**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:**

# Passive filters:

1. **First order circuits:**

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

# The voltage source must be replaced with an ac source Vac with magnitude =1V



Fig (5.1)

1. Perform **ac sweep/ decade type** with suitable range of frequencies from

1Hz-1MHz

1. Plot magnitude of VR1 in decibels: i.e. : db(VR1)
2. Plot magnitude of VC1 note that this is differential voltage across C1 in decibels

**From 5 and 6 indicate location and value of cutoff frequency fc**

1. Plot phase of VR and Vc in degrees: i.e. : p(VR) and p(Vc).
2. **Second Order Fiters:**

# Simulate the circuit of Fig (5.2) using ac sweep (take values for L1,C1 and R1 from the lab manual)

# 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)

1. Perform ac sweep/ decade type from 1Hz to 1MHz
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.

# 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 range of frequencies from 1Hz-100kHz
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