

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – SUMMER 2024****Subject Code:2142505****Date:01-07-2024****Subject Name:Probability and Introduction to Statistics****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1 (a)** Define Following **03**
1. Random Variable
 2. Primary Data
 3. Null Hypothesis
- (b)** Explain Cumulative Frequency Curves **04**
- (c)** Discuss various Data Representation Techniques in detail. **07**
- Q.2 (a)** Explain Kurtosis. **03**
- (b)** Compare various measures of dispersion. **04**
- (c)** Three groups of children contain respectively 3 girls and 1 boy; 2 girls and 2 boys; 1 girl and 3 boys. One child is selected at random from each group, find probability that the selected group of three children consist of 1 girl and 2 boys. **07**
- OR**
- (c)** The daily emissions of sulfur dioxide from an industrial plant in tones/day were as follows: **07**
- 4.2, 6.7, 5.4, 5.7, 4.9, 4.6, 5.8, 5.2, 4.1, 6.2, 5.5, 4.9, 5.1, 5.6, 5.9, 6.8, 5.8, 4.8, 5.3, 5.7.
- Determine mean, median, mode and standard deviation for the data
- Q.3 (a)** Differentiate between Primary and Secondary Data **03**
- (b)** Calculate $E(X)$ and $V(X)$ for the random variable X . **04**
- | | | | | | |
|--------|------|------|------|-----|------|
| X | 0 | 1 | 2 | 3 | 4 |
| $P(X)$ | 0.25 | 0.35 | 0.25 | 0.1 | 0.05 |
- (c)** Find median and mode and standard deviation of the following data **07**
- | | | | | | | |
|-----------|-------|-------|-------|-------|-------|--------|
| Class | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
| Frequency | 12 | 10 | 15 | 17 | 8 | 3 |
- OR**
- Q.3 (a)** Define Null Hypothesis and Alternate hypothesis. **03**
- (b)** Set the null and alternate hypothesis for the following: **04**
- A vendor claims that his company fills any accepted order, on the average, in at most 6 working days. You suspect that the average is greater than six working days and want to test the claim
- (c)** Explain *Chi-Square* test with suitable example. **07**
- Q.4 (a)** Define expectations of Random Variable and list its properties **03**
- (b)** Explain Stratified Random Sampling Method. **04**
- (c)** Explain Z-test with suitable example. **07**

OR

- Q.4** (a) Explain Type-I and Type-II error with reference to Hypothesis Testing **03**
(b) Explain Systematic Sampling Method **04**
(c) Explain t-test with suitable example. **07**

- Q.5** (a) Suppose X is the normal distribution $N(70, 4)$. Find $P(X \geq 74)$ **03**
(b) Explain the concept of *p-value* with suitable example. **04**
(c) Explain Joint Probability Distribution of two random variables with suitable example. **07**

OR

- Q.5** (a) What is Regression Analysis? **03**
(b) Discuss the properties of Binomial Distribution. **04**
(c) In the inspection of tin plate produced by a continuous electrolytic process, 0.2 imperfections spotted per minute, on average. Find the probabilities of spotting **07**
1. One imperfection in 3 minutes;
2. At least two imperfections in 5 minutes;
3. At most one imperfection in 15 minutes.
