

SYLHET CADET COLLEGE

TEST EXAMINATION - 2024

CLASS: XII

STATISTICS (CREATIVE)

FIRST PAPER

TIME – 2 hours & 35 minutes

FULL MARKS – 50

Set	A
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Subject Code:	1	2	9
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[**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 $\sum_{i=1}^5 \sum_{j=1}^5 (x_i - y_j)$ 3
- (d) Analyze the statement theoretically and empirically: $\sum_{i=1}^5 (4x_i - 6y_j) = 4 \sum_{i=1}^5 x_i - 6 \sum_{i=1}^5 y_j$ 4

2. An arithmetic series is formed as follows:

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

- (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: $1, 2, 4, \dots, 2^n$.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 $\sum_{i=1}^5 (x_i - 20)^2$ 3
- (d) Find the value of $\sum_{i=1}^5 (3x_i^2 - 2x_i - 3)$ 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)1
- (b) Draw the shape of a left-skewed distribution.1
- (c)2
- (d) Derive the value of the first central moment.2
- (e) Obtain the first four central moments.3
- (f) Estimate and comment on the skewness and kurtosis.4

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 moments. 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	~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 opportunities. 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