'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 1st Semester Examination, 2021

GE1-P1-STATISTICS

STATISTICAL METHODS

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
All symbols are of usual significance.

GROUP-A

1. Answer any ***five*** questions from the following: 1×5 = 5

   (a) What is Ogive?

   (b) Calculate the arithmetic mean of the first n natural numbers.

   (c) What do you mean by measure of dispersion?

   (d) What is central moments?

   (e) What do you mean by frequency distribution?

   (f) What is histogram?

   (g) What do you mean by mean deviation about median?

   (h) Distinguish between primary and secondary data.

GROUP-B

2. Answer any ***three*** questions from the following: 5×3 = 15

   (a) 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.

   (b) If r_{xy} denotes the correlation co-efficient between x and y, then prove that $-1 \le r_{xy} \le 1$.

   (c) Calculate the arithmetic mean and standard deviation of the following frequency distribution.

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

(d) Prove that $\frac{m_4}{m_2^2} \geq \frac{m_3^2}{m_2^3}$; where the symbols have their usual meanings.

(e) Prove that the correlation co-efficient is the geometric mean of the coefficients of regression.

GROUP-C

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

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

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

where the symbols have their usual meanings.

(b) What is correlation coefficient? x and y are two variables with standard deviations s_x and s_y respectively. They have positive correlation co-efficient 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 rank and rank correlation? Prove that $R = 1 - \frac{6\sum d^2}{n(n^2-1)}$, where the symbols have their usual meanings.

(d) What is rth order moments about an arbitrary origin? Establish the relation between central and raw moments. What are the expressions for the first four central moments in terms of raw moments?

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