

Bachelor of Arts (B.A.) Part-I Second Semester Examination**STATISTICS****Optional Paper—2**

Time : Three Hours]

[Maximum Marks : 50

N.B. :— All questions are compulsory and carry equal marks.

1. (A) Define arithmetic mean and derive formula for pooled mean of two sets of values. Write its extension for a case K groups of values.
- (B) Define mode. Derive the formula for mode of a grouped frequency distribution.
- (C) Explain the importance of weights and define various weighted means.
- (D) Give merits and demerits of mean as a measure of central tendency. 2.5×4

OR

- (E) Define geometric mean and develop a formula for pooled geometric mean of two groups.

A variable takes values 1, r, r²,, r⁽ⁿ⁻¹⁾. Calculate the arithmetic mean and geometric mean of the values. State two drawbacks of geometric mean as an average. 10

2. (A) Define mean deviation, variance and standard deviation. Write their formulae in case of a grouped frequency distribution. Also, state the merits and demerits of these measures of dispersion. Explain the effect of change of origin and scale on variance. 10

OR

- (E) State the characteristics of a good measure of dispersion.
- (F) Derive an expression for rth central moment in terms of raw moments.
- (G) Explain the need for measures of relative dispersion. Define such measure based on standard deviation.
- (H) Show that standard deviation is not less than mean deviation from mean. 2.5×4

3. (A) Define quartiles. How can these be obtained graphically ? Define a measure of :
 - (i) central tendency,
 - (ii) dispersion, and
 - (iii) skewness based on quartiles.

- (B) Write a short note on Kurtosis of a frequency distribution. 5+5

OR

- (E) What are deciles and percentiles ? State the formula for ith decile (i = 1, 2,,9) and ith percentile (i = 1, 2,, 99). How can 7th decile be obtained graphically ?
- (F) What is a box-plot ? How can it be used to study skewness ? What are outliers ? How can these be detected using a box-plot ? 5+5

4. (A) Derive an equation to the line of regression of Y on x. Define the regression coefficient of Y on x. Show that :
- (i) Correlation coefficient is geometric mean of regression coefficients
 - (ii) If one regression coefficient is greater than 1 then the other is less than 1.
 - (iii) Arithmetic mean of regression coefficients is greater than the correlation coefficient. 10

OR

- (E) Define Kendall's rank correlation. Derive its formula in case of ties. Derive its limits. Show that Kendall's τ can be written as a product moment correlation. 10

5. Solve any **ten** of the following questions :

- (A) Calculate arithmetic mean of first n natural numbers.
- (B) State two advantages of median as a measure of central tendency.
- (C) Give a situation where harmonic mean is an appropriate average.
- (D) When are Sheppard's corrections used ?
- (E) Define quartile deviation and a measure of relative dispersion based on quartiles.
- (F) For what average, does mean deviation take the smallest value ?
- (G) How are ranks given to the tied items ?
- (H) Define coefficient of determination.
- (I) Give formula for simple correlation coefficient and state its limits.
- (J) Define Karl Pearson's coefficient of skewness.
- (K) Define β_1 and show that it is non-negative.
- (L) What percentage of values fall between 2nd decile and 70th percentile ? 1×10