2024

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 is Frequency Polygon? 2

(b) For a positively skewed distribution, what is the relation between mean, median and mode? 2

(c) The first two moments of a distribution about the value 3 are 5 and 41 respectively. Then find the coefficient of variation. 2

(d) Let, $2x - 5y = 10$, and quartile deviation of x is 5. Find the quartile deviation of y. 2

(e) 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

(f) What is Cost of Living Index number? 2

(g) What is a questionnaire? 2

(h) What is Ratio Chart? 2

(i) What do you mean by Base shifting in the context of Index number? 2

(j) What is Gini Coefficient? 2

(k) Find the first moment about the point 5 for the set of numbers 4, 6, 8, 10. 2

(l) How can you differentiate between Primary data and Secondary data? 2

(m) If $\sum x_i^2 = 300$, $\sum x_i = 60$, then what is the possible value of number of observations? 2

(n) What is the value of mean deviation about mean for the first 5 Natural Numbers? 2

(o) If $AM = 10$, and $CV = 50\%$, find $\text{Var}(5 - 2x)$. 2

Group - B

Answer ***any five*** questions.

2. What are the points to be kept in mind while framing a questionnaire? 5

3. Calculate median from the following data. 5

Class	5 – 14	15 – 19	20 – 29	30 – 39	40 – 44	45 – 49
Frequency	4	6	10	15	8	2

4. What is the variance of first n Odd Natural Numbers? 5

5. Calculate price index number using Fisher's Formula, and show that it satisfies time reversal test. 5

Commodity	2019		2020	
	Quantity	Price(₹)	Quantity	Price(₹)
A	50	32	50	30
B	35	30	40	25
C	55	16	50	18

6. The scores of two batters A and B are given below. Who is a more consistent player? 3+2

A	32	28	47	63	71	39	10	60	96	14
B	19	31	48	53	67	90	10	62	40	80

7. If two variables x and y are related as $y = a + bx$, a and b being constants, show that correlation coefficient between x and y is (+1) or (–1) according as b is positive or negative. 5

8. If regression coefficient of y on x (b_{yx}) is $\left(-\frac{3}{2}\right)$, and regression coefficient of x on y (b_{xy}) is $\left(-\frac{1}{5}\right)$, then find the Ratio of variance of x and variance of y. 5

9. Show that odd central moments of a symmetrical frequency distribution of a discrete variable are all zero. 3+2

Group - C

Answer ***any three*** questions.

10. (a) For two positive values X_1, X_2 of a variable X, prove that

A.M. × H.M. = G.M.^{2}.

Is this result true for any number of observations?

(b) A student's grades in laboratory, lecture and examination parts of a physics course were 71, 78 and 89 respectively.

(i) If the weights accorded to these grades are 2, 4 and 5 respectively, what is an appropriate average grade?

(ii) What is the average grade if equal weights are used? (4+1)+(3+2)

11. (a) For a distribution the mean, variance, third order central moment and β_2 are 10, 16, 64 and 4 respectively.

(i) Find the first three moments about origin,

(ii) Compute Y_1 and Y_2 coefficients, and comment on the nature of skewness and kurtosis of the distribution.

(b) If the incomes of five persons are ₹ 1,000, ₹ 2,500, ₹ 1,500, ₹ 5,000 and ₹ 3,000, then compute the Gini coefficient of inequality. (4+2)+4

12. (a) Find the angle between the two regression lines in a bi-variate model and interpret the cases when (i) $r = \mp 1$ and (ii) $r = 0$.

(b) Consider the following data :

$n = 10 \quad \Sigma Y = 96 \quad \Sigma X = 80 \quad \Sigma Y^2 = 952 \quad \Sigma X^2 = 668 \quad \Sigma XY = 789$

Find the regression equation of Y on X. (4+2)+4

13. (a) What are the shortcomings of correlation coefficient as a measure of association between two variables?

(b) On the basis of 25 pairs of values of two variables X and Y, the following results were obtained :

$\Sigma X = 125 \quad \Sigma Y = 100 \quad \Sigma X^2 = 650 \quad \Sigma Y^2 = 460 \quad \Sigma XY = 508.$

It was, however, later detected at the time of checking that two pairs of values (X, Y), (6, 14) and (8, 6) were copied wrongly in computing the above results. Find the correct value of correlation coefficient between X and Y after replacing the incorrect pairs by the correct pairs (8, 12) and (6, 8). 4+6

14. (a) What do you mean by fixed-base and chain-base indices? What are their relative merits and demerits?

(b) Find Price Index Numbers using

(i) simple average of price relatives and

(ii) weighted average of price relatives for the following data using 2012 as the base period :

Item	Price in 2012	Price in 2023	Weight
A	16	20	40
B	40	60	25
C	5	6	5
D	6	8	20
E	2	4	10

(2+3)+(2+3)

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