George Mason University — Physics 311

Active Filter Circuits

The goal of this lab is to demonstrate the frequency response characteristics of a multiple feedback bandpass filter.

The bandpass filter is designed using a single opamp and multiple RC circuits. The multiple feedback circuit is generally restricted to values of Q that are less than 50. The gain cannot be independently controlled. For example, the value of A_{CL} can be approximated as $R_f/2R_1$.

Since the values of R_f and R_1 both weigh into the f_0 equation for the circuit, you cannot change A_{CL} without changing the frequency response characteristics of the circuit. In this exercise, you will calculate and measure the operating frequency, bandwidth, Q and cutoff frequencies.

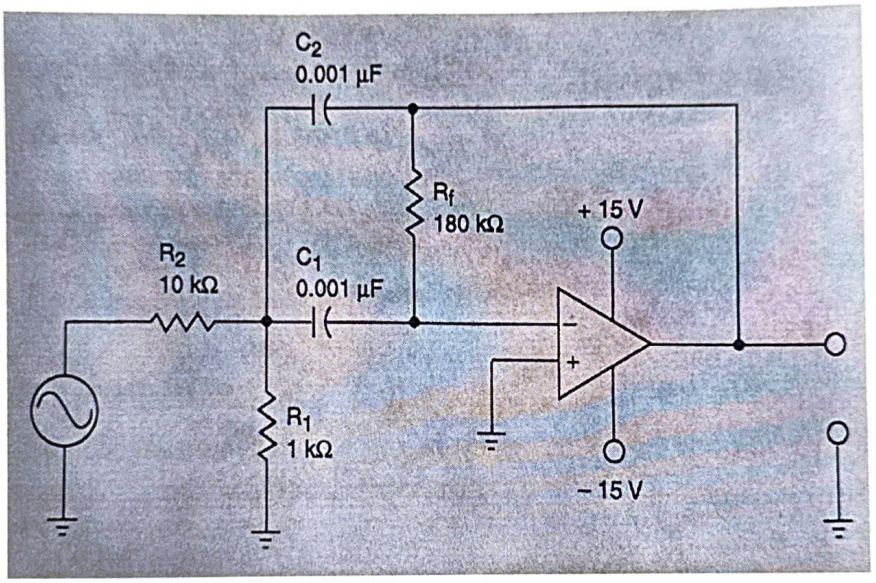

Figure 1: Active Bandpass filter

Construct the circuit in figure 1.

Predict the following parameters: f_0, Q, BW, f_{c1}, f_{c2}.

Apply power to the circuit. Set your AC signal generator amplitude to its minimum value. Set the frequency of the signal generator to approximately 12 kHz.

While viewing the output of the circuit, increase the circuit input amplitude until you obtain an output of approximately 4-V_{pp}.

Vary the input frequency until you obtain the maximum output amplitude from the filter. Then readjust the input amplitude to obtain a 4-Vpp output from the filter.

Measure and record f_{c1} and f_{c2}.

Now calculate the actual center frequency f_0, BW, and Q.

Calculate the percent error between your predicted and measured values and discuss your results.