**2022**

# ECONOMICS

## (Honours)

## Paper : V - A & B

## [New Syllabus]

Full Marks : 100 Time : Four Hours

*The figures in the margin indicate full marks.*
*Candidates are required to give their answers in their own words as far as practicable.*

## Paper : V - A

(Marks : 20)

Choose the correct answer.

Each question carries 2 marks.

1. In a normally distributed distribution, which one of the following holds trure ?

   (A) Mean > Median > Mode

   (B) Mean = Median = Mode

   (C) Mean < Median < Mode

   (D) Mean = Median + Mode.

2. Sum of the squares of the deviations is least when it is measured about —

   (A) Median

   (B) Mode

   (C) Mean

   (D) None of these

3. Arithmetic Mean depends on change of :

   (A) Origin only

   (B) Scale only

   (C) Both origin and scale

   (D) Neither origin and scale

4. The arithmetic mean of the number 1, 2, 3...., $n$ is —

   (A) $\frac{n(n-1)}{2}$

   (B) $\frac{n+1}{2}$

   (C) $\frac{n}{2}$

   (D) 1

5. Frequency densities are necessary for drawing :

   (A) Histogram

   (B) Step Diagram

   (C) Ogive

   (D) Column Diagram

6. Monthly Income of workers of a factory is —

   (A) Continuous variable

   (B) Discrete variable

   (C) Attribute

   (C) None of these

7. The value of Rank correlation lies between —

   (A) $0 \leq R \leq \infty$

   (B) $-\infty \leq R \leq \infty$

   (C) $-1 \leq R \leq 1$

   (D) $-\infty \leq R < 0$

8. If $E$ and $F$ are two events such that $P(E \cup F) = \frac{3}{5}$ and $P(E \cup F^c) = \frac{4}{5}$, then $P(E)$ is equal to

(A) $\frac{1}{5}$

(B) $\frac{2}{5}$

(C) $\frac{3}{5}$

(D) None of these

9. If a random variable $X$ assumes the values –1, 0 and 1 with corresponding probabilities $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{1}{4}$, Find $E(X^2)$

(A) $\frac{1}{2}$

(B) 0

(C) 1

(D) $\frac{1}{4}$

10. In simple random sampling without replacement, the probability that a particular member is included in the selected sample is

(A) $N/n$

(B) $1/N$

(C) $1/n$

(D) $\frac{n}{N}$

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# Paper : V - B

(Marks : 80)

## Section - I

[Short Essay Type Questions]

Answer any ***four*** questions from the following. 10×4=40

1. (a) If $Z$ is a linear function of $n$ variates, such as $x_1, x_2, x_3, ..., x_n$ then show that the arithmetic mean of $Z$ is a linear function of the arithmetic mean of $x_1, x_2, x_3, ..., x_n$.

   (b) Describe briefly the different methods of collecting primary data. 5+5

2. (a) What are the characteristics of a good statistical table ?

   (b) From the following data, calculate the coefficient of variation :

| Class | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 |
|---|---|---|---|---|---|
| Frequency | 5 | 10 | 12 | 8 | 5 |

4+6

3. (a) If $3x + 4y = 5$ and mean deviation of $x$ about its mean is 8; find the man deviation of $y$ about its mean.

   (b) Let $X$ be a variable, assuming the values 1, 2, 3, ..., $n$ and let $F_1, F_2, F_3..., F_n$ be the corresponding more than type Cumulative frequencies. Show that the Mean of $X$ will be :

$$\bar{X} = \sum_{i-1}^{n} \frac{F_i}{F_1}$$

5+5

4. Show that the Laspayre's Index Number and Paasche's Index Number do not satisfy the Time Reversal Test and Factor Reversal Test whereas the Fisher's Ideal Index Number satisfies both the tests. 10

5. What is time series ? Explain briefly the different components of time series. 2+8

6. (a) A bag contains 8 white and 3 red balls. If two balls are drawn at random, find the probability that —

   (i) both are white

   (ii) both are red

   (iii) one is of each colour

(b) Prove that for any two events $A$ and $B$,

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

What happens if A and B are mutually exclusive ? 6+4

7. Prove that, for the Poisson Distribution Mean = Variance. 10

8. (a) Prove that the central moments are independent of change of origin but depends on change of scale.

(b) If the three uncorrelated variable $X_1$, $X_2$ and $X_3$ have the same standard deviation, find the correlation coefficient between $(X_1 + X_2)$ and $(X_2 + X_3)$ 5+5

## Section - II

[Essay Type Questions]

Answer any ***two*** questions from the following. 20×2=40

9. (a) What is meant by stratified random sampling ?

(b) Differentiate between standard error and standard deviation ?

(c) As a result of test on electric bulbs, it was found that the lifetime of a particular make was distributed normally with an average life of 1000 burning hour and standard deviation of 200 hours. Out of 10,000 bulbs produced by the company, how many bulbs are expected to fail (i) in the first 800 burning hours.

(d) If a random variable $X$ follows poisson distribution such that $P(X = 1) = P(X = 2)$, then find —

(i) Mean of the distribution

(ii) $P(X = 0)$ 4+4+6+6

10. (a) If the letters of the word MATHEMATICS be arranged at random, find the probability that the vowels would occur together.

(b) If $P(A)=\frac{1}{2}, P(B)=\frac{1}{3}$ and $P\left(A^c \cap B^c\right)=\frac{5}{12}$, Find

(i) $P\left(A/B\right)$

(ii) $P(B-A)$

(iii) $P\left(A^c/B^c\right)$

(c) A card is drawn from a well shuffled pack of playing cards. Find the probability that it is either a diamond or a king.

(d) Define : Multiplication Theorem of Probability.

Conditional Probability.

Baye's Theorem. 4+6+4+6

11. (a) Prove that the arithmetic mean of the absolute values of the two regression coefficients cannot be less than the absolute value of the Correlation Coefficient.

(b) Two regression lines $10x+3y-16=0$ and $6x+5y-16=0$ have been calculated on two variables $x$ and $y$. Find

(i) Correlation Coefficient between the two variables.

(ii) Mean of $X$ and $Y$.

(iii) Ratio of the variances. 10+10

12. (a) A group of 100 items have a mean of 55 and a standard deviation of 5. If the mean and standard deviation of 40 of those items be 61 and 4.5 respectively. Find the standard deviation of other 60 items.

(b) Find the coefficient of quartile deviation of the following table.

| Class Interval : | 10-19 | 20-29 | 30-39 | 40-49 | 50-59 |
|---|---|---|---|---|---|
| Frequency : | 5 | 9 | 14 | 20 | 25 |

| Class Interval : | 60-69 | 70-79 | 80-89 |
|---|---|---|---|
| Frequency : | 15 | 8 | 4 |

(c) In order to find correlation coefficient between two variables $X$ and $Y$ from 5 pair of observation the following calculation were made

$\sum X = 30$, $\sum Y = 40$, $\sum X^2 = 220$, $\sum Y^2 = 340$, $\sum XY = 214$

Later it was detected that the pair $(X = 4, Y = 8)$ was copied wrongly, the correct value being $(X = 2, Y = 6)$. Find the corrected value of correlation co-efficient.

6+8+6

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