SYLHET CADET COLLEGE

FIRST TERM-END EXAMINATION - 2024 | Set | A |
CLASS: XII
STATISTICS (CREATIVE) **Subject Code:** | 1 | 2 | 9 |
FIRST PAPER
TIME – 2 hours & 35 minutes
FULL MARKS – 50

[**N.B.** – The figures of the right margin indicate full marks. Read the stems carefully and answer the associated questions. Answer any **FIVE** questions taking at least two questions from each group]

Group - A

1. **A software developer tracked the response times (in milliseconds) of a web application under test during peak usage hours. An unexpected delay of 1.2 ms was added to each recorded response time due to server lag. The recorded times are as follows:**

$$45,\ 48,\ 52,\ 50,\ 47,\ 53,\ 60,\ 55,\ 58,\ 49$$

   (a) What is nominal scales of measurement?

   (b) If the ages of a group of people are 22, 25, 28, 30, and 35, find $\sum_{i=1}^{5}(x_i^2 + 3x_i)$ 2

   (c) Calculate $\sum_{i=1}^{10}(X_i - 25)$ from the stem. 3

   (d) Find the sum of the original response times before the lag was added. 4

2. **Concentrations of a chemical solution (in mol/L) were recorded over several trials as follows:**

Concentration (mol/L)	0.1-0.2	0.2-0.3	0.3-0.4	0.4-0.5	0.5-0.6
Frequency	4	7	5	6	3

   (a) If $u_i = x_i + y_i$, what us $\bar{x}$ in terms of u? 1

   (b) Find Arithmetic Mean: $14, 18, 22, \cdots 70$ 2

   (c) Compute the Arithmetic Mean of the distribution given using the Short-cut method. 3

   (d) Compute the Arithmetic Mean using a different assumed mean (A).
   Do both methods yield the same result? 4

3. **A botanist measures the heights (in cm) of plants from a sample as shown below:**

Height (cm)	**Frequency**
20-30	6
30-40	10
40-50	12
50-60	8
60-70	4

   (a) Is Median affected by outliers?

   (b) Does Median depend on origin and scale? Prove.

   (c) Find the median height of the plants and interpret. 3

   (d) Determine the first (Q1) and third (Q3) quartiles of the plant heights. Explain the significance of these quartiles in understanding the data distribution. 4

4. **A psychologist is studying the stress levels (measured on a scale of 1 to 50) experienced by five participants during a specific task. The observed values are:**

$$x_1 = 32, x_2 = 28, x_3 = 40, x_4 = 35, x_5 = 22$$

   (a) Is the brand of a smartphone (e.g., Apple, Samsung, etc.) a qualitative or quantitative variable? 1

   (b) After expansion, what does $\sum_{i=1}^{n}(ax_i - b)$ become?

   (c) Compute the value of $\sum_{i=1}^{5}(x_i - 30)^2$. 3

   (d) Calculate $\sum_{i=1}^{5}(2x_i^2 - 5x_i + 4)$ using both a direct approach and by splitting the summation terms. 4

Group - B

5. **A study was conducted to track the daily water consumption (in liters) of 10 individuals over a week. The recorded values are as follows:**

2.5, 3.1, 2.8, 3.5, 2.7, 3.3, 2.6, 3.0, 2.9, 3.4

(a) What is central moment? 1

(b) Can moments be negative? Analyze. 2

(c) Determine the variance of the data set. 3

(d) Assess whether the data distribution appears to be symmetric with the help two different methods. 4

6. **A data set represents the test scores of 10 students in a recent exam, recorded as follows:**

56, 62, 68, 71, 65, 59, 74, 67, 70, 63

(a) How many types of kurtosis are there? 1

(b) What is the pattern of in a left-skewed didstribution? 2

(c) Calculate the first four moments about 3. 3

(d) Compute the variance and kurtosis of the data using converted central moments. Explain what the kurtosis indicates about the distribution. 4

7. **The quarterly production data (in tons) for a factory is given below:**

Quarter	Q1	Q2	Q3	Q4	Q5	Q6	Q7
Production	150	160	155	145	170	165	180

(a) Give an example of irregular variation. 1

(b) Mention the methods of measuring the trend. 2

(c) Calculate the trend using the moving average method for a 3-quarter period. 3

(d) Plot the trend line and predict the production for Q8 using two methods and compare. 4

8. **Government organizations rely on statistical data to create policies and allocate resources efficiently. In some countries, statistical data on health, education, and economic performance is used by policymakers to make decisions. However, the misuse of data can lead to ineffective or harmful policies.**

(a) What does BBS stand for? 1

(b) Differentiate between official and non-official statistics. 2

(c) Define the scope of official statistics in policy-making and the role they play in resource allocation. 3

(d) Discuss the possible consequences of misusing statistical data in policymaking, providing an example from a real-world situation. 4