EXPERIMENT 7
LC FILTERS

Frequency characteristics of lowpass and highpass filters

PRELIMINARY WORK

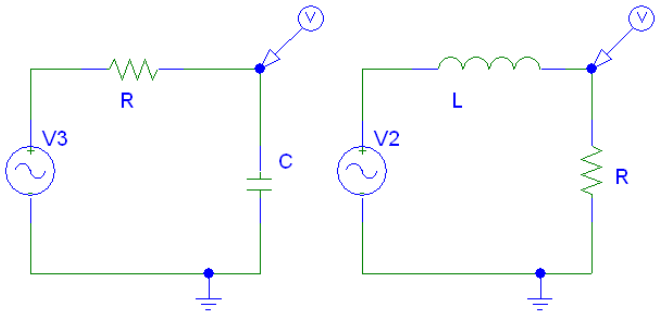

Figure 1

a) Series RC circuit b) Series RL circuit

P1 For the series circuit in Figure 1 a. Determine the type of filter

a) Find the transfer function between the source voltage and the output voltage
b) What is the attenuation in dB?
c) Determine an equation for the cutoff frequency in the series RC circuit
d) Find the value of R that will result in a cutoff frequency of 3183 Hz if capacitor value is chosen as 0.1uF

Plot the gain curve in PSPICE by choosing the values as C=0.1uF and the resistance value is chosen as the value that you found in P1 d

P2 For the series circuit in Figure 1 b. Determine the type of filter

a) Find the transfer function between the source voltage and the output voltage.
b) What is the attenuation in dB?
c) Determine an equation for the cutoff frequency in the series RL circuit
d) Find the value of R that will result in a cutoff frequency of 3183 Hz if Inductor value is chose as 5mH

Plot the gain curve in PSPICE by choosing the values as L=5mH and the resistance value is chosen as the value that you found in P2 d

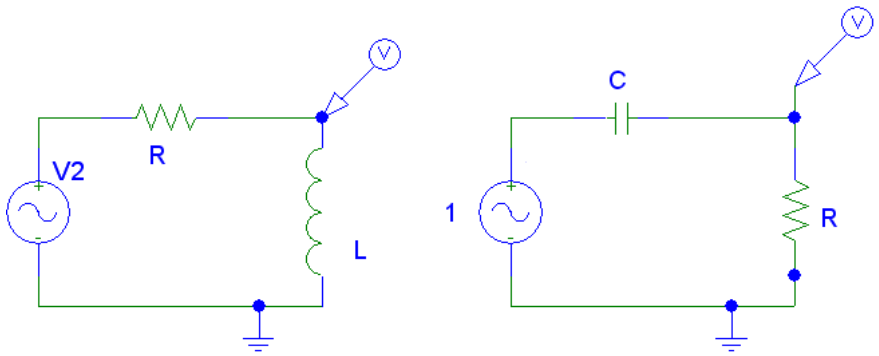

Figure 2

a) Series RL circuit **b)** Series RC circuit

P3 For the series circuit in Figure 2 a. Determine the type of filter

a) Find the transfer function between the source voltage and the output voltage
b) What is the attenuation in dB?
c) Determine an equation for the cutoff frequency in the series RL circuit
d) Find the value of R that will result in a cutoff frequency of 3183 Hz if Inductor value is chosen as 5mH

Plot the gain curve in PSPICE by choosing the values as L=5mH and the resistance value is chosen as the value that you found in P3 d

P4 For the series circuit in Figure 2 b. Determine the type of filter

a) Find the transfer function between the source voltage and the output voltage
b) What is the attenuation in dB?
c) Determine an equation for the cutoff frequency in the series RC circuit
d) Find the value of R that will result in a cutoff frequency of 3183 Hz if capacitor value is chosen as 0.1uF

Plot the gain curve in PSPICE by choosing the values as C=0.1uF and the resistance value is chosen as the value that you found in P4 d

EXPERIMENTAL WORK

E1 Setup the circuit given in figure 1 a. By changing the frequency of signal generator, obtain the Voltage transfer function between input and output. Please choose at least 20 proper frequency values up to 20 KHz. **Indicate cutoff frequencies on your plot.**

E2 Repeat E1 for Figure 1 b

E3 Repaet E1 for Figure 2 a

E4 Repeat E1 for Figure 2b