SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &
Accredited by NBA (B.E - CSE, EEE, ECE, Mech&B.Tech.IT)
COIMBATORE-641 035, TAMIL NADU

DEPARTMENT OF MATHEMATICS

23MAT203 & PROBABLITY AND RANDOM PROCESS

UNIT-2 (PART-B)

1. The joint distribution of X and Y is given by $f(x,y) = \frac{x+y}{21}$, $x = 1,2,3$; $y = 1,2$. Find the marginal distribution. Also, find E[XY].

2. Three balls are drawn at random without replacement from a box containing 2 white , 3 red and 4 black balls. If X denotes the number of white balls drawn and Y denote the number of red balls drawn, Find the joint probability distribution of (X, Y)

3. Suppose the point Probability Density Function is given by
$$f(x,y) = \begin{cases} \frac{6}{5}(x + y^2) \; ; \; 0 \le x \le 1, 0 \le y \le 1 \\ 0; \; otherwise \end{cases}$$. Obtain the marginal density
function of X that of Y. Hence, otherwise find $P(\frac{1}{4} \le y \le \frac{3}{4})$.

4. If the joint pdf of atwo dimensional random variable (X, Y) is given by
$f(x,y) = x^2 + \frac{xy}{3}$. $0 < x < 1, 0 < y < 2$. Find i) $P(X > \frac{1}{2})$ ii) $P(Y < X)$ iii) $P(Y < \frac{1}{2}/X < \frac{1}{2})$

5. Given joint p.d.f of (X,Y) as $f(x,y) = \begin{cases} 8xy, 0 < x < y < 1 \\ 0, otherwise \end{cases}$. Find the marginal and conditional p.d.f. of X and Y. Are X and Y independent?

6. Let X and Y are discrete random variables with probability function
$f(x,y) = \frac{x+y}{27}$, $x = 1,2,3$; $y = 1,2$ Find i) Mean and variance of X and Y ii)Cov (X,Y) iii) Correlation of X and Y.

7. Two random variables X and Y have the joint density
$f(x,y) = \begin{cases} 2 - x - y, 0 < x < 1, 0 < y < 1 \\ 0, otherwise \end{cases}$. Show that cov(X,Y)=$\frac{-1}{144}$

8. Suppose that the 2D Random variables (X,Y) has the joint p.d.f $f(x) = \begin{cases} x + y, 0 < x < 1, 0 < y < 1 \\ 0, otherwise \end{cases}$. Obtain the correlation between X and Y. Check whether X and Y are independent.

9. The two lines of regression are
8x-19y+66=0
40x-18y-214=0, The variance of x is 9. Find i) The means of x and y ii) correlation coefficient between x and y.

10. The Regression equations are 3x+2y=26 and 6x+y=31. Find the correlation coefficienct between X and Y.

11. If the p.d.f of a two dimensional random variable (X,Y) is given by $f(x,y) = x + y$, $0 \le (x,y) \le 1$. Find the p.d.f of U=XY.

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12. If X and Y are independent random variables with p.d.f $e^{-x}, x \geq 0; e^{-y}, y \geq 0$ respectively. Find the density function of $U = \dfrac{X}{X+Y}$ and V=X+Y. Are $U\&V$ independent?