

EE3900 - Gate Assignment 3

W Vaishnavi - AI20BTECH11025

Download all latex-tikz codes from

<https://github.com/vaishnavi-w/EE3900/blob/main/Gate3/latex3.tex>

Consider a signal,

$$f(2t) = e^{-2t}u(2t) \quad (0.0.7)$$

$$E' = \int_{-\infty}^{\infty} |e^{-2t}u(2t)|^2 dt \quad (0.0.8)$$

$$= \int_0^{\infty} e^{-4t} dt \quad (0.0.9)$$

$$= \frac{1}{4} = \frac{E}{2} \quad (0.0.10)$$

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If a signal $f(t)$ has energy E , the energy of the signal $f(2t)$ is equal to

- A) E
- B) $\frac{E}{2}$
- C) $2E$
- D) $4E$

SOLUTION

The energy of the signal $f(t)$ is given as.

$$E = \int_{-\infty}^{\infty} |f(t)|^2 dt \quad (0.0.1)$$

The energy of signal $f(2t)$,

$$E' = \int_{-\infty}^{\infty} |f(2t)|^2 dt \quad (0.0.2)$$

Putting $u = 2t$,

$$du = 2dt \quad (0.0.3)$$

$$E' = \int_{-\infty}^{\infty} |f(u)|^2 \frac{du}{2} = \frac{E}{2} \quad (0.0.4)$$

Answer: Option B

Example :

Consider a signal

$$f(t) = e^{-t}u(t) \quad (0.0.5)$$

Energy of the signal,

$$E = \int_{-\infty}^{\infty} |e^{-t}u(t)|^2 dt = \int_0^{\infty} e^{-2t} dt = \frac{1}{2} \quad (0.0.6)$$