

2025

(November-December)

STATISTICS

Paper: STS-M-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: 1×4=4
- (a) A train covered the first 5 km of its journey at a speed of 30 km per hour and next 15 km at a speed of 45 km per hour. The average speed of the train was
- i. 35 km/hour ii. 40 km/hour
iii. 32 km/hour iv. 42 km/hour
- (b) The value of coefficient of kurtosis β_2 can be
- i. Less than 3 ii. Greater than 3
iii. Equal to 3 iv. All of the above
- (c) Cost of Living Index is another name for:
- i. Wholesale price index ii. Quantity index
iii. Consumer price index iv. Value index
- (d) What is the probability of a sure event?
- i. 1 ii. 0
iii. 1/4 iv. 1/2
2. Answer the following questions in brief: 2×4=8
- (a) What do you mean by independence of attributes?
- (b) Show that the algebraic sum of the deviations from the mean is consistently zero.

- (c) What is chain base index number?
 (d) Define independent event and mutually exclusive event.

3. (a) Distinguish between variable and attribute. Explain with examples. Describe the different measurement scales used in Statistics. 3+6=9

Or

- (b) What are the basic points to be considered in classification and tabulation of statistical data? 5+4=9
 Examine whether there exists any association between the extravagance exhibited by fathers and their sons from the following.

Extravagant sons with extravagant fathers, (AB) = 450

Miser sons with extravagant fathers, (aB) = 155

Extravagant sons with miser fathers, (Ab) = 175

Miser sons with miser fathers, (ab) = 1150

4. (a) If \bar{x}_i , ($i = 1, 2, \dots, k$) are means of k component series of sizes n_i , ($i = 1, 2, \dots, k$) respectively, then prove that the mean, \bar{x} of the composite series is given by

$$\bar{x} = \frac{\sum_{i=1}^k n_i \bar{x}_i}{\sum_{i=1}^k n_i}$$

The following data represent the survey regarding the heights (in cm) of 51 students in a class. Find the median height.

Height (in cm)	Number of students
Less than 140	4
Less than 145	11
Less than 150	29
Less than 155	40
Less than 160	46
Less than 165	51

5+4=9

Or

- (b) What are skewness and kurtosis?

The fourth moment about mean of a frequency distribution is 48. What must be the value of its standard deviation in order that the distribution be (i) leptokurtic, (ii) mesokurtic and (iii) platykurtic? 3+3+3=9

5. (a) What is an index number? Explain its various methods of construction. 2+5=7

Or

- (b) Prove that Fisher's index number satisfies both the time reversal and factor reversal tests.

Explain the different methods of construction of consumer price index number. 4+3=7

6. (a) What are mutually exclusive and independent events? State the multiplication theorem of probability.

In a survey conducted among a small group of individuals, 60% reported reading Hindi newspapers, 40% read English newspapers, and 20% read both. If an individual is selected at random and is known to read an English newspaper, what is the probability that this person also reads a Hindi newspaper?

3+2+3=8

Or

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

A bag contains 5 white and 2 black balls. Another bag contains 4 white and 4 black balls. One ball is transferred at random from the first bag to the second bag and then a ball is drawn from the second bag. What is the probability that the ball is white? 2+2+4=8
