

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?
- The daily selling prices of gold in India in a particular week.
 - The profit and losses of a business concern for a period of 10 years.
 - Revenue and expenditure of the Central Government for a period of 5 years.
 - The total production cost and its components of a manufacturing firm in a particular year.

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

- (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

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- (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. :

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

2+3

3. Evaluate mode as a measure of central tendency. 5
4. A variable assumes the values 1, 2, ..., 7 with frequencies $1^2, 2^2, \dots, 7^2$ 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

$3\frac{1}{2} + \frac{1}{2} + 1$

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. \geq G.M. \geq 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

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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)
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