Experiment #5 Prelab Procedure ENEE2103

Filters

Pre-lab Work:

1. Simulate the given circuits using ac sweep analysis, plot the Magnitude, and phase frequency response.
2. Compare the cutoff frequencies obtained from simulation with those computed theoretically.

Procedure:

A. Passive filters:

I. First order circuits:

1. Simulate the circuit of Fig (5.1) using **ac sweep ANALYSIS.**
2. **The voltage source must be replaced with an ac source Vac with magnitude =1V**

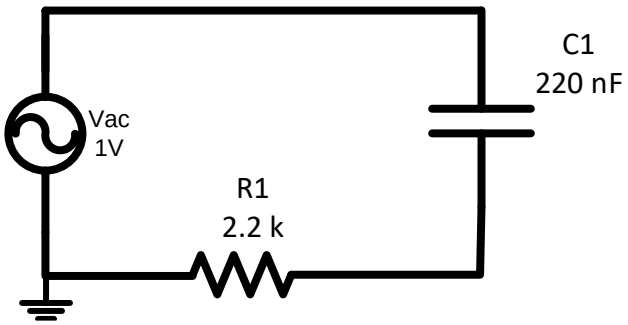

Fig (5.1)

3. Perform **ac sweep/ decade type** with suitable range of frequencies from 1Hz-1MHz
4. Plot magnitude of V_{R1} in decibels: i.e. : db(VR1)
5. Plot magnitude of V_{C1} note that this is differential voltage across C1 in decibels

   From 5 and 6 indicate location and value of cutoff frequency fc
6. Plot phase of V_R and Vc in degrees: i.e. : p(VR) and p(Vc).

II. Second Order Fiters:

1. Simulate the circuit of Fig (5.2) using ac sweep.
2. The voltage source must be replaced with an ac source **Vac** with magnitude =1V, make sure to add a ground reference connection in the circuit

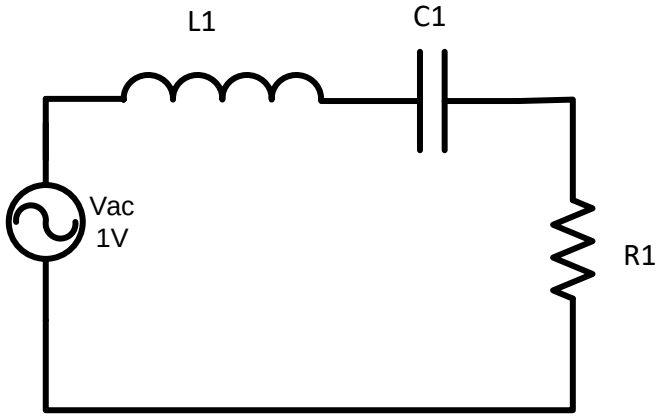

Fig (5.2)

3. Perform ac sweep/ decade type from 1Hz to 1MHz
4. Plot magnitude of V_R and $(Vc+V_L)$ in decibels.
5. Plot phase of of V_R and $(Vc+V_L)$
6. From the magnitude-frequency plots of (V_R / Vi) and $((V_C + V_L)/ Vi)$ determine the filter type in each case.
7. From the plots of step 6. Determine approximately the 3db cut-off frequency in each of the two cases.

B. Active filters:

1. Simulate Circuit of Fig. 5.3

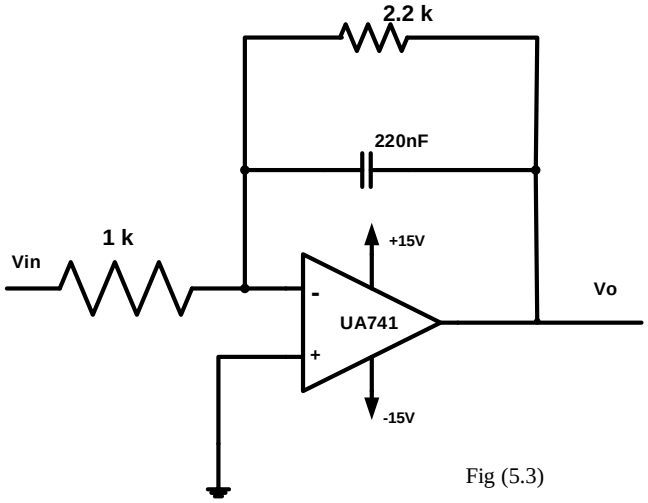

Fig (5.3)

2. Make sure to connect +15 V bias source to V+ terminal and -15 V to V- terminal.
3. Perform ac sweep/ decade type with range of frequencies from 1Hz-100kHz
4. Plot magnitude of Vo in decibels.
5. Plot phase of of Vo.
6. From the magnitude-frequency plot, determine the filter type.
7. From the plots of step 6. Determine approximately the 3db cut-off frequency.
8. Compare theoretical and simulation values of fc