UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 1st Semester Examinations, 2018

GE1-STATISTICS

STATISTICAL METHODS

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

GROUP-A

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

   (a) What is skewness?

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

   (c) What do you mean by mean deviation?

   (d) State the merits and demerits of median.

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

   (f) Median and mode of a distribution is 39 and 37. Find mean value.

   (g) Distinguish between primary data and secondary data.

   (h) What is histogram?

GROUP-B

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

   (a) Prove that $\frac{m_4}{m_2^2} \geq \frac{m_3^2}{m_2^3} + 1$, where the symbols have their usual meanings.

   (b) If r_{xy} denotes the correlation coefficient between two variables x and y, then show that $-1 \leq r_{xy} \leq 1$.

   (c) Prove that correlation coefficient is the geometric mean between the two regression coefficients.

   (d) 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.

   (e) Prove that all odd-ordered central moments are zero for symmetric distribution.

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 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.

(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 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) (i) 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?

(ii) The arithmetic mean of a certain distribution is 5. The second and third moments about the mean are 20 and 140 respectively. Find the third moment of the distribution about 10.

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