Gate 2023 EE Q36

EE23BTECH11212 - Manugunta Meghana Sai*

Gate 2023 EE Q36 The magnitude and phase plots of an LTI systems are shown in figure. Find the transfer function.

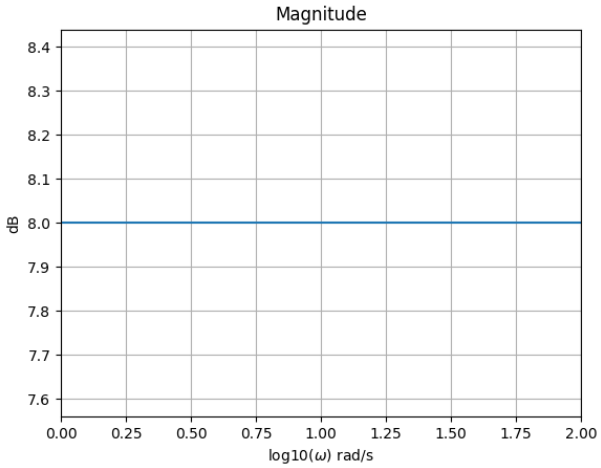

Fig. 0. Magnitude

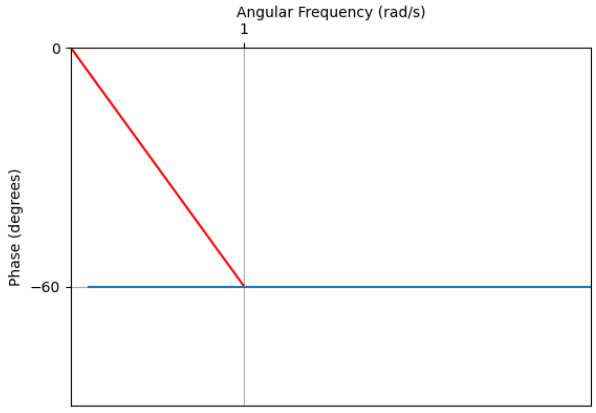

Fig. 0. Phase

Solution: From the graph 0, we can infer that the magnitude of the transfer function does not change with ω.

$$|H(j\omega)|,(dB) = 20\log_{10}(|H(j\omega)|) \tag{1}$$

$$8 = 20\log_{10}(|H(j\omega)|) \tag{2}$$

$$|H(j\omega)| = 10^{0.4} = 2.511 \tag{3}$$

From the graph 0, we can infer the relation between phase and ω:

$$\text{phase} = \frac{-\pi}{3}\omega \tag{4}$$

The direction of the transfer function is:

$$\angle H(j\omega) = e^{-j\frac{\pi}{3}\omega} \tag{5}$$

$$H(j\omega) = |H(j\omega)|\angle H(j\omega) \tag{6}$$

$$H(j\omega) = 2.511e^{-j\frac{\pi}{3}\omega} \tag{7}$$

$$= 2.511e^{-0.032s} \tag{8}$$