SYLHET CADET COLLEGE

PRE-TEST 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 from each group.]

Group–A

1. **The capital and profit (in million BDT** of some Bangladeshi industries are bgiven below:

Industry	1	2	3	4	5
Capital (X)	20	15	26	31	18
Profit (Y)	15	10	17	25	10

    (a) What is finite population?   1

    (b) What are the functions of statistics?   2

    (c) Find the value of $\displaystyle\sum_{i=1}^{5}\sum_{j=1}^{5}(x_i - y_j)$ 3

    (d) Analyze the statement theoretically and empirically: $\displaystyle\sum_{i=1}^{5}(4x_i - 6y_j) = 4\sum_{i=1}^{5}x_i - 6\sum_{i=1}^{5}y_j$ 4

2. **An arithmetic series is formed as follows:**

$$a, a + c, a + 2c, \cdots, a + 2nc$$

    (a) What is change of origin and scale?   1

    (b) Convert the series into a set of natural numbers.   2

    (c) Find the arithmetic mean of the series with the use of change of origin and scale.   3

    (d) Find the geometric mean of the series: $1, 2, 4, \cdots, 2^n$.   4

3. **Arithmetic (AM) and Harmonic Mean (HM) of two numbers are 25 and 9, respectively.**

    (a) When is HM useful?   1

    (b) Derive HM formula using the concept of average velocity.   2

    (c) Find the two values from the stem.   3

    (d) Show mathematically that $HM \leq AM$ (for n=2)   4

4. **A researcher has collected some data:**

$$x_1 = 15, x_2 = -12, x_3 = 10, x_4 = 21, x_5 = 33$$

    (a) What is sample?   1

    (b) Briefly explain shift or origin and scale.   2

    (c) Compute the value of $\displaystyle\sum_{i=1}^{5}(x_i - 20)^2$ 3

    (d) Find the value of $\displaystyle\sum_{i=1}^{5}(3x_i^2 - 2x_i - 3)$ and examine its dependency on origin and scale.   4

Group–B

5. **The first four moments of a distribution around 5 are 2, 20, 40, and 50, respectively.**

    (a)

    (b) Draw the shape of a left-skewed distribution.   1

    (c)

    (d) Derive the value of thew first central moment.   2   2

    (e) Obtain the first four central moments.   3

    (f) Estimate and comment on the skewness and kurtosis.   4

1

6. **United Nations Children's Fund (UNICEF) is an agency of the United Nations responsible for providing humanitarian and developmental aid to children worldwide. A UNICEF researcher collected heights (in feet) of 7 children for a project, and the heights are**

$$2.2, 2.15, 1.9, 3.1, 2.7, 3.0, 3.5$$

   (a) Which value are central moments estimated around? 1

   (b) Moments around origin (0) are central moments - Comment. 2

   (c) Find the first three central moment. 3

   (d) Find the skewness of the data and interpret. 4

7. **Bangladesh foreign debt has been increasing rapidly in recent years. The Bangladesh bank provides the follwoing data.**

Fiscal Year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Debt	41.17	45.81	56.01	62.63	68.55	81.62	95.45	98.94	$\sim$130.00

   (a) Name the components of time series. 1

   (b) What are linear and non-linear trends? 2

   (c) Find 3-yearly moving avergae from the data and plot. 3

   (d) Whaich components of time series may underlie the data? Analyze. 4

8. **Globalization creates many opportuninities. Many government and non-government organizatios collcet and analyze data analyze different aspects of the trend.**

   (a) What is official statistics? 1

   (b) What is the role of the United Nations? 2

   (c) What are the limitations of published statistics in Bangladesh? 3

   (d) Compare the statistical analysis in Bangladesh with international standard. 4