

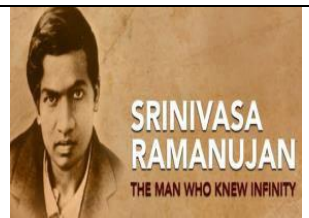


**SRM Institute of Science and Technology
Kattankulathur**

DEPARTMENT OF MATHEMATICS

**18MAB203T- Probability and Stochastic
Processes**

**Module – V
Tutorial Sheet - 14**



Sl.No.	Questions	Answer
Part – B		
1	The cross-power spectrum of real random processes $\{X(t)\}$ and $\{Y(t)\}$ is given by $S_{XY}(\omega) = \begin{cases} a + ib\omega & ; w < 1 \\ 0 & ; otherwise \end{cases}$ Find the Cross-correlation function.	$R_{XY}(\tau) = \frac{1}{\pi\tau^2} ((a\tau + b)\sin\tau + b\tau\cos\tau)$
2	If the cross correlation of two processes $\{X(t)\}$ and $\{Y(t)\}$ is $R_{XY}(t, t + \tau) = \frac{AB}{2} (\sin\omega_0\tau + \cos(\omega_0(2t + \tau)))$ where A, B and ω_0 are constant. Find the cross-power spectrum.	$S_{XY}(\omega) = \frac{-i\pi AB}{2} [\delta(\omega + \omega_0) + \delta(\omega - \omega_0)]$
3	The cross-power spectrum of real random processes $\{X(t)\}$ and $\{Y(t)\}$ is given by $S_{XY}(\omega) = \begin{cases} 1 + i\omega & ; w < 1 \\ 0 & ; otherwise \end{cases}$ Find the Cross- correlation function.	$R_{XY}(\tau) = \frac{1}{\pi\tau^2} ((\tau - 1)\sin\tau + \tau\cos\tau)$
4	If X(t) and Y(t) are uncorrelated random processes then find the power spectral density of Z if $Z(t) = X(t) + Y(t)$. Also find the cross spectral density $S_{XZ}(\omega)$ & $S_{YZ}(\omega)$.	$R_{ZZ}(\tau) = R_{XX}(\tau) + R_{XY}(\tau) + R_{YX}(\tau) + R_{YY}(\tau)$ $S_{XZ}(\omega) = S_{XX}(\omega) + S_{XY}(\omega)$ $S_{YZ}(\omega) = S_{YX}(\omega) + S_{YY}(\omega).$