

B. Sc. DEGREE END SEMESTER EXAMINATION - JULY 2021**SEMESTER 2 : COMPLEMENTARY STATISTICS FOR B Sc MATHEMATICS / COMPUTER APPLICATIONS****COURSE : 19U2CPSTA02 / 19U2CRSTA02 : PROBABILITY AND STATISTICS***(For Regular - 2020 Admission and Improvement / Supplementary - 2019 Admission)*

Time : Three Hours

Max. Marks: 75

PART A**Maximum marks for this section is 10**

1. For any event A, Show that $0 \leq P(A) \leq 1$
2. State addition theorem for two events
3. State multiplicative law of probability
4. Who introduced classical definition probability?
5. Examine the following function is a p.d.f

$$f(x) = \begin{cases} \frac{1}{4} & \text{for } x = 1 \\ \frac{3}{2} & \text{for } x = 2 \\ 0 & \text{otherwise} \end{cases}$$
6. Find $P[4x + 5 \leq 6.3]$.if $F(x) = \begin{cases} 0 & \text{if } x < 0 \\ x & \text{if } 0 \leq x \leq 1 \\ 1 & \text{if } x \geq 1 \end{cases}$
7. The distribution function of a random variable X is F(x). If F(3)=0 and F(7)=1, find F(2) and F(8)?
8. Define probability distribution function and distribution function of a pair of continuous type random variables (X,Y)
9. Find k, if $f(x,y) = k$, $0 < x < 1$, $0 < y < 1$ is a joint probability density function.
10. Find the angle between the two regression line if the correlation coefficient $r=0$
11. The mean values of two variables X and Y are 5 and 8 respectively. If one of them regression lines between them is $6X - 2Y - k = 10$, then find k?
12. What is the correlation of the pairs of points (2,5) and (3,1)?

(1 x 10 = 10)**PART B****Maximum marks for this section is 15**

13. From a pack of cards 13 cards are drawn. Find the probability that there are exactly 5 spades among the selected cards.
14. Using frequency definition of probability show that $P(A \cap B) = P(A) - P(B)$ if $B \subset A$
15. Distinguish between p.d.f. and distribution function of a random variable. How are the two function related?
16. If $F(x) = x^2$ for $0 < x < 1$ is the distribution function of a random variable x, find the distribution function of $Y = X + 10$
17. The joint pdf of a random variable X and Y is $f(x,y) = e^{-(x+y)}$ if $x \geq 0$, $y \geq 0$ and =0 otherwise. Find the marginal p.d.f's
18. What are the important properties of the regression coefficients?
19. What is rank correlation?

(3 x 5 = 15)

PART C

Maximum marks for this section is 20

20. Distinguish between mutually exclusive events and independent events. The odds in favour of an event A are 2:5. The odds against another event B are 4:3. If the events are disjoint, find the probability of happening of at least one of the events.
21. For any two events A and B prove that $P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$
22. The p.d.f. of a random variable is given by $f(x) = kx$, for $x = 1, 2, 3, 4$. Find (i) k (ii) $P[1 \leq x \leq 3]$ (iii) $P[x \geq 2]$ (iv) $P[x < 3]$
23. If $f(x, y) = kx^2(1-y)$ for $0 < x < 2$, $0 < y < 1$ is the joint p.d.f of (X, Y) find (i) k (ii) find the marginal distribution function of X and Y
24. Show that correlation coefficient lies between -1 and +1
25. Show that correlation coefficient is invariant under linear transformation

(5 x 4 = 20)

PART D

Maximum marks for this section is 30

26. (1) State and prove Baye's theorem (2) Explain conditional probability (3) Explain the terms 'a priori probabilities and posteriori probabilities
27. A continuous random variable X has the following density function $f(x) = ax$, $0 \leq x \leq 1$
 $= a$, $1 \leq x \leq 2$
 $= -ax + 3a$, $2 \leq x \leq 3$
 $= 0$ elsewhere
(1) Determine the constant a (2) Determine the distribution function (3) sketch the graphs of $f(x)$ and $F(x)$
28. Given $f(x, y) = k e^{-x-2y}$ $x > 0$, $y > 0$. Find (1) k (2) obtain the marginal distributions
29. Given the two regression lines $8x - 10y + 66 = 0$ and $40x - 18y = 214$ and variance of x is 9. Find the mean of x, mean of y, the correlation coefficient between x and y, and variance of y

(10 x 3 = 30)