



Sheet (5)... Passive Filters

1. Show that a series LR circuit is a low-pass filter if the output is taken across the resistor. Calculate the corner frequency f_c if $L = 2 \text{ mH}$ and $R = 10 \text{ k}\Omega$.
2. Find the transfer function V_o/V_s of the circuit in Figure 1. Show that the circuit is a low-pass filter.

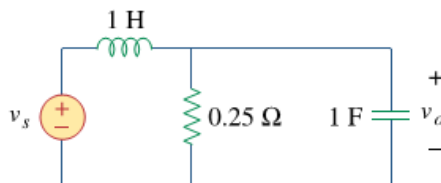


Fig.1

3. Determine the cutoff frequency of the low-pass filter described by

$$\mathbf{H}(\omega) = \frac{4}{2 + j\omega 10}$$

Find the gain in dB and phase of $H(\omega)$ at $\omega = 2 \text{ rad/s}$.

4. Determine what type of filter in figure 2. Calculate the corner frequency f_c

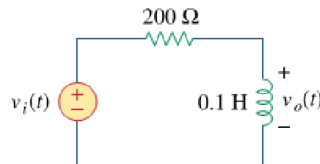


Fig.2

5. In a high-pass RL filter with a cutoff frequency of 100 kHz , $L = 40 \text{ mH}$. Find R .
6. Design a series RLC type band-pass filter with cutoff frequencies of 10 kHz and 11 kHz . Assuming $C = 80 \text{ pF}$, find R , L , and Q .
7. Determine the range of frequencies that will be passed by a series RLC band-pass filter with $R = 10 \Omega$, $L = 25 \text{ mH}$, and $C = 0.4 \mu\text{F}$. Find the quality factor.
8. The circuit parameters for a series RLC band-stop filter are $R = 2 \text{ k}\Omega$, $L = 0.1 \text{ H}$, $C = 40 \text{ pF}$. Calculate:
 - (a) The center frequency
 - (b) The half-power frequencies
 - (c) The quality factor.

Good Luck