

# Gate Assignment 4

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Download all latex-tikz codes from

[https://github.com/V-gopireddy/EE3900/blob/main/GATE\\_Assignment4/GateAssignment-4.tex](https://github.com/V-gopireddy/EE3900/blob/main/GATE_Assignment4/GateAssignment-4.tex)

1 EC-1998/Q2.23

The Fourier transform of a voltage signal  $x(t)$  is  $X(f)$ . The unit of  $|X(f)|$  is

- 1) volt
- 2) volt-sec
- 3) volt/sec
- 4)  $\text{volt}^2$

2 SOLUTION

**Definition 1** (Fourier Transform). *It is a mathematical transform that decomposes functions depending on space or time into functions depending on spatial or temporal frequency. The fourier transform of a given signal  $x(t)$  is denoted by  $\mathcal{F}\{x(t)\}$  or  $X(f)$*

$$X(f) = \mathcal{F}\{x(t)\} = \int_{-\infty}^{\infty} e^{j2\pi ft} x(t) dt \quad (2.0.1)$$

Given  $x(t)$  is a voltage signal. Therefore, the unit of  $x(t)$  is volt.

We have,

$$X(f) = \int_{-\infty}^{\infty} e^{j2\pi ft} x(t) dt \quad (2.0.2)$$

Since  $e^{j2\pi ft}$  has no units. The units of  $X(f)$  will be the product of units of  $x(t)$  and  $dt$ .

Therefore the units of  $X(f)$  will be volt-sec.