2025/FYUG/ODD/SEM/
STADSC–101T/033

**FYUG Odd Semester Exam., 2025**

# STATISTICS

**( 1st Semester )**

Course No. : STADSC–101T

**( Descriptive Statistics and Probability )**

*Full Marks* : 70
*Pass Marks* : 28

*Time* : 3 hours

*The figures in the margin indicate full marks for the questions*



## UNIT—I

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

(a) Explain the Statistics in plural and singular sense. State one limitation of Statistics.

(b) Define nominal and ordinal data.

(c) State the importance of diagrammatic representation of data in Statistics.

2. Answer any *one* of the following questions :

(a) Describe briefly about different parts of a statistical table. In a sample study on coffee habits of people in two towns, the following data were observed :

Town—*A* : 55% people were males
40% were coffee drinkers
28% were male coffee drinkers

Town—*B* : 65% people were males
45% were coffee drinkers
35% were male coffee drinkers

Represent the above data in tabular form. 5+5

(b) What are the steps for the construction of frequency distribution with reference to the magnitude of the class interval and class limit? Explain the method of drawing ogives from frequency distribution with an example. 4+6

## UNIT—II

3. Answer any *two* of the following questions : 2×2

(a) What are the different measures of central tendency? Which of them are positional measures?



( Continued )



(b) What is the basic difference between measures of central tendency and measures of dispersion?

(c) Define the $r$th raw moment and $r$th central moment. What is the value of the first central moment?

4. Answer any *one* of the following questions : 10

(a) Show the effect of change of origin and scale on the arithmetic mean and standard deviation. 5+5=10

(b) What do you mean by skewness and kurtosis? What are their measures? State some uses of skewness and kurtosis. 6+2+2=10

## UNIT—III

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

(a) What do you understand by independence of two attributes?

(b) What is meant by the order of classes?

(c) Examine the consistency of the following data :

$N = 1000$, $(A) = 600$, $(B) = 500$, $(AB) = 50$

( Turn Over )

6. Answer any *one* of the following questions :

(a) Define Yule's coefficient of association Q. Establish the relationship between Yule's coefficient of association Q and coefficient of colligation Y. Also prove that $-1 \le Q \le 1$. 2+4+4

(b) Write a short note on the method of least squares. Explain the method of fitting a polynomial of degree two by method of least squares. 4+6=10

## UNIT—IV

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

(a) State the properties of Karl Pearson's coefficient.

(b) Define the line of regression of $Y$ on $X$ and $X$ on $Y$.

(c) How do you get an idea about positive and negative correlation from a scatter diagram?

8. Answer any *one* of the following questions : 10

(a) Prove that correlation coefficient is independent of change of origin and scale. Define intraclass correlation and correlation ratio. 5+2½+2½=10



( Continued )



(b) State the properties of regression coefficients. For the variables $X$ and $Y$, the two lines of regression are given by $3x+2y-25=0$ and $6x+y-30=0$.

(i) Identify the lines of regression $X$ on $Y$ and $Y$ on $X$.

(ii) Find the means of $X$ and $Y$.

(iii) Find the correlation coefficient between $X$ and $Y$. 4+6=10

## UNIT—V

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

(a) Let $A$ and $B$ be two events, then prove that

$$P(A \cap B) \le P(A) \le P(A \cup B)$$

(b) If the events $A$ and $B$ are independent, examine whether $\overline{A}$ and $\overline{B}$ are also independent.

(c) Give axiomatic definition of probability.

10. Answer any *one* of the following questions : 10

(a) (i) Prove that

$$P\left(\bigcap_{i=1}^{n} A_i\right) \ge \sum_{i=1}^{n} P(A_i) - (n-1)$$ 6

( Turn Over )

(ii) Two persons $A$ and $B$ toss a fair coin alternatively. The person who gets head first wins the game. Find the chances of $A$ and $B$ winning the game.

(b) (i) State and prove Bayes' theorem.

(ii) There are two bags $A$ and $B$, where $A$ contains $k$ white and 2 black balls and $B$ contains 2 white and $k$ black balls. One of the two bags is selected at random and two balls are drawn from it without replacement. If both the balls drawn are white and the probability that the bag $A$ was chosen to draw the balls is $\frac{6}{7}$, find the value of $k$.

★★★