POST-GRADUATE COURSE

Term End Examination — June, 2022/December, 2022

ECONOMICS

Paper-II : STATISTICS FOR ECONOMICS

Time : 2 hours] [Full Marks : 50

Weightage of Marks : 80%

Special credit will be given for precise and correct answer. Marks will be deducted for spelling mistakes, untidiness and illegible handwriting. The figures in the margin indicate full marks.

Use of scientific calculator is permitted.

1. Answer any *four* of the following questions : $2\frac{1}{2} \times 4 = 10$

   a) The sum of 11 observations is 231 and mode is 18. Find out the median.

   b) Suppose, a and b are two positive quantities such that $a \neq b$. Then prove that AM, GM and HM of these two quantities are related as AM > GM > HM.

   c) Calculate the Mean and S.D. of Standard natural numbers.

   d) For a moderately Skewed distribution, mean = 20, coefficient of Skewness = 0·25 and coefficient of variation is 20%. Find out the mode.

   e) AM of n observations $x_1 , x_2 , ..., x_n$ is 15 and

   $$\sum_{i=1}^{n} (x_i - 9) = 72 \text{. Find the value of } n.$$

PG/TE-2015 [Turn over

f) There are 17 balls, numbered from 1 to 17 in a bag. If a person selects one ball at random, what is the probability that the number printed on the ball will be an even number greater than 9 ?

2. Answer any *four* of the following questions :   5 × 4 = 20

a) Prove that central moments are dependent on the change of scale but independent of any change in origin.

b) From the following frequency distribution of marks of 100 students, calculate the first quartile and second percentile.

Marks :	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40
No. of students :	3	10	20	30	20	9	5	3

c) Prove that the value of correlation coefficient runs from − 1 to + 1.

d) The equations of two regression lines between two variables are expressed as $4y - 5x - 8 = 0$ and $2x - 3y = 0$

   i) Identify which of the two equations can be called regression of y on x and regression of x on y.

   ii) Find $\bar{x}$ and $\bar{y}$ and the correlation coefficient (r) from the equations.

e) From the data given below compute Laspeyre's and Paasche's Index Number (Price and Quantity both) for 2020 with 2010 as the base year.

Commodity	Price		Quantity	
	2010	2020	2010	2020
A	4	10	50	40
B	3	9	10	2
C	2	4	5	2

(Price and Quantity figures are in appropriate units)

f) A random variable X has the following probability function :

(Values of X) x :	– 2	– 1	0	1	2	3
(Probability of X) $p(x)$:	0·1	k	0·2	$2k$	0·3	k

Find the value of k and calculate the mean and variance.

3. Answer any *two* of the following questions : $10 \times 2 = 20$

a) What are the various measures of central tendency ? Choose an appropriate measure of central tendency for the following distribution :

Monthly Income (in Rs.) in locality x	No. of families
Below 100	50
100 – 200	500
200 – 300	555
300 – 400	100
400 – 500	3
500 and above	2

b) Prove that neither Laspeyre's Index Number nor Paasche's Index Number obeys time reversal or factor reversal tests while Fisher's Ideal Index Number obeys both the tests.

c) What do you mean by 'Moment generating function' of a random variable ? Find out the moment generating function about mean of a Normal Distribution.

OR

Write down the *p.d.f.* of Normal Distribution. What are the properties of a Normal Distribution ?

d) Write short notes on any *two* of the following :

   i)   Least square estimation method of the best-fit regression line.

   ii) Consumer Price Index Number and its uses.

   iii) Bayes' Theorem.

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