EE3900 - Gate Assignment 3

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GATE EC - 2001 Q1.21

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.

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

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

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

Putting $u = 2t$,

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

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

Answer: Option B