

**2020**

**STATISTICS — GENERAL**

**Paper : GE/CC-1**

**(Descriptive Statistics)**

**Full Marks : 50**

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

1. Answer **any ten** of the following : 1×10
- (a) Name two different diagrams used in representing an attribute.
  - (b) Give examples of a Discrete variable and a Continuous variable.
  - (c) Give a real life example where mode is the appropriate measure of central tendency.
  - (d) Let 'G' be the G.M. of a given series of observations. If each observation of the series is multiplied by 2, what will be the G.M. of the new series of observations?
  - (e) Prove or disprove :  $\sum_{i=1}^{50} |i - 25.1| = \sum_{i=1}^{50} |i - 25.2|$
  - (f) Find the standard deviation of two real numbers 'a' and 'b'.
  - (g) Write down a measure of relative dispersion.
  - (h) For two variables show that the strictly positive correlation coefficient cannot be greater than arithmetic mean of two regression coefficients.
  - (i) What is a Scatter Diagram?
  - (j) Find the angle between two regression lines when the correlation coefficient is equal to 0.
  - (k) If the two regression lines are  $2x + y = 4$  and  $5x + 8y = 7$ , find the value of the correlation coefficient.
  - (l) Write down a measure of kurtosis based on moments.
  - (m) Find the correlation coefficient between  $x$  and  $y$  where  $y = 3x + 2$ .
  - (n) Write down the formula of Spearman's rank correlation coefficient.
  - (o) Define multiple correlation coefficient.

**Please Turn Over**

2. Answer **any four** of the following :

- (a) Define Histogram and describe how it is constructed. Mention one use of it. 2+2+1
- (b) What are the desirable properties of an ideal average? Give an example where median is taken to be a better measure of central tendency than mean. 4+1
- (c) Obtain the standard deviation of first  $n$  natural numbers. 5
- (d) Show that the Central Moments are invariant under the change of origin, but not under the change of scale. 5
- (e) Discuss the merits and demerits of the standard deviation as a measure of dispersion. 5
- (f) For a set of  $n$  observations show that  $S^2 \leq R^2/4$ ,  
where  $R$  and  $S$  denote respectively the range and standard deviation of the observations. 5

3. Answer **any two** of the following :

- (a) What does correlation coefficient  $r$  measure? Show that it lies between  $-1$  and  $+1$ . When will it be  $-1$  or  $+1$ ? 3+5+2
- (b) Let, there be two groups of ' $n_1$ ' and ' $n_2$ ' values with means  $\bar{x}_1, \bar{x}_2$  and variances  $s_1^2, s_2^2$  respectively. Then, show that the combined variance  $s^2$  of  $(n_1+n_2)$  values can be expressed as :

$$s^2 = \frac{n_1 s_1^2 + n_2 s_2^2}{n_1 + n_2} + \frac{n_1 n_2}{(n_1 + n_2)^2} (\bar{x}_1 - \bar{x}_2)^2$$

Hence, show that when the group means are equal  $s^2$  lies between  $s_1^2$  and  $s_2^2$ . 7+3

- (c) What do you mean by skewness? Describe different types of skewness with diagrams. Give a measure of skewness based on quartiles. Obtain the range of this measure. 2+2+2+4
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