EGR 272 Due date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Circuit Theory II

File: N272PS2

**PSPICE Assignment #2 – AC Circuit Analysis**

**Reference**:

PSPICE Lecture – AC Circuit Analysis

**PSPICE Assignment**:

1. **Circuit 1**:

A) **Assigned circuit values:** Use values for Circuit 1 based on your Student ID as follows:

* Let C = last 3 non-zero digits of your Student ID in F
* Let L = first 3 non-zero digits of your Student ID in mH
* Let θ = last 2 non-zero digits of your Student ID in degrees
* Ex: For the ID 20345607, use C = 567 F, L = 234 mH, and θ = 67 degrees.
* Show how your determined your values.

1. **Hand Analysis:**

Analyze Circuit 1 by hand using phasor analysis. Determing the phasor values (in polar form) for I, VR1, VR2, VL, and VC. Show all details in the solution.

1. **Transient Analysis:**

* Construct Circuit 1 in PSPICE using your assigned values using the appropriate type of voltage source (see notes).
  + Add text to the schematic, including name, course, assignment number, and the purpose of the problem.
  + Add text showing how you determined the length of the transient analysis.
  + Label all nodes.
  + Graph 3 cycles of Vs(t), VC(t), and VL(t).
  + Add text to the graph (name, course, assignment number)
  + Add text to label each waveform on the graph.
  + Discuss the result. Are the magnitudes correct? Do the phase shifts look correct (explain)?

1. **AC Sweep Analysis:**

* Construct Circuit 1 in PSPICE using your assigned values using the appropriate type of voltage source (see notes).
* Add a current printer to measure the magnitude and phase of the current.
* Add voltage printers to measure the magnitude and phase of VR1, VR2, VL, and VC.
* Include the section of the .OUT file in your report with the results from the printer. Highlight and label each result.
* Create a table comparing the calculated and measured results (both magnitude and phase) for I, VR1, VR2, VL, and VC.
* Discuss the results.

2. **Circuit 2**:

A) **Assigned circuit values:** Use the same values for L and C as in Circuit 1

B) **Calculate the resonant frequency:** Calculate wo and fo.

C) **Hand analysis**: Using your calculated value of wo, analyze Circuit 2 to find phasor magnitude and phase for IR, IL, IC, and V. Recall that ZTotal should be maximum at resonance, so V should also be maximum.

D) **PSPICE analysis**:

* Perform an AC Sweep from 0.1f0 to 10f0.
* Graph the magnitude of V versus f.
* Place a cursor at the peak and mark the point.
* Compare the measured values of fo and max voltage with your hand values.
* Discuss the results.

+ VR1 -

50

+ VR2 -

100

+

VL

\_

L

C

+

VC

\_

I

24sin(250t + θ) V

Circuit 1

IL

L

IC

C

IR

100

2sin(wt) A

+

V

\_

Circuit 2