



'समानो मन्त्रः समितिः समानी'

**UNIVERSITY OF NORTH BENGAL**  
B.Sc. Major 1st Semester Examination, 2023

**USTAMAJ11001-STATISTICS**

**DESCRIPTIVE STATISTICS-I**

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 do you mean by Statistics?
  - (b) Calculate the geometric mean of the 1st  $n$ -natural numbers.
  - (c) What do you mean by primary data?
  - (d) What are the different measures of central tendency?
  - (e) What do you mean by measure of dispersion?
  - (f) What is central moment?
  - (g) What do you mean by mean deviation?

**GROUP-B**

2. Answer any **three** questions from the following: 5×3 = 15
- (a) Write a short note on measures of relative dispersion.
  - (b) Prove that if there be  $t$  sets of values of  $x$ , containing  $n_1, n_2, n_3, \dots, n_t$  values and having means  $\bar{x}_1, \bar{x}_2, \dots, \bar{x}_t$ , then the grand mean of  $x$  is

$$\bar{x} = \frac{\sum_{i=1}^t n_i \bar{x}_i}{\sum_{i=1}^t n_i}$$

- (c) Write a short note on histogram. What are the uses of histogram?
- (d) Compare among mean, median and mode.
- (e) Calculate the mean deviation of the following values about the median.

8, 15, 53, 49, 19, 62, 7, 15, 95 and 77

**GROUP-C**

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

(a) (i) If  $y = a + bx$ , then prove that  $s_y = |b|s_x$ , where  $s_x$  and  $s_y$  are the sd's of  $x$  and  $y$ . 5+5

(ii) The means and sd's of two samples of size  $n_1$  and  $n_2$  are  $\bar{x}_1, \bar{x}_2$  and  $s_1, s_2$  respectively. Show that the sd of the composite sample is given by

$$s^2 = \frac{n_1s_1^2 + n_2s_2^2}{n_1 + n_2} + \frac{n_1n_2(\bar{x}_1 - \bar{x}_2)^2}{(n_1 + n_2)^2}$$

(b) What is  $r$ th 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?

(c) (i) Prove that  $\frac{m_4}{m_2} \geq \frac{m_3^2}{m_2^3} + 1$ , where the symbols have their usual meanings. 6+4

(ii) Write a short note on Kurtosis.

(d) (i) Prove that all odd order central moments are zero for symmetrical distribution.

(ii) What is skewness? Explain the different measures of skewness.

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