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3 (Sem–1/CBCS) STA HC 1

2021

(Held in 2022)

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 as directed : 1×7=7

   (a) The column headings of a statistical table are known as

   (i) sub-titles

   (ii) stubs

Contd.

(iii) reference notes

(iv) captions

(Choose the correct option)

(b) If 5 is subtracted from each observation of a set, then the arithmetic mean of the new set of observations is reduced by _____.

(Fill in the blank)

(c) The best measure of dispersion for comparison of *two* different series is coefficient of variation.

(State True ***or*** *False)*

(d) With usual notations, if for two attributes A and B, $(AB) > \frac{(A)(B)}{N}$, the attributes are

(i) independent

(ii) positively associated

(iii) negatively associated

(iv) None of the above

(Choose the correct option)

(e) Laspeyres price index number uses the _____ quantities as weights.

(Fill in the blank)

(f) If X and Y are independent, the value of regression coefficient β_{YX} is equal to

(i) 1

(ii) ∞

(iii) 0

(iv) None of the above

(Choose the correct option)

(g) The partial correlation coefficient lies between $-\infty$ and $+\infty$.

*(State True **or** False)*

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

(a) State *two* limitations of statistics.

(b) For a distribution, mean is 10 and variance is 16. Find the first two moments about origin.

(c) Prove that Paasche's index number does not satisfy the time reversal test.

(d) "The regression coefficient of X on Y is 3.2 and that of Y on X is 0.8." Is this statement correct ? Give reasons in support of your answer.

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

(a) Give a brief description of different components of a statistical table. 5

(b) What is standard deviation ? Find standard deviation of the first n natural numbers. 1+4=5

(c) Define multiple and partial correlation coefficient. If $r_{12} = 0.85, r_{13} = 0.65$ and $r_{23} = 0.72$; find $R_{1.23}$. (Notations having usual meaning.) 2+3=5

(d) Suppose P_{01}^{La}, P_{01}^{Pa} and P_{01}^{ME} denote Laspeyres, Paasche and Marshall-Edgeworth price index numbers respectively. If $P_{01}^{La} < P_{01}^{Pa}$, then prove that

$$P_{01}^{La} < P_{01}^{ME} < P_{01}^{Pa}$$ 5

(e) Obtain the normal equations for fitting of the 2nd degree parabola $y = a + bx + cx^2$ on the basis of n pairs $(x_1, y_1), (x_2, y_2), \ldots (x_n, y_n)$ of values of (X, Y). 5

4. Answer either *(a)* **or** *(b)* : 10

(a) (i) Distinguish between attributes and variables. 2

(ii) Discuss the construction of cost of living index number by family budget enquiry. 3

(iii) Prove that correlation coefficient lies between −1 and +1. Give the geometrical interpretation of the case when $r = +1$. 4+1=5

(b) (i) Write a brief note on consistency of data with special reference to attributes. 2

(ii) Write a note on selection of base period in construction of index number. 3

(iii) Prove that regression coefficients are independent of charge of origin but not of scale. 5

5. Answer either *(a)* **or** *(b)* : 10

(a) *(i)* Write briefly on control experiments. 2

(ii) Find the arithmetic mean of the AP series a, $a+d$, $a+2d$,....., $a+2nd$. 3

(iii) Elaborate on the uses of cost of living index number. 5

(b) *(i)* What does Karl Pearson correlation coefficient measure ? 1

(ii) Define mode and derive its formula. 1+5=6

(iii) State the properties of multiple correlation coefficient. 3

6. Answer either *(a)* **or** *(b)* : 10

(a) *(i)* State the values of β_1 and β_2 for a symmetric distribution. 1

(ii) Write a brief note on box plot. 3

(iii) Derive the formula for Spearman's rank correlation coefficient in case of non-repeated ranks. 6

(b) *(i)* Define chain-based index number. 2

(ii) What is skewness ? State various measures of skewness. 1+2=3

(iii) With usual notations, prove that

$$r_{12.3} = \frac{r_{12} - r_{13}r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}.$$ 5
