Find $G(j\omega)$ if the amplitude characteristic for this function is shown in fig 11.33.

![Graph showing magnitude characteristic](image)

**Problem 11.33**

**Suggested Solution**

Zeros: $2 \times 100$ r/s

Simple poles: dc $\times 900$ r/s

Complex poles: $\tau = 1/20s \times \zeta = 0.1$

So $\omega_0 = 20$ r/s

$2\zeta \xi = 0.01$

Also,

$$H(j0.8) = 20dB = 10$$

$$H(j\omega) = \frac{k(0.1j\omega+1)^2}{(j\omega)\left(\frac{j\omega}{900}+1\right)\left(\frac{j\omega}{20}+\frac{j\omega}{100}+1\right)}$$

$$H(j0.8) = 10 \Rightarrow K = 8$$

$$H(j\omega) = \frac{0.8(0.1j\omega+1)^2}{(j\omega)\left(\frac{j\omega}{900}+1\right)\left(\frac{j\omega}{20}+\frac{j\omega}{100}+1\right)}$$

**Problem 11.54**

Given the network in fig 11.54 sketch the magnitude characteristic of the transfer function.
Determine what type of filter the network shown in fig 11.57 represents by determining the voltage transfer function.
Suggested Solution

\[ Z_{\text{eq}} = R_1 \Box \frac{1}{jwL} = \frac{jwLR_1}{R_1 + jwL} \]

\[ G_v = \frac{V_o}{V_i} = \frac{R_2}{R_2 + Z_{\text{eq}}} = \frac{(R_1 + jwL)R_2}{R_1R_2 + jwLR_1 + jwLR_1} \]

\[ G_v = \frac{1 + \frac{jwL}{R_1}}{1 + \frac{jwL}{R}} \]

\[ R = \frac{R_1 \Box R_2}{R_1} < R_1 \]

\[ W_z = \frac{R_1}{L} \]

\[ W_p = \frac{R}{L} \]

\[ W_p < W_z \]

NETWORK IS A LOW-PASS FILTER.

Problem 11.59

Given the network shown in fig 11.59 and employing the voltage follower analyzed in chapter 3 determine the voltage transfer function and its magnitude characteristic. What type of filter does the network represent?
\[
R = 1\Omega \\
C = 1F \\
\frac{V_i}{V_i} = \frac{1}{(1/ jw) + 1} = \frac{1}{1 + jw} \\
\frac{V_o}{V_i} = \left(\frac{1}{1 + jw}\right)^2
\]

SECOND ORDER LOW-PASS