

[**N.B.** – The figures of the right margin indicate full marks. Read the stems carefully and answer the associated questions. Answer all the **FIVE** questions.]

1. The monthly sales and expenses (in thousand BDT) of five retail stores are given below:

Store	A	B	C	D	E
Sales (X)	50	65	40	70	55
Expenses (Y)	30	45	25	50	35

- (a) What is a sample?1
- (b) Differentiate between discrete and continuous variable.2
- (c) Calculate $\sum_{i=1}^5 (x_i + y_i)$ 3
- (d) Verify whether $\sum_{i=1}^5 (3x_i - 2y_i) = 3 \sum_{i=1}^5 x_i - 2 \sum_{i=1}^5 y_i$ holds true.4

2. The following table tracks the number of individuals who sleep within specific hourly intervals.

Hours of Sleep (per night)	4-5	5-6	6-7	7-8	8-9	9-10	10+
Number of Individuals	12	20	25	30	18	8	7

- (a) What is a histogram used for?1
- (b) Relate histogram and stem and leaf plot2
- (c) Draw an Ogive from the data provided and explain.3
- (d) Write five useful insights about the data combining information from the Ogive and the table.4

3. The number of hours worked (in a week) and weekly earnings (in dollars) of some employees are recorded as follows:

Hours Worked (x)	40	35	50	30
Weekly Earnings (y)	400	350	500	300

- (a) What is univariate data?1
- (b) Explain change of origin and scale with an example.2
- (c) Are, in the stem, $\sum_{i=1}^n \sum_{j=1}^n x_i y_j = \sum_{i=1}^n x_i y_i$? Vindicate3
- (d) Using the data, prove that the sum of squares is unequal to the square of the sum of numbers.4

4. The ages of 20 participants in a fitness program were recorded and found to be as follows:

25, 30, 28, 35, 40, 38, 26, 32, 36, 31
27, 33, 29, 41, 42, 37, 34, 39, 43, 45

- (a) If two class intervals of a frequency distribution are (10-30) and (30-50), what is the width of class interval?1
- (b) For a pie chart, how are the angles calculated?2
- (c) Create a frequency distribution and interpret.3
- (d) Create a Histogram from the data and explain. If the no. of classes were fewer, how would the pattern of the distribution shift?4

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5. Mean monthly salaries of employees of two companies A & B are tk. 65,000 and tk. 75,000. The combined arithmetic mean (AM) is tk. 71,000 and number of employees in the company A is 20.
- (a) Write down the formula of combined AM for k groups. 1
 - (b) What is the combined AM of two data sets with AM 35 and 45 and number of values equal? 2
 - (c) How many employees are there in the company B? 3
 - (d) Salary of an employee of company A was recorded as tk. 60,000 in place of 65,000. What is the new AM of company A. Also find the corrected combined AM. 4

“Without data, you’re just another person with an opinion.” — William Edwards Deming