

**Bachelor of Science (B.Sc.) Semester-II (C.B.S.) Examination****STATISTICS (DESCRIPTIVE STATISTICS-II)****Compulsory Paper—2**

Time : Three Hours]

[Maximum Marks : 50

**Note :—** All questions are compulsory and carry equal marks.

1. (A) Define mean, median and mode. Derive the formula for median and mode to be used in a grouped frequency distribution.  
Explain the effect of change of origin and scale on mean. 10
- OR**
- (E) Define geometric mean and harmonic mean. Also, state their formulae for grouped frequency distribution.  
Give a situation each where harmonic mean and Geometric mean are appropriate averages. Let  $G_1$  and  $G_2$  be the geometric means of two sets of  $n_1$  and  $n_2$  values respectively. Derive the formula for pooled geometric mean. 10
2. (A) Define standard deviation. State its merits and demerits.  
(B) Derive the formula for pooled variance of two groups of values.  
(C) For ungrouped data, show that standard deviation is not less than mean deviation from mean.  
(D) Find the standard deviation of a set of  $n$  values which are in arithmetic progression. 2.5×4
- OR**
- (E) Define mean deviation and quartile deviation. Also, state their formulae in case of a grouped frequency distribution. Give two conditions where quartile deviation is more suitable than mean deviation, as a measure of dispersion.  
(F) Define raw and central moments of order  $r$ . Derive an expression for  $r^{\text{th}}$  central moment in terms of raw moments. Hence, state the formulae for the second, third and fourth central moments. 5+5
3. (A) Explain symmetry and skewness with the help of graphs.  
For a frequency distribution, state the conditions on moments, quartiles and measures of central tendency, if the distribution is symmetrical, positively skewed or negatively skewed. Define various measures of skewness and explain their use in studying the skewness.  
State the empirical limits of Karl Pearson's coefficient of skewness and derive the limits of Bowley's coefficient of skewness. 10
- OR**
- (E) Define quartiles, deciles and percentiles. In case of a grouped frequency distribution, explain how quartiles can be obtained graphically. Also, state its formula.  
(F) Write a note on Kurtosis of a frequency distribution. 5+5
4. (A) What is a scatter plot ? Explain its use. Define simple correlation coefficient and obtain its limits.  
(B) Explain the use of rank correlation. Derive the formula for Spearman's rank correlation in case of no tie. 5+5
- OR**
- (E) Derive the equation to the line of regression of  $Y$  on  $x$ .  
Show that :  
(i) Mean of errors of prediction is zero.  
(ii) Coefficient of determination is equal to the proportion of total variability that is explained by linear regression.  
(iii) Mean of observed values is equal to the mean of predicted values. 10

5. Answer any **ten** of the following questions

- (A) Give the formula for weighted arithmetic mean.
- (B) Find the mean of first  $n$  natural numbers.
- (C) Find the weighted mean of first  $n$  natural numbers when the weights are the corresponding numbers.
- (D) Define range and give its main drawback.
- (E) If variance of 10 values is 3.5, then what is the variance of the 10 value after subtracting 2 from each value ? Justify your answer.
- (F) Define coefficient of variation. How is it used ?
- (G) Which decile, quartile and percentile are equal ?
- (H) On a cumulative frequency diagram of greater than type, let A be a point. If y-coordinate of A is  $0.9N$ , where  $N$  is a total frequency. Then, what is the x-coordinate of A ?
- (I) In a box-plot, what percentage of values fall in the box ?
- (J) If the correlation coefficient between  $x$  and  $y$  is 0.58, then what is the correlation coefficient between :
  - (i)  $3x$  and  $5y$
  - (ii)  $x-8$  and  $y+10$  ?
- (K) Define Kendall's  $\mathfrak{S}$ .
- (L) Name the method which is used to find estimates of unknown constants in the predicting formula.

1×10