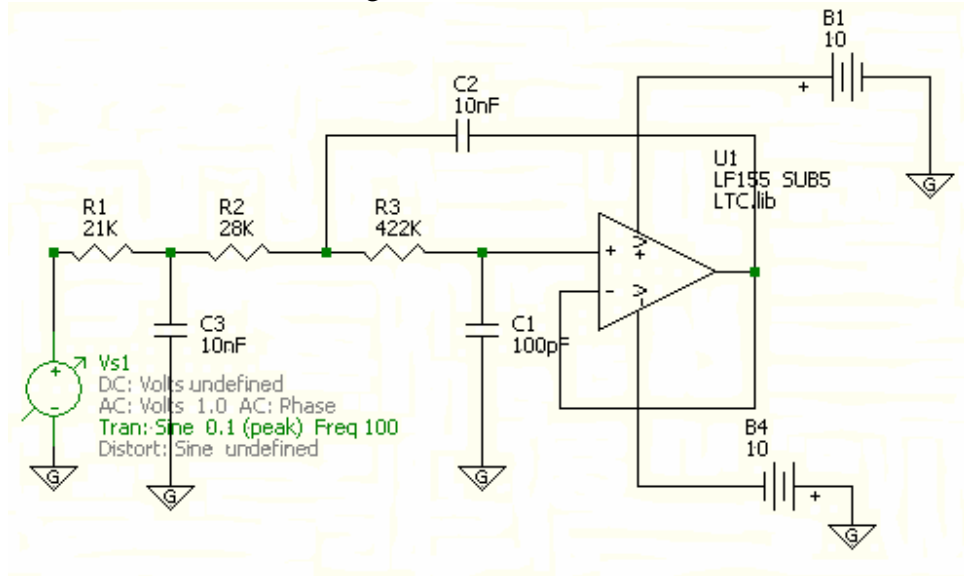


## EEE 202-CIRCUIT THEORY

### SOFTWARE LAB #8

#### ANALYSIS OF A THIRD ORDER CIRCUIT: BUTTERWORTH FILTER

The circuit of a butterworth filter is given below:



The capacitor  $C_3$  has an initial voltage of 1V. You may need to modify the circuit to put the initial condition.

#### A) PRELIMINARY WORK (30%):

Using phasors, calculate the steady state magnitude and phase of the output voltage for the following values of frequency and fill in the first two columns of the given table. Plot these values as a function of frequency.

Frequency	Calculated $ V_{out} $	Calculated Phase of $V_{out}$	Measured $ V_{out} $	Measured Phase of $V_{out}$
10 Hz				
30 Hz				
100 Hz				
300 Hz				
1 KHz				
3 KHz				
10 KHz				

#### B) EXPERIMENTAL WORK (70%):

Simulate the given circuit in 5Spice by running a transient analysis for each value of the above-mentioned frequencies. Note down the steady state magnitude and phase of the output voltage and fill in the last two columns of the table. Plot these values as a function of frequency. (The y-axis must be in dB scale and the x-axis must be in log scale)

#### C) BONUS PART (+20%):

Theoretically calculate the transient behavior of the circuit and compare it with your experimental results. You may use Matlab to solve the required third order differential equations.

Submit your results in the form of a report.