

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.

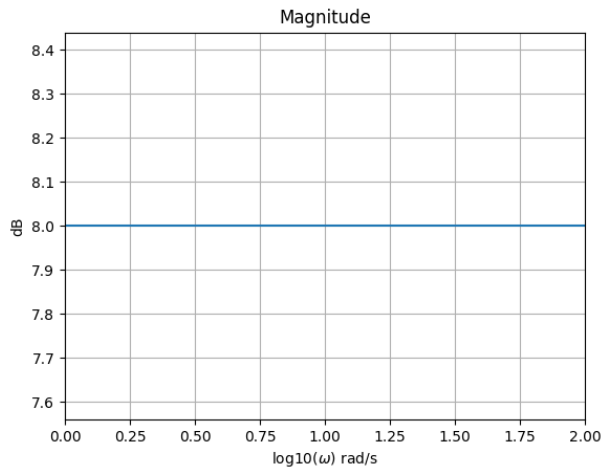


Fig. 0. Magnitude

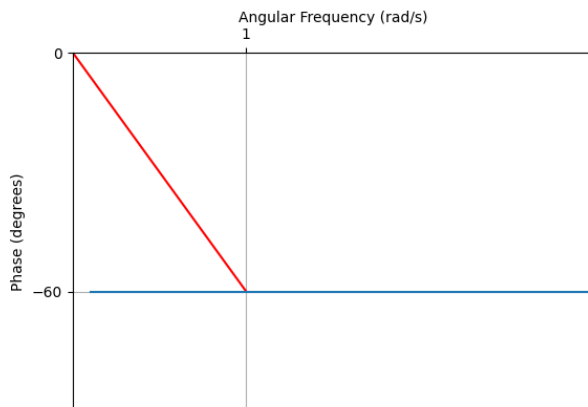


Fig. 0. Phase

with ω .

$$|H(j\omega)| \text{ (dB)} = 20 \log_{10}(|H(j\omega)|)$$

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

$$|H(j\omega)| = 10^{0.4} = 2.511 \quad (1)$$

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

$$\text{phase} = \frac{-\pi}{3} \omega \quad (2)$$

The direction of the transfer function is:

$$e^{-j\frac{\pi}{3}\omega} \quad (3)$$

The transfer function is a product of its magnitude and direction,

$$H(j\omega) = 2.511 e^{-j\frac{\pi}{3}\omega} \quad (4)$$

$$= 2.511 e^{-0.032s} \quad (5)$$

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