# 2019/TDC/ODD/SEM/STSHCC-101T/114

## TDC (CBCS) Odd Semester Exam., 2019

## STATISTICS

**( 1st Semester )**

Course No. : STSHCC-101T

**( Descriptive Statistics )**

*Full Marks* : 50

*Pass Marks* : 20

*Time* : 3 hours

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

Answer **all** questions

### UNIT—I

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

(a) Distinguish between statistical population and sample.

(b) Explain ordinal scale of measurement with example.

(c) State the advantages of diagrammatic representation of statistical data.

2. Answer *either* [(*a*) and (*b*)] *or* [(*c*) and (*d*)] :

(*a*) In a sample study on coffee habits of people in two towns, the following data was found :

*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. 3

(*b*) Briefly discuss about any two methods of collection of primary data. 3

(*c*) Describe briefly about different parts of a statistical table. 3

(*d*) Explain the method of drawing 'ogives' from frequency distribution. 3

UNIT—II

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

(*a*) Define raw and central moments.

(*b*) Write a note on Sheppard's corrections.





(*c*) The arithmetic mean of two observations is 127·5 and their geometric mean is 60. Find the value of two observations.

4. Answer *either* [(*a*) and (*b*)] *or* [(*c*) and (*d*)] :

(*a*) Show that standard deviation is independent of change of origin but not of scale. 3

(*b*) The first three moments of a distribution about the value 2 are 1, 16 and −40. Show that the first three moments about origin are 3, 24 and 76. 3

(*c*) Discuss how median can be located graphically. 3

(*d*) The first of the two samples has 100 items with mean 15 and standard deviation 3. If the whole group has 250 items with mean 15·6 and standard deviation $\sqrt{13 \cdot 44}$, find the mean and standard deviation of the second sample. 3

UNIT—III

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

(a) Explain scatter diagram.

(b) The regression lines of $Y$ on $X$ and $X$ on $Y$ are $Y = aX + b$ and $X = cY + d$. Show that $\overline{X} = bc + d / 1 - ac$ and $\overline{Y} = ad + b / 1 - ac$.

(c) Show that

$$1 - R_{1\cdot 23}^2 = (1 - r_{12}^2)(1 - r_{13\cdot 2}^2)$$

6. Answer *either* [(a) and (b)] *or* [(c) and (d)] :

(a) Define correlation coefficient. Prove that correlation coefficient lies between −1 and +1. 1+2=3

(b) Explain multiple correlation and partial correlation with example. 1½+1½=3

(c) Prove that Spearman's rank correlation coefficient is given by

$$1 - \frac{6\sum d_i^2}{n(n^2 - 1)}$$

where $d_i$ is the difference between the ranks of $i$-th individual. 3

(d) Find the angle between two lines of regression. Hence derive the condition under which two regression lines will be perpendicular to each other. 2+1=3





UNIT—IV

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

(a) When are two attributes said to be positively and negatively associated?

(b) Explain the principle of least squares.

(c) Examine the consistency of the following data :

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

8. Answer *either* (a) *or* (b) :

(a) Define Yule's coefficient of association $Q$. Establish the relationship between Yule's coefficient of association $Q$ and coefficient of colligation $Y$. Prove that $-1 \le Q \le 1$. 1+3+2=6

(b) (i) Fit a second degree polynomial to a given set of data by method of least squares. 3

(ii) When are two attributes $A$ and $B$ said to be completely associated, completely dissociated and independent? 3

## UNIT—V

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

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

$$P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$$

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

*(c)* Give axiomatic definition of probabilities.

**10.** Answer *either* [*(a)* and *(b)*] *or* [*(c)* and *(d)*] :

*(a)* Prove that

$$P\left(\bigcap_{i=1}^{n} A_i\right) \geq \sum_{i=1}^{n} P(A_i) - (n-1)$$ 3

*(b)* 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. 3





*(c)* 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 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 6/7, find the value of $k$. 4

*(d)* State the Bayes' theorem of probability. 2

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