SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution) Coimbatore – 641 035 DEPARTMENT OF MATHEMATICS RANDOM PROCESSES, WIDE SENSE STATIONARY PROCESS



J. Show that the eardon peocess x(t) = Acoc(wt+0) where AR w are constant; O is wolfermly detained to (-IT, IT) is was.

To place: coss.

ii).
$$R_{xx}(\tau) = E[x(t) \times (t+\tau)]$$

STACE & le conformly dectabated 90 (-TT, TT).

$$F(0) = \frac{1}{b-a}$$

$$= \frac{1}{\pi + \pi}$$

$$F(0) = \frac{1}{2\pi}$$

i).
$$E[x(t)] = \int x(t) f(\theta) d\theta$$

$$= \int A \cos(\omega t + \theta) \frac{1}{2\pi} d\theta$$

$$= \frac{A}{2\pi} \left[SPn(\omega t + \theta) \right]^{T}$$

$$= \frac{A}{2\pi} \left[SPn(\pi + \omega t) - SPn(-\pi + \omega t) \right]$$

$$= \frac{A}{2\pi} \left[-SPn(\pi + \omega t) - SPn(-\pi + \omega t) \right]$$

$$= \frac{A}{2\pi} \left[-SPn(\pi + \omega t) - SPn(\pi + \omega t) \right]$$

$$= -SPn(\pi + \omega t)$$

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11).
$$E[x(t) \times (t+\tau)]$$

$$= E[A \cos(\omega t + \theta) A \cos(\omega(t+\tau) + \theta)]$$

$$= A^{2} E[\cos(\omega t + \theta) \cos(\omega t + \omega \tau + \theta)]$$

$$= \frac{A^{2}}{2} E[\cos(\omega t + \theta + \omega t + \omega \tau + \theta) + \cos(\omega t + \theta + \omega \tau + \theta)]$$

$$= \frac{A^{2}}{2} E[\cos(\omega t + \omega \tau + 2\theta) + \cos(-\omega \tau)]$$

$$= \frac{A^{2}}{2} E[\cos(\omega t + \omega \tau + 2\theta)] + E[\cos(\omega \tau)]$$

$$= \frac{A^{2}}{2} E[\cos(\omega t + \omega \tau + 2\theta)] + E[\cos(\omega \tau)]$$

$$= \frac{A^{2}}{2} \cos(\omega \tau + \frac{A^{2}}{2} E[\cos(\omega t + \omega \tau + 2\theta)] + E[\cos(\omega \tau)]$$

$$= \frac{A^{2}}{2} \cos(\omega \tau + \frac{A^{2}}{2} E[\cos(\omega t + \omega \tau + 2\theta)] + E[\cos(\omega \tau)]$$

$$= \int_{-\pi}^{\pi} \cos(\omega t + \omega \tau + 2\theta) \int_{2\pi}^{\pi} d\theta$$

$$= \int_{-\pi}^{\pi} [\cos(\omega t + \omega \tau + 2\theta)] \int_{2\pi}^{\pi} d\theta$$

$$= \int_{-\pi}^{\pi} [\sin(\omega t + \omega \tau + 2\theta)] \int_{2\pi}^{\pi} d\theta$$

$$= \int_{-\pi}^{\pi} [\sin(\omega t + \omega \tau) - \sin(\omega \tau + \omega \tau)]$$

$$= \int_{-\pi}^{\pi} [\sin(\omega t + \omega \tau) + \sin(\omega \tau + \omega \tau)]$$

$$= \int_{-\pi}^{\pi} [\sin(\omega t + \omega \tau) - \sin(\omega \tau + \omega \tau)]$$

$$= \int_{-\pi}^{\pi} [\cos(\omega t + \omega \tau)] \int_{-\pi}^{\pi} \cos(\omega t + \omega \tau)$$

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$$= \int_{-\pi}^{\pi} \cos(\omega t + \omega \tau) \int_{-\pi}^{\pi} \cos(\omega t + \omega \tau)$$

$$= \int_{-\pi}^{\pi} \cos(\omega t$$

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