.89 | 7.2  | 2.78 |
| 6.72 | 7.8   | 5.47 | 4.15 | 3.55 | 3.53 |
| 3.34 | 4.95  | 5.42 | 8.64 | 4.84 | 4.1  |
| 5.1  | 6.45  | 4.65 | 1.97 | 2.84 | 3.21 |

- (ii)** A production company's 350 hourly employee average 37.6 years of age, with a standard deviation of 8.3 years. If a random sample of 45 hourly employee is taken, what is the probability that the sample will have an average age of less than 40 years? 3

- Q.3 a. (i)** Define the following terms : 3

1. Mutually Exclusive Events    2. Equally Likely Event    3. Sample Space

- (ii)** The probability that there is at least one error in an accounts statement prepared by A is 0.2 and for B and C they are 0.25 and 0.4 respectively. A, B and C prepared 10,16 and 20 statement respectively. Find the expected number of correct statement in all. 4

- b.** Five fair coins were tossed 100 times. From the following outcomes, calculate expected frequencies: 7

No of Heads Up	0	1	2	3	4	5
Observed Frequency	2	10	24	35	18	8

**OR**

- Q.3 a.** The following table shows the number of customers returning the products in a marketing territory. The data is for 100 stores: Calculate IQR. 7

No of returns	0	1	2	3	4	5	6
No of stores	4	14	23	23	18	9	9

- b.** An investment consultant predicts that the odds against the price of a certain stock will go up during the next week are 2:1 and odds in favour of the price remaining the same are 1:3. What is the probability that the price of the stock will go down during the next week? 7

- Q.4 a. (i)** Define the following terms: 3

1. Population    2. Sample    3. Proportion

- (ii)** A coin was tossed 400 times and head turned up 216 times. Test the hypothesis that the coin is unbiased. 4

- b.** To verify whether a course in accounting improved performance, a similar test was given to 12 participants both before and after the course. The original marks recorded in alphabetical order of the participants were: 7

Before Test	44	40	61	52	32	44	70	41	67	72	53	72
After Test	53	38	69	57	46	39	73	48	73	74	60	78

Was the course useful?

**OR**

**Q.4 a.** Two types of drugs were used on 5 and 7 patient for reducing their weight. Drug A was imported and drug B indigenous. The decrease in the weight after using the drugs for six months was as follow: 7

Drug A	10	12	13	11	14		
Drug B	8	9	12	14	15	10	9

Is there a significant difference in the efficiency of the two drugs? If not, which drug should you buy?

(For  $v = 10, t_{0.05} = 2.223$ )

**b.** What is Sampling? Describe Sampling Methods in detail 7

**Q.5 a.** Based on information on 1,000 randomly selected fields about the tenancy status of the cultivation of these fields and use of fertilizers, collected in an agro-economic survey, the following classification was noted: 7

	Owned	Rented	Total
Using Fertilizers	416	184	600
Not using Fertilizers	64	336	400
Total	480	520	1,000

Would you conclude that owner cultivators are more inclined towards the use of fertilizers at 5% level?

**b.** From the data given below find: 7

- The two regression equations.
- The coefficient of correlation between marks in Economics and Statistics
- The most likely marks in Statistics when the marks in Economics are 30.

Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

**OR**

**Q.5 a. (i)** A study is conducted in a company that employs 800 engineers. A random sample of 50 engineers reveals that the average sample age is 34.3 years. Historically, the population standard deviation of the age of the company's engineer's is approximately 8 years. 4

Construct 98% confidence interval to estimate the average age of all the engineers in this company.

- (ii)** Define : 1. Type I and Type II error. 2. Characteristics of a good estimator. 3
- b. (i)** The owner of a large equipment rental company wants to make a rather quick estimate of the average number of days a piece of ditchdigging equipment is rented out per person per time. The company has records of all rentals, but the amount of time required to construct an audit of all accounts would be prohibitive. The owner decides to take a random sample of rental invoices. Fourteen different rentals of ditchdiggers are selected randomly from the files, yielding the following data. She uses these data to construct a 99% confidence interval to estimate the average number of days that a ditchdigger is rented and assume that the number of days per rental is normally distributed in the population. 4
- 3 1 3 2 5 1 2 1 4 2 1 3 1 1
- (ii)** Suppose you want to estimate the average age of all boeing 727 airplanes now in active domestic U.S. service. You want your estimate to be within two years of the actual figure. The 727 was first placed in service about 30 years ago, but you believe that no active 727s in the U.S. domestic fleet are more than 25 years old. How large a sample should you take? 3

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