

GATE Assignment 1

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Download all python codes from

[https://github.com/SavaranaDatta/EE3900/tree/main/GATE Assignment1/codes](https://github.com/SavaranaDatta/EE3900/tree/main/GATE%20Assignment1/codes)

and latex codes from

[https://github.com/SavaranaDatta/EE3900/tree/main/GATE Assignment1/GATE.tex](https://github.com/SavaranaDatta/EE3900/tree/main/GATE%20Assignment1/GATE.tex)

1 PROBLEM(GATE 2019(EC) 21)

Consider the signal

$$f(t) = 1 + 2 \cos(\pi t) + 3 \sin\left(\frac{2\pi}{3}t\right) + 4 \cos\left(\frac{\pi}{2}t + \frac{\pi}{4}\right) \quad (1.0.1)$$

, where t is in seconds. Its fundamental time period in seconds, is

2 SOLUTION

Given,

$$f(t) = 1 + 2 \cos(\pi t) + 3 \sin\left(\frac{2\pi}{3}t\right) + 4 \cos\left(\frac{\pi}{2}t + \frac{\pi}{4}\right) \quad (2.0.1)$$

Individual natural frequencies of each term are

$$f_1 = \frac{1}{2} \quad (2.0.2)$$

$$f_2 = \frac{1}{3} \quad (2.0.3)$$

$$f_3 = \frac{1}{4} \quad (2.0.4)$$

Individual fundamental time periods of each term are

$$T_1 = \frac{1}{f_1} = 2 \quad (2.0.5)$$

$$T_2 = \frac{1}{f_2} = 3 \quad (2.0.6)$$

$$T_3 = \frac{1}{f_3} = 4 \quad (2.0.7)$$

Fundamental time period(T) of the signal

$$T = LCM(T_1, T_2, T_3) \quad (2.0.8)$$

$$= LCM(2, 3, 4) \quad (2.0.9)$$

$$= 12 \quad (2.0.10)$$

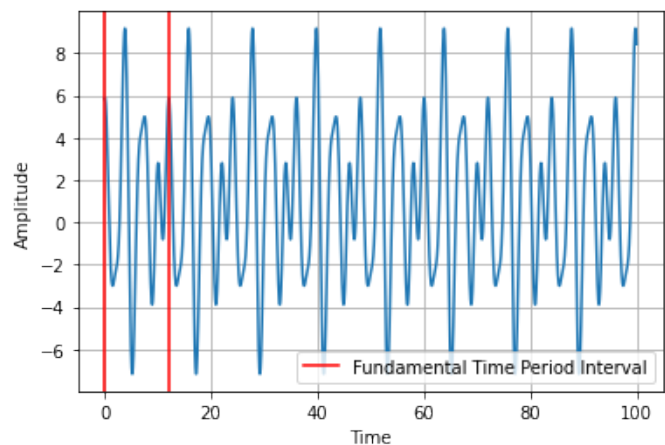


Fig. 0: Plot of the signal