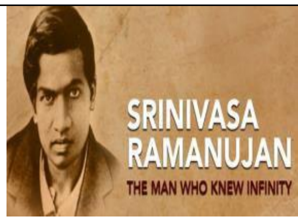
SRM Institute of Science and Technology
Kattankulathur

DEPARTMENT OF MATHEMATICS

18MAB203T- Probability and Stochastic Processes

Module – V
Tutorial Sheet - 15



Sl.No.	Questions	Answer
	Part – B	
1	If X(t) is the input voltage to a circuit and Y(t) is the output voltage, $\{X(t)\}$ is a stationary random process with $\mu_x = 0$ & $R_{XX}(\tau) = e^{-2\|\tau\|}$. Find $\mu_y, S_{XX}(\omega), S_{YY}(\omega)$ & $R_{YY}(\tau)$ if the system function is given by $H(\omega) = \frac{1}{2+i\omega}$	(i) 0 (ii) $\frac{4}{\omega^2+4}$ (iii) $S_{YY}(\omega) = \frac{4}{\left(4+\omega^2\right)^2}$ $R_{YY}(\tau) = \frac{e^{-2\|\tau\|}}{8}\left(1+2\|\tau\|\right)$
2	A Circuit has an impulse response given by $h(t) = \begin{cases} \frac{1}{T} & 0 \le t \le T \\ 0 & otherwise \end{cases}$ Evaluate $S_{YY}(\omega)$ in terms of $S_{XX}(\omega)$.	$S_{YY}(\omega) = \left(\frac{\sin(\omega T/2)}{\omega T/2}\right)^2 S_{XX}(\omega)$
3	A system has an impulse response $h(t) = e^{-\beta t}U(t)$ .Find the power spectral density of the output Y(t) corresponding to the input X(t).	$S_{YY}(\omega) = \frac{1}{\beta^2+\omega^2} S_{XX}(\omega)$
4	Find the output power density spectrum and output autocorrelation function for a system with $h(t) = e^{-t} \quad t \ge 0$,for an input with power density spectrum $\frac{\eta_0}{2} \quad -\infty < f < \infty$.	$R_{YY}(\tau) = \frac{\eta_0}{4} e^{-\|\tau\|}$, $-\infty < \tau < \infty$.