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3 (Sem-1/CBCS) STA HC 1

2020

(Held in 2021)

STATISTICS

(Honours)

Paper : STA-HC-1016

(Descriptive Statistics)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

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

(a) It is necessary to find cumulative frequencies in order to draw a/an

(i) histogram

(ii) frequency polygon

(iii) ogive

(iv) pie chart

(Choose the correct option)

Contd.

(b) If the harmonic mean of the two numbers 'a' and 'b' is 5 and if $a = 5$, then b is _____. (Fill in the blank)

(c) "Two series A and B have the same standard deviations, but the mean of A is greater than that of B . The coefficient of variation of A is less than that of B ".
(State True or False)

(d) For consumer price index, price quotations are collected from

- (i) wholesale dealers
- (ii) retailers
- (iii) fair price shops
- (iv) government depots.

(Choose the correct option)

(e) What do you mean by controlled experiment?

(f) In a regression line of Y on X , the variable X is known as

- (i) independent variable
- (ii) regressor
- (iii) explanatory variable
- (iv) All of the above.

(Choose the correct option)

(g) State the limits for Spearman's rank correlation coefficient.

2. Answer the following questions : $2 \times 4 = 8$

(a) State with suitable example, the distinction between an attribute and a variable.

(b) Prove that the arithmetic mean of a variable whose given values are all equal, must be the same as their common value.

(c) State *any two* assumptions of Karl Pearson's correlation coefficient.

(d) Give the interpretation of Wholesale price index and Cost of living index number.

3. Answer *any three* of the following questions : $5 \times 3 = 15$

(a) Differentiate between —

(i) primary data and secondary data

(ii) questionnaire and schedule.

$$2\frac{1}{2} + 2\frac{1}{2} = 5$$

(b) Define absolute moment and factorial moment. If $Y = a + bX$ be a linear function of X ; then prove that the arithmetic means of Y and X are related in the same way as Y and X themselves are.

2+3=5

(c) Write a note on different scales of measurement — nominal, ordinal, interval and ratio.

(d) Explain briefly different types of errors in Index number.

(e) Define Skewness and Kurtosis. For discrete distribution, prove that $\beta_2 > 1$, notation having usual meaning.

2+3=5

4. Answer **either** (a) **or** (b) :

(a) (i) The sum of 10 items is 12 and sum of their squares is 16.9. What is the value of the standard deviation? 2

(ii) Write a brief note on Sheppard's Correction for moments. 3

(iii) The variables X and Y are connected by the equation $aX + bY + c = 0$. Show that the correlation between them is -1 if the signs of ' a ' and ' b ' are alike and $+1$ if they are different. 5

(b) (i) Why do we calculate in general, only the first four moments about mean of a distribution and not the higher moments? 2

(ii) Examine the consistency of the following data —

$N = 1000$; $(A) = 600$; $(B) = 500$;
 $(AB) = 50$, the symbols having their usual meaning. 2

(iii) If $L(p)$ and $P(q)$ represent respectively Laspeyre's index number for prices and Paasche's index number for quantities, show that

$$\frac{L(p)}{L(q)} = \frac{P(p)}{P(q)} \quad 6$$

5. Answer **either** (a) or (b) :

(a) (i) Differentiate between population and sample. 2

(ii) Define raw and central moments of a frequency distribution. Obtain the relationship between the central moments of order r in terms of the raw moments.

1+4=5

(iii) Briefly describe the term 'deflation' in Index number. 3

(b) (i) Give an idea of scrutiny of data for internal consistency. 2

(ii) For a trivariate distribution, explain partial correlation coefficient with example. 2

(iii) What do you mean by method of least squares? Derive the equation of the line of regression of Y on X .

1+5=6

6. Answer **either** (a) or (b) :

(a) (i) Define standard deviation. If n_1, n_2 are the sizes, \bar{x}_1, \bar{x}_2 , the means and σ_1, σ_2 , the standard deviations of two series respectively, then find the standard deviation σ of the combined series of size $n_1 + n_2$.

1+6=7

(ii) Write a note on Index of industrial production. 3

(b) (i) Write a note on choice of weights in construction of index number. 3

(ii) Define Multiple correlation coefficient with usual notations, prove that

$$R_{1.23}^2 = \frac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1 - r_{23}^2} \quad 1+6=7$$
