

[**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 health specialist is analyzing the daily calorie intake (in hundreds of calories) of five individuals on a specific diet. The recorded values are:

$y_1 = 24, y_2 = 18, y_3 = 30, y_4 = 26, y_5 = 16$

- (a) What is a quantitative variable?1
- (b) Show that $\sum_{i=1}^4 \sum_{j=1}^4 x_i \times y_j \neq \sum_{i=1}^4 x_i \times y_i$ 2
- (c) Compute the value of $\sum_{i=1}^5 (y_i - 20)^2$.3
- (d) Calculate the values of $\sum_{i=1}^5 (3y_i^2 - 4y_i + 7)$ and $\sum_{i=1}^3 (y_i^2 - 5y_i)$.4

2. Given below are the names of the districts encountering road accidents during the first five days in January, 2025.

Day	Districts
1	Narayanganj, Faridpur, Naogaon, Pabna, Satkhira, Mymensingh, Dinajpur, Rajshahi
2	Chuadanga, Khagrachhari, Cox’s Bazar, Barishal, Chattogram,Munshiganj
3	Munshiganj, Narayanganj, Bogura, Gaibandha, Sunamganj, Chattogram
4	Dhaka, Patuakhali, Noakhali
5	Natore, Munshiganj, Mymensingh

- (a) On which day do you see the highest number of accidents?1
- (b) Make a table of top 5 districts with highest number of accidents.2
- (c) Make a Pie Chart using the table in (c).
- (d) Make a bar diagram showing the number of the districts affected daily.4

3. A sports analyst collected ages of athelets having ages between 10 and 35. He then presented his findings as below:

Age	10-15	15-20	20-25	25-30	30-35
No. of Athlete	2	8	10	5	3

- (a) What is central tendency?1
- (b) When is geometric mean iappropriate to measure?2
- (c) Compute median from the stem.3
- (d) Show that Arithmetic mean is greater than Harmonic mean. Which one of them is more suitable for this data?4

4. The monthly temperatures in the cities of Dhaka (in Degree Celsius) and New York (in degree Fahrenheit) are given in the following table:

City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dhaka ($^{\circ}C$)	24	28	32	33	33	32	32	32	32	32	29	26
New York ($^{\circ}F$)	29	32	40	50	60	70	75	74	67	56	46	35

- (a) How is the Range defined?1

- (b) Can the standard deviation exceed the variance? Prove. 2
- (c) Find the standard deviation of the above data and compare the cities. 3
- (d) Examine the efficacy the standard deviation in light of the given context. 4
- Is a better measure availabe? Analyze.

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) Write down the formula first moment around 3. 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 table below displays the weekly hours of practice and corresponding tournament scores of 9 competitive tennis players. It is theorized that tournament score depends on practice hours.**

Practice Hours (X)	5	7	9	10	12	14	16	18	20
Tournament Score (Y)	45	52	60	68	75	82	88	93	98

- (a) What is the range of the Pearson’s correlation coefficient (r)? 1
- (b) Make a scatter plot using the data.
- (c) Estimate and interpret the regression coefficient of y on x. 3
- (d) Estimate the regression coefficient of x on y. Is this model realistic? Explain. 4

7. **The annual revenue (in million dollars) of a software company over eight years is given below:**

Year	2014	2015	2016	2017	2018	2019	2020	2021
Revenue	120	135	150	165	180	195	210	225

- (a) What is linear trend? 1
- (b) Mention the methods of measuring the trend. 2
- (c) Compute the trend using the four-yearly moving average method. 3
- (d) Estimate the approximate revenue for the year 2022 using both graphical and moving average methods, and compare. 4

8. **Climate change is an alarming problem throughout the world. To determine what to do to solve the problem, many government and non-government organizatios collcet and analyze data to come to a consistent solution.**
- (a) What is official statistics? 1
 - (b) What is the role of World Meteorological Organization? 2
 - (c) What are the limitations of published statistics in Bangladesh? 3
 - (d) How can the quality of published statistics in Bangladesh be improved? 4

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Group - A

1. Goals scored by a footballer in 25 matches are summarized as shown below.

Goals	0	1	2	3	4
Times	8	9	5	2	1

- (a) Is no. goals a discrete or continuous variable?

1
- (b) Verify theoretically: $\sum_{i=1}^2 X_i Y_i = \sum_{i=1}^2 X_i \times \sum_{i=1}^2 Y_i$

2
- (c) Find the total number of goals using a suitable notation.

3
- (d) If he scores two (2) goals in the next match, will the scoring rate increase? Explain logically and empirically

4

2. Some of the most-searched key words on the web by the employees of a social media research firm are:

Facebook, Google, YouTube, Facebook, Facebook, YouTube, Weather,
YouTube, Gmail, YouTube, Facebook, YouTube, Google, YouTube,
Gmail, Weather, Gmail, Gmail, YouTube, Facebook, YouTube,
Gmail, Facebook, YouTube, Facebook

- (a) What is most popular key word?

1
- (b) Differentiate between primary and secondary data.

2
- (c) Draw a Bar Chart from the above data and explain.

3
- (d) Is a Pie Chart a better representation of this data? Justify.

4

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