

# Assignment 1

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Download all python codes from

<https://github.com/V-Gopireddy/EE3900/blob/main/Assignment1/codes/Assignment-1.py>

and latex-tikz codes from

<https://github.com/V-gopireddy/EE3900/blob/main/Assignment1/Assignment-1.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) volt<sup>2</sup>

## 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,

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

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

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