## UNIT- III

Q 1) Define Bivariate p.m.f./p.d.f. Also explain Marginal and conditional p.m.f./p.d.f.

Q 2) If bivariate p.m.f. is given by

i) $P(X,Y) = K(X+Y)$ $X,Y = 1,2,3$

ii) $P(X,Y) = K(2X+Y)$ $X,Y = 2,3,4$

iii) $P(X,Y) = Kp^2q^{(x+y)}$ $X,Y = 0, 1,2,3\ldots\ldots\ldots$ $0<p<1$, $p+q=1$

Obtain the value of K . Also obtain marginal densities of X and Y.

Write down the expression for conditional p.m.f of X given Y=y.

Check whether X and Y are independent

Q 3) If f(X,Y) is a bivariate p.d.f. Obtain the value of K . Also obtain marginal densities of X and Y. Write down the expression for conditional p.d.f of X given Y=y. check whether X and Y are independent

i) $f(x,y) = K(6-x-y)$ $0< x < 2$, $2<y<4$

ii) $f(x,y) = K$ $0< x< y <1$

iii) $f(x,y) = K$ $0<x, y<1$

iv) $f(x,y) = Kxy$ $0< x, y <1$

v) $f(x,y) = Kxy$ $0< x< y <1$

vi) $f(x,y) = K(x+y)$ $0< x<a$, $0< y <b$

vii) $f(x,y) = Kxye^{-(x+y)}$ $x, y >0$

viii) $f(x,y) = K(x^2+y^2)$ $0< x< y <1$

ix) $f(x,y) = K(3x^2+xy)$ $0< x< 1, 0<y <2$

x) $f(x,y) = Kxe^{-x(1+y)}$ $x, y >0$

Q 4) If conditional density of X given Y is $kx/y^2$ , $0<x<y$ & $0<y<1$ and marginal density of Y is $cy^4$ for $0<y<1$. Obtain expressions for marginal density of X and conditional density of Y given X.

Q 5) Define correlation coefficient. State and prove its properties

Q 6) With usual notations show that

i) $E(E(X/Y))=E(X)$

ii) $E(V(X/Y))+V(E(X/Y)) =V(X)$

iii) $E(aX+bY)= aE(X)+bE(Y)$

iv) $V(aX+bY)= a^2V(X)+b^2V(Y)+2ab\ COV(X,Y)$

v) $$\rho = \frac{V(X)+V(Y)-V(X-Y)}{2\sqrt{V(X)*V(Y)}}$$

Q 7) Find the value of k so that U and V are uncorrelated. U= X +k Y , Y= X +( $\sigma_x / \sigma_y$) Y

Q 8) Find the value of a so that U and V are uncorrelated. U= Xsina +Ycosa and V=Xcosa +Ysina

Q 9) If the random variable X follows p.d.f. f(x) . obtain p.d.f. of i)Y=2X+3 ii) U= $X^2$ iii)V=$e^x$ iv)W =1/X

Q 10) If a r.v X follows uniform distribution over the range (-1,1) . Obtain p.d.f of i)Y=2X+3 ii) U= $X^2$

Q 11) If a r.v X follows uniform distribution over the range ($-\pi/2$, $\pi/2$). Obtain p.d.f of Y=tanX

Q 12) If a r.v X follows uniform distribution over the range (0,1) . Obtain p.d.f of i) Y= -2logX ii) U =√X iii) V= 1/X

Q 13) A.r.v. X follows uniform distribution over range (-1, 1). Obtain p.d.f. of i) Y =$X^2$ ii)V = X + 2 iii) V = $X^3$ + 4

Q 14) A r.v. X follows uniform distribution over range ( -Π, Π ) Obtain p.d.f. of Y=tanX

Q 15) Random variable X and Y are independently identically distributed each having an exponential distribution with parameter $\lambda$. Obtain joint p.d.f. of U=X +Y , V = X/(X+Y), Are they independent

Q 16) Random variable X and Y are independently identically distributed each having an exponential distribution with parameter$\lambda$. Obtain joint p.d.f. of U=X+Y, V=X/Y. Are they independent