**Experiment #5 Prelab Procedure ENEE2103**

**Filters**

**Pre-lab Work:**

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

**Procedure:**

# Passive filters:

1. **First order circuits:**

# Simulate the circuit of Fig (5.1) using ac sweep.

# 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 (5.1)

1. Perform ac sweep/ decade type with suitable range of frequencies
2. Plot magnitude of VR and Vc in decibels: i.e. : db(VR),db(Vc).
3. Plot phase of VR and Vc in decibels: i.e. : p(VR),p(Vc).
4. **Second Order Fiters:**

# Simulate the circuit of Fig (5.2) using ac sweep.

# 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)

2. Set the component values **R1=1 k, L1=100 mH and C1=470nF.**

1. Perform ac sweep/ decade type with suitable range of frequencies
2. Plot magnitude of VR and (Vc+VL) in decibels.
3. Plot phase of of VR and (Vc+VL )
4. From the magnitude-frequency plots of (VR / Vi ) and ((VC + VL )/ Vi ) determine the filter type in each case.
5. From the plots of step 6. Determine approximately the 3db cut-off frequency in each of the two cases**. (use cursors)**
6. Compare theoretical and simulation values of fc1, fc2

# Active filters:

#

# Simulate Circuit of Fig. 5.3



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