



'সমানো মন্ত্র: সমিতি: সমানী'

UNIVERSITY OF NORTH BENGAL
B.Sc. Programme 1st Semester Examination, 2023

DSC1/2/3-P1-STATISTICS

DESCRIPTIVE STATISTICS

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

GROUP-A

1. Answer any **five** questions from the following: 1×5 = 5
- (a) What do you mean by raw moments?
 - (b) If mean = 8.2, median = 8 and S.D. = 2.6, then find the skewness.
 - (c) Find the relation between correlation coefficient and coefficient of regression.
 - (d) What do you mean by measure of dispersion?
 - (e) Calculate arithmetic mean of the first n natural numbers.
 - (f) Calculate geometric mean of the following series:
 $1, 3, 9, 27, \dots, 3^n$
 - (g) State the merits and demerits of median.
 - (h) What is Kurtosis?

GROUP-B

2. Answer any **three** questions from the following: 5×3 = 15
- (a) If r_{XY} denotes the correlation coefficient between two variables X and Y , then show that $-1 \leq r_{XY} \leq 1$.
 - (b) Prove that all odd ordered central moments are zero for symmetric distribution.
 - (c) A group of 100 items has mean 60 and variance 25. If the mean of the 1st 50 items is 61 and S.D. is 4.5, find the mean and S.D. of the other 50 items.
 - (d) Prove that $\frac{m_4}{m_2^2} \geq \frac{m_3^2}{m_2^3} + 1$, where the symbols have their usual meanings.
 - (e) The means and S.D. of two samples of sizes n_1 and n_2 are \bar{x}_1, \bar{x}_2 and s_1, s_2 respectively. Show that the S.D. of the composite sample is given by

$$s^2 = \frac{n_1 s_1^2 + n_2 s_2^2}{n_1 + n_2} + \frac{n_1 n_2 (\bar{x}_1 - \bar{x}_2)^2}{(n_1 + n_2)^2}$$

GROUP-C

3. Answer any *two* questions from the following: 10×2 = 20

(a) What are central moments? Establish the relation between central and raw moments. What are the expressions for the first four central moments in terms of raw moments?

(b) What is correlation coefficient? X and Y are two variables with standard deviations S_X and S_Y respectively. They have positive correlation coefficient r .

Determine the value of k such that $X + kY$ and $X + \frac{S_X}{S_Y}Y$ are uncorrelated.

(c) What do you mean by regression coefficients of X on Y ? Prove that the angle θ between the two regression lines is given by

$$\theta = \tan^{-1} \left(\frac{1-r^2}{r} \cdot \frac{s_X s_Y}{s_X^2 + s_Y^2} \right)$$

where the symbols have their usual meanings.

(d) What do you mean by rank correlation? Prove that $R = 1 - \frac{6\sum d^2}{n(n^2 - 1)}$, where the symbols have their usual meanings.

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