UNIT – 1

* discrete (or) continuous
  $\Rightarrow K$
* binomial, poisson problems, memoryless property
* Normal distribution using P

UNIT – 2

75 mark

* Two dimension discrete continuous – K table, $f(x)$ given – Correlation
* functions of two dimensional R.V
  4 problems only ang

UNIT – 3

Tchebycheff's inequality
Central limit theorem

UNIT – 4

WSS & mean ergodic $\phi(x) = \begin{cases} 1 - |x| \\ 0 \end{cases}$

UNIT – 5

* $S_{xx}(\omega)$ is given to find Average power
* $h(t)$ & $R(\tau)$ is given to find $S_{yy}(\omega)$

UNIT-5

1) i) $S(\omega) = \dfrac{157+12\omega^2}{(16+\omega^2)(9+\omega^2)}$ To find average power

ii) $S(\omega) = \dfrac{\omega^2+9}{\omega^4+5\omega^2+4}$

$S(\omega) = \dfrac{\omega^2+2}{\omega^4+13\omega^2+36}$

2) A WSS $X(t)$ is the input to a linear system with impulse response $h(t) = 2e^{-7t}$, $t>0$, If the auto correlation $X(t)$ is $R_{XX}(\tau) = e^{-4|\tau|}$ Find the power spectral density of the output process.

3) Same problems given $h(t) = \begin{cases} \frac{1}{T} & ; 0 \le t \le T \\ 0 & ; \text{otherwise} \end{cases}$

Evaluate $S_{yy}(\omega)$ in terms of $S_{XX}(\omega)$.

4) $h(t) = e^{-2t}$ $t \ge 0$ & $R_{XX}(\tau) = e^{-2|\tau|}$

To find $S_{yy}(\omega)$

Ans $= \dfrac{4}{(4+\omega^2)^2}$

~~4) $Y(t) = X(t+a) - (X(t-a))$ to prove $R_{YY}(\tau) = 2R_{XX}(\tau) - R_{XX}(\tau+2a)$~~

~~Additional Problems~~

i) $R_{XX}(\tau) = \begin{cases} 1-|\tau| & |\tau| \le 1 \end{cases}$ To find $S_{XX}(\omega)$

ii) $S(\omega) = \begin{cases} \pi & ; |\omega| < 1 \\ 0 \end{cases}$ To find $R_{XX}(\tau)$

iii) $S_{XX}(\omega) = \begin{cases} \frac{b}{a}(a-|\omega|) & ; |\omega| \le a \\ 0 & ; \text{o/w} \end{cases}$ To find $R_{XX}(\tau)$

$S_{XY}(\omega) = \begin{cases} a+jb\omega & ; |\omega| < 1 \\ 0 & ; \text{o/w} \end{cases}$ to find

UNIT - 4

WSS :-

6 — 2nd "

P 1) Page No — 7 — 3rd problem } WSS

8 — 4th "

9 — 5th pro

10 — 5th p

16 — 3rd r mean & var — Hw

Page no — 17 (1)

Page no = 21 — (1)

UNIT - 3

(i) $P[|X-7| \geq 4]$
(ii) $P[-1 \leq X \leq 3]$
(iii) $P[|X-14| \geq 2\sigma]$

* Tchebycheff's inequality — page - 4 - 2, 3, 11 - 1

Central limit theorem — 14 - 1,

Pr Chernoff's bound poisson (or) normal — 17 - 1, 2
18 - 1

UNIT - 2

Page - 5 - (1), 10 - (2)

14 - 1, (27) - 2

Function of random Re

(33) - 1, 2, 3, 4 — any one compulsory

UNIT - I

K : ~~Page~~ page - 3 - (1), 5 - (2), Hw

Confirm

(Q) Normal distribution pr — Binomial & poisson

5) A RP $\{x(t)\}$ is the input to a linear system whose impulse response is $h(t) = e^{-2t}$; $t \geq 0$. If the autocorrelation function of the process is $R_{xx}(\tau) = e^{-2|\tau|}$. Find the power spectral density of the output process $y(t)$.

Soln:- given $h(t) = e^{-2t}$; $t \geq 0$; $R_{xx}(\tau) = e^{-2|\tau|}$

To find $S_{yy}(\omega)$:-

$$S_{yy}(\omega) = |H(\omega)|^2 \cdot S_{xx}(\omega) \longrightarrow ①$$

$$H(\omega) = F[h(t)] = F[e^{-2t}] \qquad \left(\because F[e^{-at}] = \frac{1}{a+i\omega}\right)$$

$$H(\omega) = \frac{1}{2+i\omega}$$

$$|H(\omega)| = \frac{1}{\sqrt{2^2+\omega^2}} \qquad \therefore |H(\omega)|^2 = \frac{1}{2^2+\omega^2} \longrightarrow ②$$

$$S_{xx}(\omega) = F[R_{xx}(\tau)] = F[e^{-2|\tau|}] = \frac{2(2)}{2^2+\omega^2} = \frac{4}{2^2+\omega^2} \rightarrow ③$$

$$\left(\text{WKT} \because F[e^{-a|\tau|}] = \frac{2a}{a^2+\omega^2}\right)$$

Substituting eqn ② & ③ in eqn ①

$$\therefore S_{yy}(\omega) = \left(\frac{1}{4+\omega^2}\right) \cdot \left(\frac{4}{4+\omega^2}\right)$$

$$S_{yy}(\omega) = \frac{4}{(4+\omega^2)^2} = \left(\frac{2}{4+\omega^2}\right)^2$$