

**Pabna Cadet College**

**Test Examination - 2021**

**Class: XII**

**Subject: Statistics First Paper (Creative)**

**Time: 2 hours & 25 minutes**

**Subject Code: 129**

**Full Marks: 50**

Answer five questions taking at least 2 (two) from each group. Figures in the right indicate full marks.

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**Group A**

**1. Prices and respective profits of some products are collected:**

Price (x)	20	30	25
Profit (y)	4	2	5

- (a) What is a discrete variable? 1
- (b) Can fractional numbers be discrete? Explain briefly. 2
- (c) Are, in the stem,  $\sum_{i=1}^n \sum_{j=1}^n x_i y_j = \sum_{i=1}^n x_i y_i$ ? Show statistically. 3
- (d) Prove empirically that sum of square is greater than square of sum of numbers. 4

**2. In the test examination, marks of 10 students in statistics are 69, 85, 77, 66, 92, 42, 97, 53, 83, 81.**

- (a) What is central tendency? 1
- (b) When is median better than arithmetic mean? Explain with an example. 2
- (c) Find the 3rd the quartile, 5th septile, and 61st percentile from the data and explain. 3
- (d) Below which mark lie marks of 60% students? Find using two separate quantiles. 4

**3. Marks of students of two colleges are:**

	Students	AM
PCC	8	82
RCC	10	80

where AM = Arithmetic Mean

- (a) What is change of origin? 1
- (b) Does median depend on change of origin? Show statistically with a made-up data 2
- (c) Determine the combined mean of the students. 3
- (d) If marks of 12 students of JCC are included to get a combined AM of 78.53, what is the AM of marks of JCC students? 4

**4. We have the data:**

$$f_1 = 2, f_2 = 4, f_3 = 6$$

$$x_1 = -3, x_2 = 7, x_3 = 4$$

- (a) What is nominal data? 1
- (b) Prove  $\sum_{i=1}^n (x_i + c) = \sum_{i=1}^n x_i + nc$  2
- (c) Show empirically that  $\sum_{i=1}^3 \sum_{j=1}^3 (f_i - x_j) \neq \sum_{i=1}^3 (f_i - x_i)$  3
- (d) Does summation depend on change of origin and scale? Show with an example (using the given data). 4

## Group B

5. The first four moments around 3 of a data are found to be -1, 5, 20, and 90.

- (a) What is skewness? 1
- (b) Draw shapes of different types of skewness. 2
- (c) Determine the 2nd and 3rd central moments from the stem. 3
- (d) Find the formulae of 4th and 5th central moments in terms of raw moments. 4

6. Diameter, height and volume for Black Cherry trees are obtained (from R Database)

Girth	Height	Volume
8.3	70	10.3
8.6	65	10.3
8.8	63	10.2
10.5	72	16.4
10.7	81	18.8
10.8	83	19.7

- (a) What are moments? 1
- (b) Which moment is equal to the variance? Show mathematically. 2
- (c) Find the first and second raw moments about 2 of volume of the trees. 3
- (d) What do you understand of the possible shape of the data on height and volume of the trees? 4

7. Income of a freelancer in 6 successive months (from Jan to Jun) was found to be 46.0, 49.5, 51.5, 50.6, 56.5, and 60 (in thousands BDT.).

- (a) What is time series data? 1
- (b) What are the components of a time series model? 2
- (c) Determine the 3-yearly moving average from the data. 3
- (d) Draw the moving averages on a graph paper and interpret. 4

8. For proper management and functioning of an organization, gathering and analyzing data are very crucial. Data play a key role in decision making. Numerous Bangladeshi institutions gather data on production, revenue, education, health, and so on.

- (a) What is official statistics? 1
- (b) What do BBS do? 2
- (c) What are the sources of non-official statistics in Bangladesh? Explain in brief. 3
- (d) Are adequate data collection, processing and analysis performed in Bangladesh? Justify your opinion. 4