'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

MDC 1st Semester Examination, 2023

UPOAMDC11015-STATISTICAL SURVEY

Time Allotted: 2 Hours 30 Minutes | Full Marks: 60

The figures in the margin indicate full marks.

GROUP-A

1. Answer any ***four*** questions: 3×4 = 12

(a) Explain the term 'classification' and 'tabulation'.

(b) Explain the term 'class limits' and 'class boundaries' with an example.

(c) Define the terms: Frequency, Relative frequency, Cumulative frequency.

(d) Define the term 'Parameter' in case of a population.

(e) Find the median of: 88, 72, 33, 29, 70, 54, 86, 91, 57, 61.

(f) 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.

GROUP-B

2. Answer any ***four*** questions: 6×4 = 24

(a) If $y_i = \frac{x_i - c}{d}$ $(i = 1, 2, 3, ..., n)$, where c and d are constants, prove that $\bar{x} = c + d\bar{y}$. 6

(b) Show that the weighted arithmetic mean is unaffected, if all the weights are multiplied by some common factor. 6

(c) Show that $\sum_{i=1}^{n}(x_i - A)^2$ is least, if $A = \bar{x}$, but $\sum_{i=1}^{n}|x_i - A|$ is least, if $A =$ median. 6

(d) What is 'bias' and how does it arise in sampling? 2+4

(e) Prove that the standard error of sample proportion in case of SRSWOR is 6

$\sqrt{\frac{PQ}{n}}\left(\sqrt{\frac{N-n}{N-1}}\right)$, where n = sample size, N = population size, $P + Q = 1$.

(f) Draw an ogive of 'more than' type on the data given below: 6

Wt. in gms.	410-419	420-429	430-439	440-449	450-459
Frequency	14	20	42	54	45

GROUP-C

3. Answer any ***two*** questions: 12×2 = 24

(a) Prove that 6

(i) A.M. ≥ G.M. ≥ H.M., where A.M., G.M., H.M. represent arithmetic, geometric and harmonic means.

(ii) Obtain the values of Median and the two Quartiles: 6

391, 384, 591, 407, 672, 522, 777, 773, 2488, 1490

(b) (i) If two groups contains n_1 and n_2 observations with means $\bar{x}_1$ and $\bar{x}_2$ respectively, then prove that the mean $(\bar{x})$ of the composite group of $(n_1 + n_2)$ observations is, $\left(\frac{n_1\bar{x}_1 + n_2\bar{x}_2}{n_1 + n_2}\right)$. 6

(ii) If x_1 and x_2 are two positive values of a variate, prove that their geometric mean is equal to the geometric mean of their arithmetic and harmonic means. 6

(c) (i) Show that the expression for median is, 6

$$\text{Median} = l_1 + \frac{\left(\frac{N}{2} - \sum f_1\right)}{f_{\text{med}}} \times c,$$

where symbols have their usual meanings.

(ii) Discuss the concept 'standard error' of a statistic. What does the standard error of a statistic measure? 6

(d) (i) Explain clearly the concept of Sampling Distribution of a Statistic. 6

(ii) Discuss in detail how anyone can construct a frequency table from raw data relating to a continuous variable. 6

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