2023

ECONOMICS — HONOURS

Paper : SEC-1

[Introductory Statistics and Application (I)]

Full Marks : 75

The figures in the margin indicate full marks.

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

Group - A

1. Answer ***any ten*** questions :

(a) What should be the suitable diagram to represent the data in each case?

(i) The daily selling prices of gold in India in a particular week.

(ii) The profit and losses of a business concern for a period of 10 years.

(iii) Revenue and expenditure of the Central Government for a period of 5 years.

(iv) The total production cost and its components of a manufacturing firm in a particular year. ½+½+½+½

(b) Find the relative frequency of the third class and frequency density of the second class for the following distribution :

Height of students (in cm.)	151-155	156-160	161-165	166-185
No. of students	5	10	15	15

2

(c) The average monthly production of a certain factory for the first five months is 3585 units and for the remaining seven months it is 2420 units. Calculate the average monthly production for the year. 2

(d) Two variables X and U are related as X = 1.5U + 2.5 and U has the mode 20; find the mode of X. 2

(e) (i) Find the median of 4, 5, 3, 1, 7.

(ii) Find the median of 4, 5 3, 1, 70.

(iii) State what favourable property of the median is illustrated by comparing the answers to (i) and (ii). 2

(f) The lower and the upper quartiles of a distribution are 14.6 and 25.2 respectively and the coefficient of skewness is 0.5. Find the median of the distribution. 2

(g) A manufacturer of television tubes has two types of tubes, A and B. For types A and B mean lifetimes are 1495 hours and 1875 hours respectively, and the standard deviations are 280 hours and 310 hours respectively. Which tube has the greater relative dispersion? 2

(h) Suppose that a variable X can take three values 30, 40 and 50. Find the third order central moment of X. 2

(i) The first two moments of a distribution about the value 2, are 1 and 16 respectively. Find the first two moments about zero. 2

(j) A distribution has a standard deviation of 2. For which value of the fourth central moment the distribution will be mesokurtic? 2

(k) In a two-variable model, show that the correlation coefficient and the regression coefficients must be of the same sign. 2

(l) For the variables X and Y, the regression lines were obtained as $3x + 2y - 25 = 0$ and $6x + y - 30 = 0$. Identify the regression equation of Y on X. 2

(m) Suppose that in constructing the price index number for a certain year with a fixed base year we take the simple arithmetic mean of the price relatives. Would this be a satisfactory index number? Why? 2

(n) What do you mean by a cost of living index number? 2

(o) What do you mean by the Gini coefficient? 2

Group - B

Answer ***any five*** questions.

2. For the following frequency distribution, draw the histogram and find the number of students whose heights lie between 158 cm and 168 cm. : 2+3

Height of students (in cm.)	151-155	156-160	161-165	166-185
No. of students	5	10	15	15

3. Evaluate mode as a measure of central tendency. 5

4. A variable assumes the values 1, 2, ..., 7 with frequencies 1^2, 2^2, ..., 7^2 respectively. Calculate the arithmetic mean of the variable. 5

5. Examine how correlation coefficient is affected by a change of origin and scale. 5

6. The second moments about the mean of two distributions are 9 and 16, while the third moments about the mean are – 8.1 and – 12.8 respectively. Which distribution is more skewed to the left? Give reason. 5

7. A variable takes only two distinct values a and b, each with equal frequency. Find the second, third, and fourth central moments. 5

8. For the following data show that $r = 0$. Do you conclude that X and Y are uncorrelated? Why?

X	−3	−2	−1	0	1	2	3
Y	9	4	1	0	1	4	9

3½+½+1

9. Laspeyres', Paasche's and Fisher's price index numbers satisfy the time reversal test. — Is the statement correct? Justify. 1+4

Group - C

Answer ***any three*** questions.

10. (a) For two positive values X_1, X_2 of a variable X, prove that A.M. ≥ G.M. ≥ H.M. Is this result true for any number of observations?

(b) Find a suitable measure of central tendency for the following distribution justifying your choice.

Class-limits	Frequency
51 – 55	4
56 – 60	10
61 – 65	14
66 and above	2

(4+1)+5

11. (a) Evaluate standard deviation as a measure of dispersion.

(b) In a factory the average daily wage of 50 workers was ₹ 500 with a standard deviation ₹ 40. Each worker is given a raise of ₹ 50. Find the new average daily wage and standard deviation.

5+(2+3)

12. (a) Obtain the appropriate regression equation from the following data :

Expenditure on food in ₹	600	750	550	1,050	1,100
Income in ₹	800	1,200	600	2,000	2,500

(b) Show that if all people of a country have the same level of Income, then Theil's inequality measure will be zero. 6+4

13. The following table gives the various group indices and weights for 2020 with 2010 as the base year.

Group	Food	Clothing	Fuel & Light	House rent	Miscellaneous
Index No.	348.7	288.9	387.2	110.0	285.1
Weight	60	5	6	9	20

(a) Compute the cost of living index number for 2000 with 2010 as the base year.

(b) A worker was getting ₹ 5,000 for a job in 2010 and ₹ 9,500 in 2020. How much extra allowance she ought to have received to maintain her 2010 standard of living? 5+5

14. (a) What do you mean by skewness and kurtosis of a frequency distribution? How can those be measured?

(b) In a distribution, the mean, median and coefficient of variation are respectively 50, 53 and 20%. Find the coefficient of skewness and interpret the result. (3+3)+(3+1)