



'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 3rd Semester Examination, 2021

GE2-P1-STATISTICS

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** out of eight questions: 1×5 = 5
- (a) Define the Relative Frequency.
 - (b) Find the standard deviation of first n natural numbers.
 - (c) Define the term Frequency Polygon.
 - (d) Write down the relation between Mean, Median and Mode.
 - (e) Define the term Frequency.
 - (f) Define the term Mean deviation about Mean.
 - (g) If $y_i = x_i - c$ ($i = 1, 2, \dots, n$) where c is constant. Prove that $\bar{x} = c + \bar{y}$.
 - (h) Define the term moment about the origin.

GROUP-B

2. Answer any **three** out of five questions: 5×3 = 15
- (a) Prove that for a given set of observations the sum of the squares of deviations is minimum when derivatives are taken from the arithmetic mean.
 - (b) Define Spearman's formula for rank correlation coefficient.
 - (c) If m'_2 and m_2 are respectively the second moment about an arbitrary origin a and that about \bar{x} , then show that $m'_2 = m_2 + d^2$, where $d = \bar{x} - a$.
 - (d) Prove that the coefficient of correlation is the geometric mean of coefficients of regression.
 - (e) Prove that A.M. \geq G.M. \geq H.M. and state the case when all of them are equal.

GROUP-C

3. Answer any *two* out of four questions: 10×2 = 20

(a) Find the first, the second and the third central moments of the frequency distribution of expenditure (Rs. per month) given below: 10

Expenditure	3-6	6-9	9-12	12-15	15-18	18-21	21-24	24-27
No. of families	28	292	389	212	59	18	2	5

(b) (i) The mean and S.D. of a group of 25 observations were found to be 30 and 3 respectively. After the calculation were made it was found that two of the observation were incorrect, which were recorded as 29 and 31. Find the mean and S.D. if the incorrect observations were excluded. 6

(ii) Prove that: 4

$$\beta_2 \geq 1,$$

$$\beta_2 - \beta_1 - 1 \geq 0$$

(c) (i) Show that the angle between two regression lines y on x and x on y will be: 6

$$\tan^{-1} \left(\frac{S_x S_y (1 - r^2)}{(S_x^2 + S_y^2) |r|} \right)$$

S_x , S_y and r be the standard deviation of x , standard deviation of y and correlation coefficient respectively.

(ii) The numbers 3.2, 5.8, 7.9 and 4.5 have frequencies $x(x + 2)$, $(x - 3)$ and $(x + 6)$ respectively. If the Arithmetic mean is 4.876. Find the value of x . 4

(d) (i) Show that for two observations x_1 and x_2 which are positive values of a variate, the geometric mean is equal to the geometric mean of their arithmetic and harmonic means. 5

(ii) Show that the weighted arithmetic mean is unaffected if all the weights are multiplied by some common factor. 5

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