



'সমানো মন্ত্র: সমিতি: সমানী'

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 3rd Semester Examination, 2022

GE2-P1-STATISTICS

STATISTICAL METHODS

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 is histogram?
 - (b) Find the variance of the 1st n -natural number.
 - (c) What is mean deviation about median?
 - (d) What is kurtosis?
 - (e) What is frequency distribution?
 - (f) What is statistics?
 - (g) What is data?
 - (h) What is coefficient of variation?

GROUP-B

2. Answer any **three** questions from the following: 5×3 = 15
- (a) Prove that all odd order central moments are zero for symmetrical distribution.
 - (b) What is rank correlation? Deduce Spearman's formula for rank correlation.
 - (c) Show that the arithmetic mean of the two regression coefficients is always greater than the coefficients of correlation.
 - (d) Calculate AM and SD of the following data:

Class Interval	0-9	10-19	20-29	30-39	40-49	50-59
Frequency	15	20	25	24	12	34

- (e) Prove that the magnitude of correlation coefficient r does not depend on any changes in origin or scale.

GROUP-C

3. Answer any *two* questions from the following:

10×2 = 20

(a) (i) Prove that $\beta_2 \geq \beta_1$.

(ii) X and Y are two variables with SDs s_x and s_y respectively. They have positive correlation r . Find the value of k such that $X + kY$ and $X + \frac{s_x}{s_y}Y$ are uncorrelated.

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

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

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

(d) (i) Find the geometric mean of the series 1, 2, 4, 8, 16, 2^n .

(ii) The mean and SD of a sample of size n_1 are \bar{x}_1 and s_1 and those for another sample of size n_2 are \bar{x}_2 and s_2 . Show that the SD of the composite sample is

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

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