

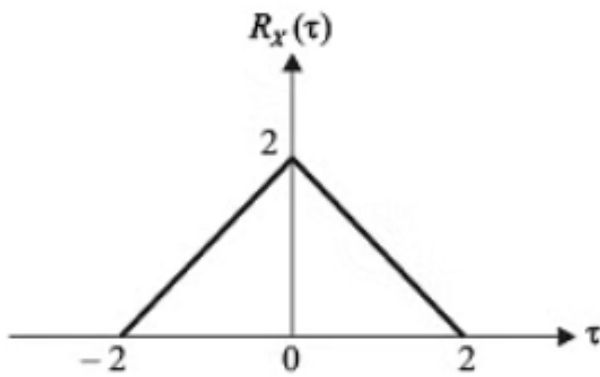
GATE 2021 EC

EE:1205 Signals and systems
Indian Institute of Technology, Hyderabad

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Question 47:

The autocorrelation function $R_x(\tau)$ of a wide-sense stationary random process $X(t)$ is shown in the figure. The average power of $X(t)$ is ?



Using this autocorrelation factor,

$$R_x(0) = E[X(t)X(t+0)] \quad (4)$$

$$= E[X(t)X(t)] \quad (5)$$

$$(6)$$

From equations (1) and (6)

$$P_x = R_x(t) \quad (7)$$

$$\Rightarrow P_x = 2W \quad (8)$$

Solution: Here $R_x(0) = 2$

Parameter	Description
$R_x(\tau)$	Autocorrelation function
$X(t)$	Stationary random process
P_x	Average power

TABLE 0
VALUES

Average power of $X(t)$ is given as mean square value of $X(t)$, i.e.

$$P_x = E[X^2(t)] \quad (1)$$

$$= E[X(t)X(t)] \quad (2)$$

$$R_x(t) = \int_{-\infty}^{\infty} E[X(\tau)X(t-\tau)] d\tau \quad (3)$$