Total No. of Printed Pages—11

1 SEM TDC STSH (CBCS) C 1 (N/O)

2022

(Nov/Dec)

STATISTICS

(Core)

Paper : C–1

(Descriptive Statistics)

The figures in the margin indicate full marks for the questions

(New Course)

Full Marks : 55
Pass Marks : 22

Time : 3 hours

1. Choose the correct answer from the following alternatives : 1×5=5

(a) Which one of the following is not a quantitative data?

(i) Weight of persons

(ii) Sex of newborn babies

(iii) Number of persons per family

(iv) Percentage of marks in English

(b) Harmonic mean cannot be calculated for a data set having

(i) positive number

(ii) negative number

(iii) zero

(iv) both (i) and (ii)

(c) The value of coefficient of kurtosis β_2 can be

(i) less than 3

(ii) greater than 3

(iii) equal to 3

(iv) All of the above

(d) The partial correlation coefficient $r_{13.2}$ is the correlation between

(i) x_1 and x_2 keeping x_3 constant

(ii) x_2 and x_3 keeping x_1 constant

(iii) x_1 and x_3 keeping x_2 constant

(iv) None of the above

(e) Price relative is equal to

(i) $\frac{\text{Price in the given year}}{\text{Price in the base year}} \times 100$

(ii) $\frac{\text{Price in the base year}}{\text{Price in the current year}} \times 100$

(iii) Price in the given year $\times 100$

(iv) Price in the base year $\times 100$

2. Answer the following questions in brief : $2 \times 5 = 10$

(a) Explain the difference between parameter and statistic.

(b) Distinguish between raw moment and central moment.

(c) What purpose is served by measuring kurtosis?

(d) Why do there exist two regression lines?

(e) "Index numbers are economic barometers." Elucidate the statement.

3. (a) What are different measuring scales used in Statistics? Illustrate each of them with examples. 7

Or

(b) Prepare a blank table, showing the distribution of population of a country regionwise (4 regions) according to sex and age group (3 age groups).

Check whether the following cases of data is consistent or not : 4+3=7

$(A) = 300, (B) = 600, (AB) = 100, N = 1000$

4. Answer any *two* of the following questions : 7×2=14

(a) What are the relative and absolute measures of dispersion? The first of the two samples has 100 items with mean 15 and standard deviation 3. If the whole group has 250 items with mean 15·6 and standard deviation $\sqrt{13 \cdot 44}$, find the standard deviation of the second group. 2+5=7

(b) Establish the relationship between central moments in terms of raw moments. Why do we calculate in general only the first four moments about mean of a distribution and not the higher moments? 5+2=7

(c) What is skewness? Write different measures used to test skewness of a set of data. The first four central moments of a distribution are 0, 2·5, 0·7 and 18·75. Check the skewness and kurtosis of the distribution and comment on the distribution. 2+2+3=7

5. Answer any *two* of the following questions : 6×2=12

(a) How can you use scatter diagram to obtain an idea of the extent and nature of correlation coefficient? Show that the correlation coefficient is the geometric mean of regression coefficients. 3+3=6

(b) Explain the concept of multiple correlation. The following informations are available for three variables x_1, x_2 and x_3 :

$$r_{12} = -0 \cdot 89 \quad r_{13} = -0 \cdot 97 \quad r_{23} = 0 \cdot 96$$

$$\sigma_1 = 4 \cdot 24 \quad \sigma_2 = 5 \cdot 29 \quad \sigma_3 = 28 \cdot 31$$

Calculate the partial regression coefficients for a regression equation of x_1 on x_2 and x_3. 2+4=6

(c) What are the assumptions made in a linear regression model? Determine the normal equations for fitting the regression line $y = a + bx + cx^2$, where a, b and c are unknown constants. 2+4=6

6. (a) Define index number. Describe different problems faced in constructing of an index number. 2+5=7

Or

(b) Why is Fisher's index number called ideal? Show that it satisfies both time-reversal test and factor-reversal test. 2+5=7

(Old Course)

Full Marks : 50
Pass Marks : 20

Time : 2 hours

1. Choose the correct answer from the following alternatives : 1×5=5

(a) Temperature (in degree celsius) is measured on

(i) nominal scale

(ii) ordinal scale

(iii) interval scale

(iv) ratio scale

(b) Harmonic mean cannot be calculated for a data set having

(i) positive number

(ii) negative number

(iii) zero

(iv) both *(i)* and *(ii)*

(c) The value of coefficient of kurtosis β_2 can be

(i) less than 3

(ii) greater than 3

(iii) equal to 3

(iv) All of the above

(d) In two sets of variables X and Y with 50 observations each, the following data were observed :

$$\bar{x} = 10, \sigma_x = 3, \bar{y} = 6, \sigma_y = 2, r_{xy} = 0 \cdot 3$$

Then $\text{cov}(X, Y)$ is

(i) 2·8

(ii) 1·8

(iii) 0·8

(iv) 3·8

(e) The weighted average of price relatives using base value as weights is same as

(i) Laspeyre's price index

(ii) Laspeyre's quantity index

(iii) Kelly's price index

(iv) Paasche's price index

2. Answer the following questions in brief : 2×5=10

(a) Define the terms sample and population.

(b) Distinguish between raw moment and central moment.

(c) What purpose is served by measuring kurtosis?

(d) Why do there exist two regression lines?

(e) "Index numbers are economic barometers." Elucidate the statement.

(Continued)

3. *(a)* Explain different measuring scales used in Statistics with examples. 7

Or

(b) Prepare a blank table, showing the distribution of population of a country regionwise (4 regions) according to sex and age group (3 age groups).

Check whether the following cases of data is consistent or not : 4+3=7

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4. Answer any *two* of the following questions : 7×2=14

(a) What are the relative and absolute measures of dispersion? The first of the two samples has 100 items with mean 15 and standard deviation 3. If the whole group has 250 items with mean 15·6 and standard deviation $\sqrt{13 \cdot 44}$, find the standard deviation of the second group. 2+5=7

(b) Establish the relationship between central moments in terms of raw moments. Why do we calculate in general only the first four moments about mean of a distribution and not the higher moments? 5+2=7

(c) What is skewness? Write different measures used to test skewness of a set of data. The first four central moments of a distribution are 0, 2·5, 0·7 and 18·75. Check the skewness and kurtosis of the distribution and comment on the distribution. 2+2+3=7

5. (a) Define rank correlation. State the assumptions made in a linear regression analysis. Show that correlation coefficient is the geometric mean of regression coefficients. 2+2+3=7

Or

(b) The following informations are available for three variables x_1, x_2 and x_3 :

$$r_{12} = -0 \cdot 89 \quad r_{13} = -0 \cdot 97 \quad r_{23} = 0 \cdot 96$$

$$\sigma_1 = 4 \cdot 24 \quad \sigma_2 = 5 \cdot 29 \quad \sigma_3 = 28 \cdot 31$$

Calculate the partial regression coefficients for a regression equation of x_1 on x_2 and x_3.

Determine the normal equations for fitting the regression line $y = a + bx + cx^2$, where a, b and c are unknown constants. 3+4=7

6. *(a)* Define index number. Describe different problems faced in constructing of an index number. 2+5=7

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(b) Why is Fisher's index number called ideal? Show that it satisfies both time-reversal test and factor-reversal test. 2+5=7

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