

2025

(November-December)

STATISTICS

Paper: STS-C-101

Descriptive Statistics-I and Probability Theory

Time: 2 Hours

Total Mark: 45

Pass marks: 14

(The figures in the right margin indicate full marks of the questions)

1. Choose the correct answer from the following: $1 \times 4 = 4$
- (a) Statistics deals with
- i. Qualitative information
 - ii. Quantitative information
 - iii. Both (a) and (b)
 - iv. None of these
- (b) The standard deviation of a set of values will be
- i. Positive when the values are positive only
 - ii. Positive when the values are negative only
 - iii. Always positive
 - iv. All of the above
- (c) The year with which comparison is made is called
- i. Current year
 - ii. Base year
 - iii. Reference year
 - iv. Average year
- (d) Two unbiased coins are tossed. What is the probability of getting at most one head?
- i. $3/4$
 - ii. $1/6$
 - iii. $1/3$
 - iii. $1/2$

2. Answer the following questions in brief: $2 \times 4 = 8$

- (a) Explain the important functions of Statistics?
(b) Prove that in usual notations $HM \leq GM \leq AM$.
(c) "Index numbers are economic barometers". Elucidate the statement.
(d) State the classical definition of probability.

3. (a) What are qualitative and quantitative data? Explain with examples. Describe the different measurement scales used in Statistics. $3 + 6 = 9$

Or

(b) What do you mean by independence of attributes? Give a criterion for the independence of two attributes A and B .

Can vaccination be regarded as a preventive measure for Covid-19 disease from the data given below?

'Of 1482 persons in a locality exposed to Covid-19 disease, 368 in all were attacked'

'Of 1482 persons, 343 had been vaccinated of Covid-19 disease and of these only 35 were attacked' $2 + 3 + 4 = 9$

4. (a) What are the characteristics of an ideal measure of central tendency? What are the two indirect measures used to determine the arithmetic mean and give an explanation for when they should be utilized?

Prove that the sum of the squares of the deviations of a set of values is minimum when taken about mean.

$$2 + 1 + 2 + 4 = 9$$

Or

(b) What are raw moments and central moments? Establish the relationship between central moments in terms of raw moments.

The first three moments of a distribution about the value

2 of a variable x are 1, 16 and -40. Find the mean, variance and third central moment. $3 + 3 + 3 = 9$

5. (a) Define index numbers. Discuss the various issues that are challenged in the construction of index numbers. $2 + 5 = 7$

Or

(b) What do you mean by consumer price index numbers? Why Fisher's index number called ideal? Show that it satisfies both the time reversal and factor reversal tests. $2 + 2 + 3 = 7$

6. (a) What are mutually exclusive and independent events? If A and B are independent event, then show that A and \bar{B} are also independent.

The probability of a student passing in science is $4/5$ and the of the student passing in both science and maths is $1/2$. What is the probability of that student passing in maths knowing that he passed in science? $3 + 2 + 3 = 8$

Or

(b) State Bayes' theorem. What are its applications?

There are three urns that contain both white and black balls. The first urn contains 3 white balls and 2 black balls, the second urn has 2 white balls and 3 black balls, while the third urn consists of 4 white balls and 1 black ball. An urn is selected at random without any bias, and a ball is drawn randomly, which turns out to be white. What is the probability that this ball was drawn from the third urn? $2 + 2 + 4 = 8$
