

ECE 301  
Fall Semester, 2006  
Test #3

wlg Version B

Name \_\_\_\_\_  
Last, First

You may omit either problem 4 or 5. I (you) am omitting #4 #5 (circle)

Work the exam on your own engineering paper. Work on one side of your paper only. Attach your work to the back of this exam sheet and staple in the top left hand corner. Each problem counts 20%.

- (1) For the circuit below, the RMS phasor voltages (as indicated) are  $V_R = 35.4\angle 45^\circ$  Vrms,  $V_L = 35.4\angle 135^\circ$  V rms,  $V_C = 70.7\angle -45^\circ$  V rms. Draw the phasor diagram (approx. to scale) showing these voltages and the source voltage  $V_S$  all on the same diagram.

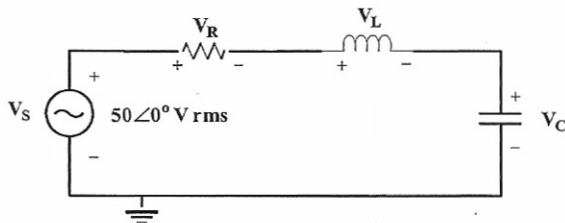


Figure 1: Circuit for problem 1.

- (2) Find the power factor for the circuit of Figure 2. Indicate which case of leading/lagging.

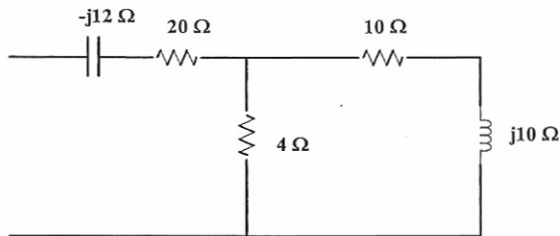


Figure 2: Circuit for problem 2.

- (3) You are given the circuit of Figure 3. Find the current  $\hat{I}_1$  as an rms phasor current.

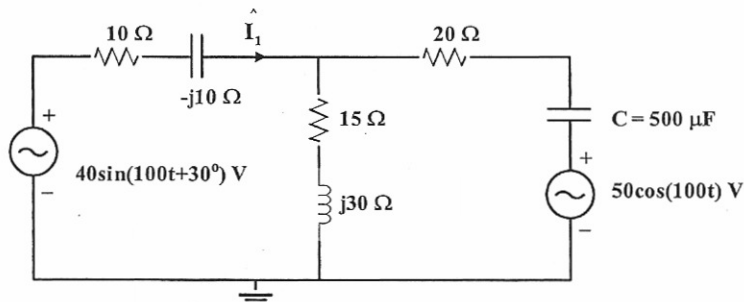


Figure 3: Circuit for problem 3.

- (4) The circuit shown in Figure 4 is used for experimental work in an aerospace project. It is required that the current in the circuit be in phase with the source voltage. The frequency of the source voltage is 100 Hz. The inductor at the output of the circuit is variable. What must be the value of  $L$  so that the requirements concerning the phase of the source voltage and current are met?

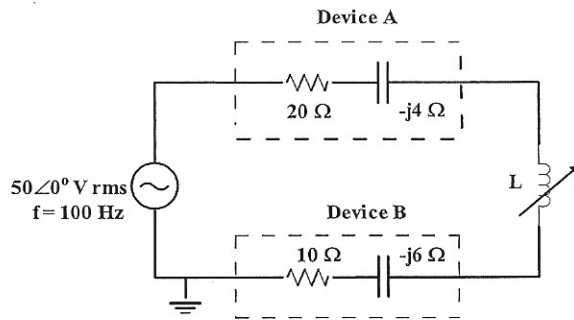


Figure 4: Circuit for problem 4

- (5) You are given the periodic voltage waveform of Fig 5. Find the RMS value of the voltage.

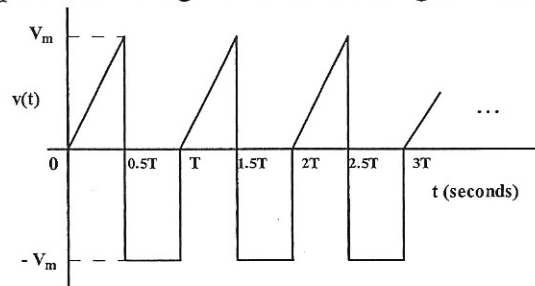


Figure 5: Waveform for problem 5.

- (6) You are given the circuit of Figure 6.

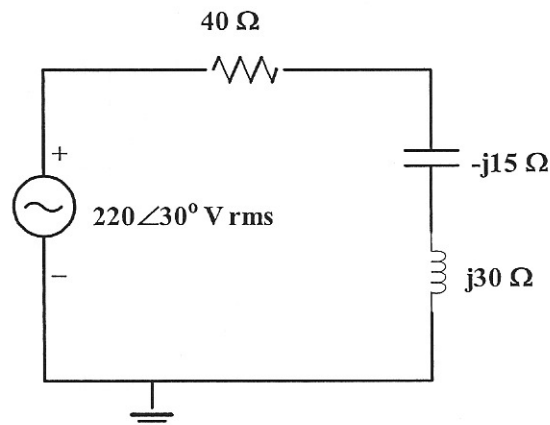


Figure 6: Circuit for problem 6.

- Determine the average complex power supplied by the source.
- Determine the average real power delivered (absorbed) by the resistor.
- Determine the average reactive power supplied to the inductor.
- Determine the average reactive power supplied to the capacitor.
- Draw (sketch) the complex power triangle for the circuit.
- Determine the power factor of the circuit, including leading/lagging.