

UNIT-II
Operations on single and multiple random variables

S.No	Questions	BT	C O	PO
Part – A (Short Answer Questions)				
1	Define joint probability density function for two random variables.	Remember	CO2	PO1,PO2,PO4
2	Define joint probability distribution function for two random variables.	Remember	CO2	PO1,PO2,PO4
3	Write properties of joint probability density function.	Remember	CO2	PO1,PO2,PO4
4	Write properties of joint probability distribution function.	Understand	CO2	PO1,PO2,PO4
5	Explain marginal density function.	Understand	CO2	PO1,PO2,PO4
6	Define marginal distribution function.	Remember	CO2	PO1,PO2,PO4
7	Define central limit theorem.	Remember	CO2	PO1,PO2,PO4
8	Discuss conditional joint distribution function.	Understand	CO2	PO1,PO2,PO4
9	Define conditional joint density function.	Understand	CO2	PO1,PO2,PO4
10	Explain distribution and density function of a sum of two random variables.	Understand	CO2	PO1,PO2,PO4
Part – B (Long Answer Questions)				
11	a) Derive expressions for mean and variance for uniform random variable.	Understand	CO2	PO1,PO2,PO4
	b) The characteristic function for a Gaussian random variable X, having a mean value of 0, is $\Phi_X(\omega) = \exp(-\omega^2 / 2\sigma^2)$. Find all the moments of X using $\Phi_X(\omega)$.	Understand	CO2	PO1,PO2,PO4
12	a) Derive expressions for mean and variance for Poisson random variable.	Remember	CO2	PO1,PO2,PO4
	b) a) Write short notes on Gaussian distribution and density function. b) Consider that a fair coin is tossed 3 times, Let X be a random variable, defined as X= number of tails appeared, find the expected value of X.	Remember	CO2	PO1,PO2,PO4
13	a) Derive expressions for mean and variance for exponential random variable.	Remember	CO2	PO1,PO2,PO4
	b) State and prove three properties of moment generating function and calculate moment generating function of exponentially distributed random variable.	Understand	CO2	PO1,PO2,PO4
14	a) If X has the probability density function $f_X(x) = 1/2 e^{- x }$, $-\infty < x < \infty$, show that the characteristic function of X is given by $\phi_X(\omega) = 1/(1+\omega^2)$. Hence find the mean and variance of X	Understand	CO2	PO1,PO2,PO4
	b) Find the PDF of $W = X + Y$. X and Y have joint Pdf $f_{XY}(x, y) = 1/15$ $0 \leq x \leq 3, 0 \leq y \leq 5$, $= 0$ otherwise.	Understand	CO2	PO1,PO2,PO4
15	a) Calculate the density function of the random variable $Y = 2X + 3$ Where X is a uniform random variable over $(-1, 2)$.	Remember	CO2	PO1,PO2,PO4
	b) write short notes on Gaussian distribution and density function.	Remember	CO2	PO1,PO2,PO4
16	a) State expressions for mean and variance for binomial random variable.	Understand	CO2	PO1,PO2,PO4
	b) The exponential density function given by $f_X(x) = (1/b)e^{-(x-a)/b}$ for $x > a$, $= 0$; otherwise. Find variance and co-efficient of skewness.	Understand	CO2	PO1,PO2,PO4