UNIT–IV

Random process and Spectral Characteristics

S.No		Questions	BT	CO	PO
Part – A (Short Answer Questions)					
1		Define wiener khinchine relations	Remember	CO4	PO1,PO2,PO3,PO4
2		State any two properties of cross-power density spectrum.	Understand	CO4	PO1,PO2,PO3,PO4
3		Define cross –spectral density and its examples.	Remember	CO4	PO1,PO2,PO3,PO4
4		Explain any two uses of spectral density. .	Understand	CO4	PO1,PO2,PO3,PO4
5		Define power density spectrum.	Remember	CO4	PO1,PO2,PO3,PO4
6		State any two properties of power density spectrum	Remember	CO4	PO1,PO2,PO3,PO4
7		State any two properties of an auto correlation function.	Remember	CO4	PO1,PO2,PO3,PO4
8		Define cross correlation and its properties.	Understand	CO4	PO1,PO2,PO3,PO4
9		Prove that $R_{XY}(\tau) = R_{YX}(-\tau)$	Remember	CO4	PO1,PO2,PO3,PO4
10		Explain any two properties of cross correlation.	Understand	CO4	PO1,PO2,PO3,PO4
Part – B (Long Answer Questions)					
11	a)	Discuss the concept of power density spectrum in detail and derive the expression psd and power	Understand	CO4	PO1,PO2,PO3,PO4
	b)	Discuss the concept of cross power density spectrum in detail and mention the properties of Sxy(w).	Understand	CO4	PO1,PO2,PO3,PO4
12	a)	Explain the concept of cross power spectral density of input and output of a linear system.	Understand	CO4	PO1,PO2,PO3,PO4
	b)	Determine whether $X_1(t)$ and $X_2(t)$ are jointly wide sense stationary. X(t) is a wide sense stationary random process. For each process $X_i(t)$ defined below (a) $X_1(t) = X(t + a)$ (b) $X_2(t) = X(at)$	Remember	CO4	PO1,PO2,PO3,PO4
13	a)	A random process has auto correlation function $Rxx(\tau)=1-\lvert\tau\rvert$ $\lvert\tau\rvert<1$ find the PSD and draw plots	Remember	CO4	PO1,PO2,sPO3,PO4
	b)	If the PSD of X(t) is Sxx(W) then find PSD of d /dx(x(t)	Understand	CO4	PO1,PO2,PO3,PO4
14	a)	Show that for any WSS system response of auto correlation function is also stationary		CO4	PO1,PO2,PO3,PO4
	b)	Consider a WSS random process X(t) with power spectral density Sxx(w).another random process is given by y(t)=X(t+T)+X(t-T) Where t is constant .Find the power spectrum of Y(t)	Remember	CO4	PO1,PO2,PO3,PO4
15	a)	Consider the random process X(t)= A Cos ($w_0t+\theta$) is wide sense stationery if it is assumed that A and w_0 are constants and θ is uniformly distributed random variable over the interval (0,π/2)Find the average power of X(t)	Understand	CO4	PO1,PO2,PO3,PO4
	b)	The auto correlation function of a random process X(t) is $R_{XX}(\tau) = 3 + e^{-4\tau^2}$. find the power spectrum of X(t).	Understand	CO4	PO1,PO2,PO3,PO4
16	a)	A random process has the power spectrum density $S_{XX}(W) = 6W^2/(1 + W^4)$ average power.	Understand	CO4	PO1,PO2,PO3,PO4
	b)	A random process has the power density spectrum $S_{XX}(w)=W^2/(W^2+1)$. Find the average power in the random process.	Remember	CO4	PO1,PO2,PO3,PO4