ET 304A
Electric Circuits Laboratory
Lab 11
Computer-aided Analysis of RLC Filters

Part 1: Low-pass Filter Response

1.) Use Circuitmaker to find the frequency response of the low-pass filter circuit shown in Figure 1 for the given values of resistance, R.
R = 100 ohms, 1000 ohms, and 10k ohms. Sweep the frequency over the range of 10 kHz to 10 MHz.

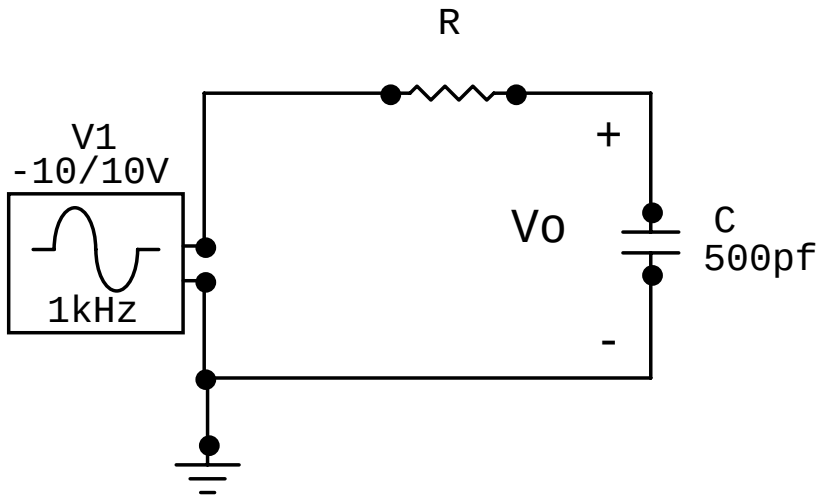

Figure 1. Low-pass Filter Circuit for Step 1 of Part 1.

2.) Print the filter's Bode plot for gain only. Produce a plot for each value of resistance over the specified range of frequency.

3.) Using the RMS ac voltmeter tool in the software, find the magnitude of output voltage, Vo, at 100 kHz, 1 MHz, and 10 MHz with R=10 k ohms. Record these values in the table below.

Table 1-Low-pass Output (R=10kΩ)

Frequency	Vo
100 kHz	
1 MHz	
10 MHz	

4.) In the experiment lab report discussion, explain how changing the value of R affects the cut-off frequency of the filter and the gain slope of the filter. Also explain the theoretical operation of the low-pass filter.

Part 2: High-pass Filter Response

1.) Use Circuitmaker to find the frequency response of the high-pass filter circuit shown in Figure 2 for the given values of resistance, R. R = 100 ohms, 1000 ohms, and 10k ohms. Sweep the frequency over the range of 10 kHz to 10 MHz.

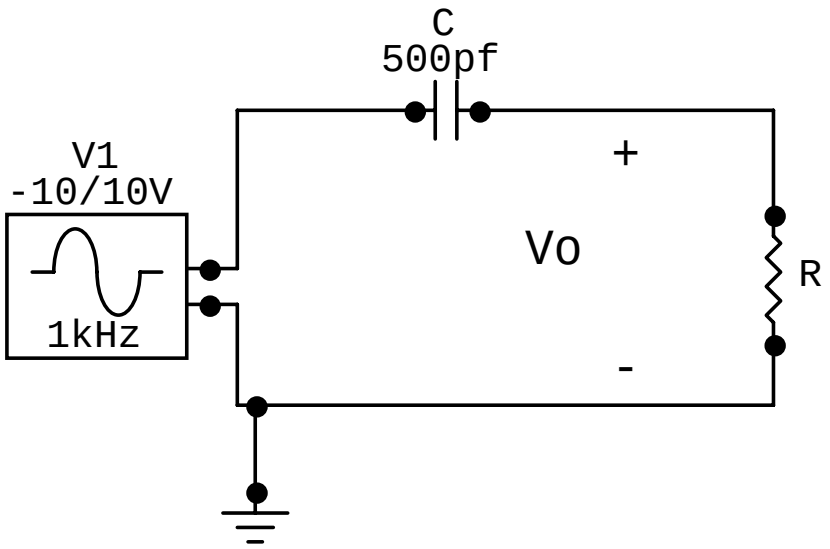

Figure 2. High-pass Filter Circuit for Step 1 of Part 2.

2.) Print the filter's Bode plot for gain only. Produce a plot for each value of resistance over the specified range of frequency.

3.) Using the RMS ac voltmeter tool in the software, find the magnitude of output voltage, Vo, at 100 kHz, 1 MHz, and 10 MHz with R=10k ohms. Record these values in the table below.

Table 2-High-pass Output (R=10kΩ)

Frequency	Vo
100 kHz	
1 MHz	
10 MHz	

4.) In the experiment lab report discussion, explain how changing the value of R affects the cut-off frequency of the filter and the gain slope of the filter. Also explain the theoretical operation of the low-pass filter.

Part 3: Band-pass Filter Response

1.) Use Circuitmaker to find the frequency response of the band-pass filter circuit shown in Figure 3 for the given values of capacitance and resistance. Sweep the frequency over the range of 10 kHz to 10 MHz.

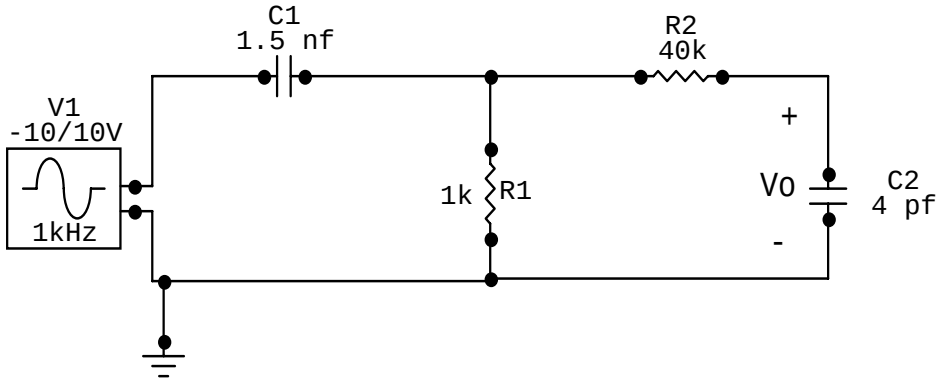

Figure 3. Band-pass Filter Circuit for Step 1 of Part 3.

2.) Print the filter's Bode plot for gain only.

3.) Using the RMS ac voltmeter tool in the software, find the magnitude of peak output voltage, Vo, and the frequency at which it occurs. Record the values in the table below. Also find the frequencies and magnitudes of the voltages for the levels that are -3 dB down from the peak filter output.

Table 3-Band-pass Output

	Frequency (Hz)	Magnitude of Vo
Peak Output		
Lower Cutoff		
Upper Cutoff		

4.) Find the filters bandwidth and record it in the space provided below.

Filter bandwith _____ Hz.