Reg. No .... Name **23U243**

B. Sc. DEGREE END SEMESTER EXAMINATION : MARCH 2023

SEMESTER 2 : STATISTICS FOR MATHEMATICS AND COMPUTER APPLICATIONS

COURSE : **19U2CPSTA02 / 19U2CRSTA02 : PROBABILITY AND STATISTICS**

(For Regular - 2022 Admission and Improvement / Supplementary – 2021/2020/2019 Admissions)

Time : Three Hours Max. Marks: 75

(Use of Scientific calculator and statistical tables are permitted)

PART A

(Each Question carries 1 mark. Maximum marks from this part is 10)

1. What do you mean by multiple correlation?
2. Examine whether the following is a p.d.f.

$$f(x) \begin{cases} = \frac{1}{3}\ for\ x = -1 \\ = \frac{1}{3}\ for\ x = 0 \\ = \frac{1}{3}\ for\ x = 5 \\ = 0\ otherwise \end{cases}$$

3. If X and Y are two independent random variables with p.d.f. h(x) =e^{-X} for X>0 and g(y) =1 for 0<y<1, find the joint distribution of X and Y
4. Who introduced classical defintion of probability?
5. Give classical definition of probability
6. If two squares are chosen at random from the 64 squares on a chess board. Find the probability that they have a side in common
7. Find the angle between the two regression line if the correlation coefficient r=0
8. When two dice are rolled and if X denotes the sum of the numbers shown, Find the number of possible values of X
9. Obtain the correlation coefficient between x and y if the two regression lines are given by 14X+12Y-3=0 and 12X+21Y-10=0
10. Define joint distribution function of X and Y
11. If the distribution function of a random variable x is

$$F(x) = 0\ \ if\ x < 0$$
$$= x\ if\ 0 \le x \le 1$$
$$= 1\ \ if\ x > 1$$
$$Find\ P(2x + 3 \le 3.6)$$

12. Define Random variable?

PART B

(Each question carries 3 marks. Maximum marks from this part is 15)

13. Use the axioms of porbability to show that P(A)≤P(B)whenever A is a subset of B
14. What is rank correlation?
15. What are the important properties of the regresson coefficients?
16. Using frequecy definition of probability show that $P(A \cup B) \le P(A) + P(B)$
17. The joint probability distribution function of a pair random variables (X,Y) is given by $f(x, y) = \frac{(x+2y)}{18}$, $(X, Y) = (1, 1), (1, 2), (2, 1), (2, 2)$. Examine whether X and Y are independent

18. The p.d.f. of a random variable X is given by $f(x) = ke^{-\theta x}$ $for\ x \geq 0\ and\ \theta \geq 0.\ \ Find\ k$

19. The following is the p.d.f. of a random variable X

$$f(x) = x \quad for\ 0 \leq x \leq 1$$
$$= 2 - x\ for\ 1 \leq x \leq 2$$

Find the distribution function of X

PART C

(Each question carries 5 marks. Maximum marks from this part is 20)

20. What is probability? What are the different approaches to the theory of probability?
21. Show that pairwise independence need not imply mutual independence
22. If f(x,y) =8xy for 0<x<1, 0<y<x is the joint p.d.f. of (X,Y), examine whether X and Y are independent
23. Show that correlation coefficient is invariant under linear transformation
24. The following is the p.d.f. of a random variable X

$$f(x) = x \quad for\ 0 \leq x \leq 1$$
$$= a - x\ for\ 1 \leq x \leq 2$$

$Find\ (i)\ a\ \ (ii)\ P[0.5 < x < 1.5]\ (iii)\ the\ distribution\ function\ of\ X$

25. What do you mean by regression? Derive the equations of the regression lines.

PART D

(Each question carries 10 marks. Maximum marks from this part is 30)

26. (i) What is Rank correlation coefficient ? (ii) Find the coefficient of rank correlation for the data given below

x	78	89	69	97	59	57	79	68	83	64
y	125	137	156	107	112	118	123	138	115	122

27. (1) State and prove Baye's theorem (2) Explain conditional probability (3) Explain the terms ' a priori probabilities and posteriori probabilities
28. $If\ f(x,y) = \frac{x+y}{21}$, $x = 1, 2, 3,\ y = 1, 2.$ Find (1) f(x/y=2) (2) f(y/x=1)
29. A random variable X has the following density function

$f(x) = ax\ if\ 0 < x < 1\ ,\ = a\ if\ 1 < x < 2,\ = -ax + 3a\ if\ 2 < x < 3\ and\ 0\ elsewhere$

(i) Determine the constant a (ii) Determine the distribution function (iii) calculate P(1<x<1.5)