$$H(j\omega) = \frac{j\omega}{10 + j\omega}$$

$$\frac{\frac{j\omega}{10}}{1 + \frac{j\omega}{10}} \qquad \frac{1}{10} = \frac{1}{\omega_c}$$

$$\omega_c = 10$$

$$M(\omega) = \frac{\omega/10}{\sqrt{1 + \frac{\omega^2}{100}}}$$

$$\phi(\omega) = 90 - \tan^{-1}\left(\frac{\omega/10}{1}\right)$$

$$H(s) = 30(j\omega + 10) \cdot \frac{1}{(2j\omega + 200)} \cdot \frac{1}{(2j\omega + 1000)}$$

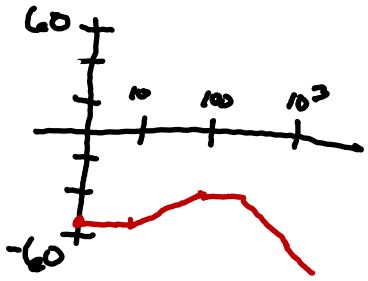
$$\frac{3}{2\times10^3}\left(\frac{j\omega}{10} + 1\right) \cdot \frac{1}{\left(\frac{2j\omega}{200} + 1\right)} \cdot \frac{1}{\left(\frac{2j\omega}{1000} + 1\right)}$$

① ② ③ ④

Poles - 100, 500

Zeros - 10

$K = \frac{3}{2\times10^3} \rightarrow 20\log_{10}\left(\frac{3}{2\times10^3}\right) = -56.4782$



$$14 = 20\log_{10}(k)$$

$$k = 10^{\frac{14}{20}} = 5.011$$

$$\frac{5.011\,(500+j\omega)^2}{(5+j\omega)(50+j\omega)}$$

$$\frac{5011\left(1+\frac{j\omega}{500}\right)^2}{\left(1+\frac{j\omega}{5}\right)\left(1+\frac{j\omega}{50}\right)}$$

KCL @ A

$$i_{2k} = i_{10k}$$

$$\frac{V_{2k}}{2k} = \frac{V_{10k}}{10k}$$

$$\frac{V_S - V_A}{2k} = \frac{V_A - V_C}{10k}$$

$$10kV_S - 10kV_A = 2kV_A - 2kV_C$$

$$10kV_S - 12kV_A = -2kV_C$$

$$V_C = 6V_A - 5V_S$$

$$\boxed{V_C = 24 - 5V_S} \quad (1)$$

KCL @ D

$$i_{6k} = i_{12k}$$

$$\frac{V_{6k}}{6k} = \frac{V_{12k}}{12k}$$

$$\frac{V_C - V_D}{6k} = \frac{V_D - V_0}{12k}$$

$$12k(V_C - V_D) = 6k(V_D - V_0)$$

$$12kV_C - 18kV_D = -6kV_0$$

$$-2V_C + 3V_D = V_0$$

$$\boxed{-2V_C + 9 = V_0} \quad (2)$$

(1) in (2)

$$V_0 = -2(24 - 5V_S) + 9$$

$$V_0 = -48 + 10V_S + 9$$

$$\boxed{V_0 = 10V_S - 39}$$

Ans!