Assignment 1

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Download all python codes from

https://github.com/SavaranaDatta/EE3900/tree/main/GATE Assignment1/codes

and latex codes from

https://github.com/SavaranaDatta/EE3900/tree/main/GATE Assignment1/GATE.tex

1 Problem(GATE 2019(EC) 21)

Consider the signal

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

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

2 Solution

Given,

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

Individual fundamental frequencies of each term are

$$f_1 = \pi \tag{2.0.2}$$

$$f_2 = \frac{2\pi}{3} \tag{2.0.3}$$

$$f_3 = \frac{\pi}{2} \tag{2.0.4}$$

Individual fundamental time periods of each term are

$$T_1 = \frac{2\pi}{f_1} = \frac{2\pi}{\pi} = 2 \tag{2.0.5}$$

$$T_2 = \frac{2\pi}{f_2} = \frac{2\pi}{\frac{2\pi}{3}} = 3 \tag{2.0.6}$$

$$T_3 = \frac{2\pi}{f_3} = \frac{2\pi}{\frac{\pi}{2}} = 4 \tag{2.0.7}$$

Fundamental time period(T) of the signal

$$T = LCM\left(T_1, T_2, T_3\right) \tag{2.0.8}$$

$$= LCM\left(2, 3, 4\right) \tag{2.0.9}$$

$$= 12 \tag{2.0.10}$$

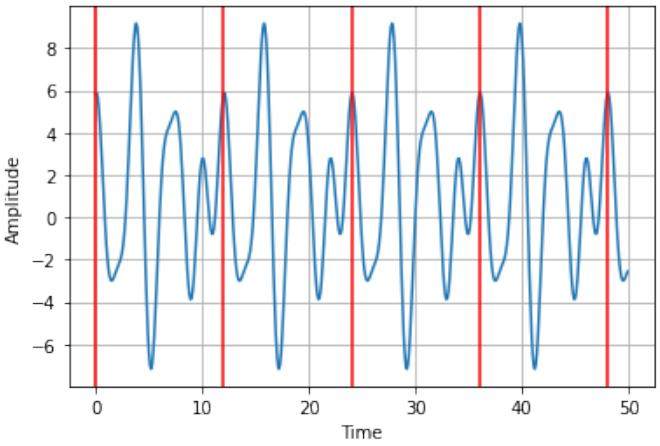

Fig. 0: Plot of the signal