

[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 athletes 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 inappropriate 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 (°C)	24	28	32	33	33	32	32	32	32	32	29	26
New York (°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.
Is a better measure available? Analyze. | 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.

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|---|---|
| (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

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|---|---|
| (a) What is the range of the Pearson's correlation coefficient (r)? | 1 |
| (b) Make a scatter plot using the data. | 2 |
| (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 organizations collect 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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