2018

STATISTICS

(Major)

Paper : 1.1

(Descriptive Statistics)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following questions as directed : 1×7=7

(a) _____ classification is done according to some characteristics that can be measured.

(Fill in the blank)

(b) State which of the statements is correct :

In drawing box-plot, we use

(i) median, mode and standard deviation

(ii) first, second and third quartiles

(c) State whether the following statement is true or false :

For any frequency distribution

mean = median = mode

(d) The algebraic sum of deviations of a set of n values from their arithmetic mean is

(i) n

(ii) 0

(iii) 1

(iv) None of the above

(Choose the correct option)

(e) If $\beta_2 > 3$, the distribution is said to be _____.

(Fill in the blank)

(f) If the regression coefficients of X on Y and Y on X are $-0{\cdot}4$ and $-0{\cdot}9$ respectively, then the correlation coefficient between X and Y is _____.

(Fill in the blank)

(g) Correlation ratio is a suitable measure of correlation if the relation between X and Y is _____.

(Fill in the blank)

2. Answer the following questions : 2×4=8

(a) Distinguish between a schedule and a questionnaire.

(b) What is standard deviation? Explain its superiority over other measures of dispersion.

(c) If the correlation coefficient between two variables X and Y is r, then what would be the correlation coefficient between

$$u = \frac{x-a}{h} \text{ and } v = \frac{y-b}{k}?$$

(d) What is the effect of change of origin and scale on moments?

3. Answer any *three* of the following : 5×3=15

(a) Distinguish between classification and tabulation of data, and explain their relative importance in statistical analysis.

(b) Write an explanatory note on box-plot.

(c) Show that for any frequency distribution kurtosis is greater than unity.

(d) Show that the coefficient of correlation between the observed and the estimated values of Y obtained from the line of regression of Y on X is the same as that between X and Y.

(e) Prove that for any discrete distribution, standard deviation is not less than mean deviation from mean.

Either

4. (a) What are the different types of diagrams used in statistics? Explain bar diagram with suitable examples. 5

(b) Define mode for continuous frequency distribution. Also derive the formula for mode. 5

Or

5. (a) Let r be the range and s be the standard deviation of a set of observations $x_1, x_2, \ldots, x_n$; then prove by general reasoning or otherwise $s \leq r$. 5

(b) Explain the method of measuring skewness and kurtosis of a frequency distribution. 5

Either

6. In a discrete series, if deviations are small compared with mean M so that $(x / M)^3$ and higher powers of (x / M) are neglected, show that

(i) $G = M\left(1 - \frac{1}{2}\frac{\sigma^2}{M}\right)$

(ii) $M^2 - G^2 = \sigma^2$ 10

Or

7. Explain the method of orthogonal polynomial. Also mention the advantages of using orthogonal polynomials over other method. 10

Either

8. (a) Write notes on the following : 5

(i) Absolute moments

(ii) Factorial moments

(b) Write a note on intra-class correlation. 5

Or

9. *(a)* Derive the line of regression of Y on X. 5

(b) Define multiple correlation coefficient. If the multiple correlation coefficient of X_1 on X_2 and X_3 is denoted by $R_{1 \cdot 23}$, then prove that

$$R^2_{1 \cdot 23} = \frac{r^2_{12} + r^2_{13} - 2r_{12}\, r_{13}\, r_{23}}{1 - r^2_{23}}$$ 5

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