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 fc if L= 2 mH and R= 10 kΩ.

2. Find the transfer function Vo/Vs of the circuit in Figure 1. Show that the circuit is a low-pass filter.

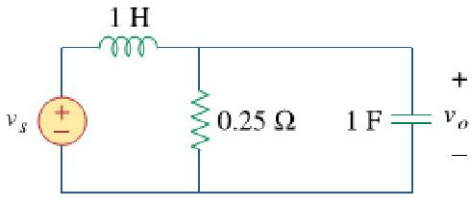

Fig.1

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 (ω) at ω= 2 rad/s.

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

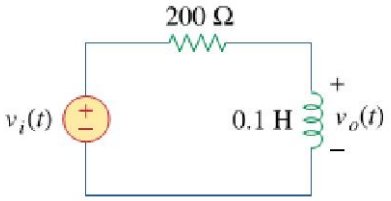

Fig.2

5. In a high-pass RL filter with a cutoff frequency of 100 kHz, L= 40 mH. Find R.

6. Design a series RLC type band-pass filter with cutoff frequencies of 10 kHz and 11 kHz. Assuming C= 80 pF, find R, L, and Q.

Dr. Basem ElHalawany

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7. Determine the range of frequencies that will be passed by a series RLC band-pass filter with R= 10Ω, L= 25mH, and C= 0.4 μF. Find the quality factor.

8. The circuit parameters for a series RLC band-stop filter are R= 2 kΩ, L= 0.1 H, C= 40 pF. Calculate:
   (a) The center frequency
   (b) The half-power frequencies
   (c) The quality factor

9. Find the bandwidth and center frequency of the band-stop filter shown in figure 3

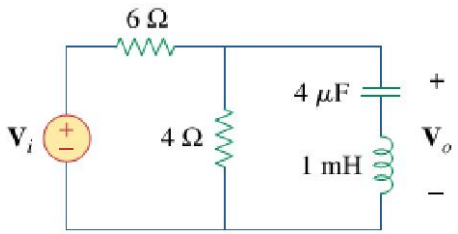

Fig. 3

Good Luck