GATE 2021 EC

EE:1205 Signals and systems
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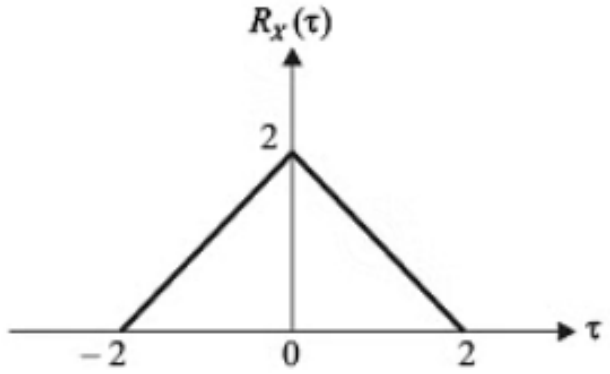
Question 47:
The autocorrection factor function $R_x(\tau)$ of a wide-sense stationary random process $X(t)$ is shown in the figure. The average power of $X(t)$ is ?



Solution: Here $R_x(0) = 2$

Parameter	Description
$R_x(\tau)$	Autocorrection factor 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.,

$$P_x = E\left[X^2(t)\right] \tag{1}$$
$$= E\left[X(t)X(t)\right] \tag{2}$$

Autocorrelation function of $X(t)$ is defined as:

$$R_x(\tau) = E\left[X(t)X(t+\tau)\right] \tag{3}$$
$$R_x(0) = E\left[X(t)X(t+0)\right] \tag{4}$$
$$= E\left[X(t)X(t)\right] \tag{5}$$

From equations (1) and (3)

$$P_x = R_x(0) \tag{6}$$
$$\implies P_x = 2W \tag{7}$$