2023

ECONOMICS

Paper : ECOHC3076

(Statistical Methods for Economics)

Full Marks : 80
Pass Marks : 32

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following (any *six*) : 1×6=6

(a) Which of the following is not a measure of central tendency?

(i) Mean

(ii) Median

(iii) Range

(iv) Mode

(b) The standard deviation of the series 10, 10, 10, 10, 10 is

(i) 10

(ii) 0

(iii) 1

(iv) 100

(c) The events that cannot occur simultaneously are called as

(i) exhaustive events

(ii) mutually exclusive events

(iii) independent events

(iv) equally likely events

(d) The expected value of a discrete random variable X is given by

(i) $P(X)$

(ii) $\sum P(X)$

(iii) 1

(iv) $\sum XP(X)$

(e) A single value used to estimate a population value is called

(i) point estimate

(ii) level of confidence

(iii) interval estimate

(iv) confidence interval

(f) The area under a standard normal curve is

(i) 0

(ii) ∞

(iii) 1

(iv) 2

(g) Which of the following is used to find the value of mode graphically?

(i) Bar diagram

(ii) Frequency curve

(iii) Pie chart

(iv) Histogram

(h) The square of standard deviation is

(i) square deviation

(ii) mean square deviation

(iii) variance

(iv) coefficient correlation

(i) The values of extreme items do not influence the average for

(i) mode

(ii) mean

(iii) harmonic mean

(iv) median

(j) If the values of two variables move in the opposite direction, the correlation is said to be

(i) linear

(ii) non-linear

(iii) positive

(iv) negative

2. Answer any *five* of the following questions : 2×5=10

(a) What do you mean by standard deviation?

(b) Mention two characteristics of a good sample.

(c) For any two positive numbers, show that $AM \times HM = (GM)^2$.

(d) State any two properties of coefficient of correlation.

(e) Write any two uses of geometric mean.

(f) Define mathematical expectation.

(g) State the multiplication theorem of probability.

3. Answer any *six* of the following questions : 5×6=30

(a) What is an average? Explain the requisite characteristics of an ideal average.

(b) The mean marks of 100 students were found to be 40. Later it was discovered that a score of 53 was misread as 83. Find the correct mean corresponding to the correct score.

(c) What is a sample? Differentiate between population parameters and sample statistics.

(d) Prove that coefficient of correlation (r) is independent of both change of origin and scale.

(e) What is normal distribution? Write the properties of normal distribution.

(f) Define an estimator. Explain the properties of a good estimator.

(g) A normal curve has mean = 10 and standard deviation = 2. Find the probability that the random variable X assumes a value between 8·4 and 13·8. Given that $P(0 < Z < 0 \cdot 8) = 0 \cdot 2881$ and $P(0 < Z < 1 \cdot 9) = 0 \cdot 4713$.

(h) If A and B are any two events with $P(A) = 0 \cdot 4$, $P(A \cup B) = 0 \cdot 7$ and $P(B) = P$, then find the value of P for which—

(i) A and B are mutually exclusive;

(ii) A and B are independent.

(i) Define arithmetic mean. Calculate the number of students against the class 30–40 of the following frequency distribution, if the mean is found to be 28 :

Marks	0–10	10–20	20–30	30–40	40–50	50–60
No. of Students	12	18	27	?	17	6

(j) Explain the roles of sampling theory.

4. Answer any *two* of the following questions : 10×2=20

(a) What is a random sample? Distinguish between simple random sampling and stratified random sampling technique of selecting sample. 2+8=10

(b) Define binomial probability distribution. State the properties of binomial probability distribution. If the probability of defective bolts is 0·1 in a total of 500 bolts, find the mean and standard deviation for the distribution. 2+4+4=10

(c) Define median. Compute the median age from the following distribution : 2+8=10

Age Group (in Year)	0–15	15–30	30–45	45–60	60 and above
No. of Persons	7	15	20	13	5

(d) Explain the absolute measures of dispersion. 10

5. Answer any *one* of the following questions : 14

(a) What is meant by sample survey? Explain the principal steps and advantages in a sample survey. 1+8+5=14

(b) What is coefficient of variance? Distinguish between coefficient of variance and standard deviation.

In two factories *A* and *B*, engaged in the same industrial area, the average weekly wages (in ₹) and the standard deviation are as follows :

Factory	*Average*	*Standard Deviation*	*No. of Workers*
A	34·5	5	476
B	28·5	4·5	526

(i) Which factory *A* or *B* pays out a larger weekly wages?

(ii) Which factory *A* or *B* has greater variability in individual wages?

1+3+10=14

(c) What is the method of moments? Differentiate between the method of moments and maximum likelihood procedures used for estimation of population parameters. 2+12=14

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