Polaris

SYLHET CADET COLLEGE
YEAR-FINAL EXAMINATION - 2025
CLASS: XI
STATISTICS (CREATIVE)
FIRST PAPER
[According to the Syllabus of 2025]
TIME – 2 hours & 25 minutes
FULL MARKS – 50

Ques Setter	
Moderator	
VP	

Subject Code: | 1 | 3 | 0 |

[**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 botanist is measuring the heights (in centimeters) of four seedlings after one week. The observed heights are:**

$$h_1 = 15, h_2 = 12, h_3 = 18, h_4 = 10$$

(a) What is a qualitative variable? 1

(b) Differentiate between ratio and interval scale. 2

(c) Compute the value of $\sum_{i=1}^{4}(h_i - 14)^2$. 3

(d) Calculate $\sum_{i=1}^{4}(3h_i^2 - 2h_i + 1)$ using both a direct approach and by splitting the summation terms. Also demonstrate that they are mathematically equivalent. 4

2. **A school health survey was conducted to understand the weight distribution among students. As part of this initiative, the weights (in kilograms) of 20 randomly selected students from different grades were measured and recorded to assess the general health status and identify patterns or anomalies in weight across the group. The collected data are as follows:**

48, 52, 55, 50, 60, 62, 53, 58, 51, 54
56, 59, 49, 47, 61, 63, 57, 46, 45, 50

(a) What is the purpose of a frequency distribution? 1

(b) Differentiate between primary and secondary data. 2

(c) Construct a frequency distribution table using a suitable class interval. 3

(d) Create an Ogive and hence estimate the quartiles and interpret. 4

3. **Scores of four athletes in different events at a track meet are recorded below:**

Event	High Jump	Long Jump	Shot Put	Javelin Throw
Score	8.5	7.2	12.8	55.5
Difficulty Factor	2	3	2.5	1.5

A coach believes that events with higher difficulty factors should contribute more to the overall ranking and suggested a new weighting where the weight for each event is the square of its difficulty factor.

(a) Write down the formula of weighted mean. 1

(b) What is difference between weight and frequency? 2

(c) Calculate the weighted average score of the athletes across all four events. 3

(d) If the coach's suggestion is implemented, would the mean be shifted upward or downward? Show mathematically and empricially. 4

4. **Monthly sales (in thousand dollars) of two stores over five months are given below:**

(a) Is Range influenced by extreme values or outliers? 1

(b) Does Mean Deviation depend on change of origin and scale? Verify. 2

Month	1	2	3	4	5
Store P	50	55	48	52	49
Store Q	60	58	65	63	61

(c) Calculate the variance of Store P's sales data. 3

(d) Compare the sales stability of both stores using an appropriate statistical measure. 4

Group - B

5. **The first four moments around 4 of productions of a company over four years are -1.5, 17, -30, and 108.**

(a) Draw a symmetrical distribution. 1

(b) Can the second central moment be negative? 2

(c) Determine the second and third central moments. 3

(d) What kind of kurtosis do the data have? 4

6. **The following table shows the exam scores of 10 students and the number of hours they studied for the exam. It is hypothesized that the exam score depends on the number of hours studied.**

Hours Studied (X)	2	3	4	5	6	7	8	9	10	11
Exam Score (Y)	65	70	72	78	80	85	88	92	95	98

(a) What does $r = -1$ imply? 1

(b) Does the regression coefficient depend on scale? Verify mathematically. 2

(c) Estimate and interpret the regression coefficient of y on x. 3

(d) Using data, show $r = \sqrt{b_{yx} \times b_{xy}}$; How much variation is explained by the obtained model? 4

7. **The average monthly temperature (in degrees Celsius) recorded at a weather station over seven months is given below:**

Month	September	October	November	December	January	February	March
Temperature	22	20	18	15	12	16	20

(a) What is trend? 1

(b) What are the components of Time Series? 2

(c) Compute the trend using the three-monthly moving average method. 3

(d) Estimate the approximate average temperature for the month of April using both graphical and moving average methods, and compare the projections. 4