



UNIVERSITY OF NORTH BENGAL
B.Sc. Honours 3rd Semester Examination, 2020

GE3-STATISTICS

STATISTICAL METHODS

Full Marks: 40

ASSIGNMENT

*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

Answer all questions

2×4 = 8

1. Obtain mean and variance of first n natural numbers.
2. The first four moments of a distribution about the value 4 of the variable are -1.5 , 17 , -30 and 108 .
Find the moments about mean.
3. The variables X and Y are connected by the equation $aX + bY + c = 0$. Show that the correlation between them is -1 , if the signs of a and b are alike and $+1$, if they are different.
4. In a partially destroyed laboratory record of an analysis of correlation data, the following results were obtained $\sigma_X^2 = 9$.
Regression equations: $8X - 10Y + 66 = 0$
 $40X - 18Y = 214$
Find:
 - (i) the mean values of X and Y .
 - (ii) the correlation co-efficient between X and Y , and
 - (iii) the standard deviation of Y .

GROUP-B

Answer any four questions

8×4 = 32

5. (a) What is rank correlation? 2
 (b) Deduce Spearman's formula for rank correlation coefficient. 6
6. (a) What do you mean by coefficient of variation? 1
 (b) Calculate the coefficient of variation where Pearson's measure of Skewness = 0.42; Arithmetic mean = 86, Median = 80. 2
 (c) Show that, for a given set of observations the sum of the squares of deviation will be minimum when the deviation are taken from the arithmetic mean. 5
7. Define harmonic mean. Prove that $AM \geq GM \geq HM$ and state the case when both of them are equal. 2+6
8. (a) What do you mean by Kurtosis? 1
 (b) Prove that 3+4
 (i) $\beta_2 \geq 1$
 (ii) $\beta_2 - \beta_1 - 1 \geq 0$.
 When β_1 and β_2 have usual meanings.
9. (a) Derive the regression equation of x on y . 4
 (b) Show that the angle between two regression lines y on x and x on y will be 4

$$\tan^{-1} \left[\frac{s_x s_y (1 - r^2)}{(s_x^2 + s_y^2) |r|} \right]$$

where s_x , s_y and r are the standard deviation of x , standard deviation of y and correlation coefficient respectively.

- 10.(a) If three uncorrelated variables x_1 , x_2 and x_3 have the same standard deviation, find the coefficient of correlation between $x_1 + x_2$ and $x_2 + x_3$. 3
 (b) Prove that, all odd order central moments are zero for symmetric distribution. 5

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