

LAB 5: AC Measurements.

OBJECTIVE:

- In this lab will learn how to use oscilloscopes to measure complex voltages.
- Learn how to use the oscilloscope to calculate the phase difference between 2 voltages.

Read chapter 10 and the appropriate slides.

PRELAB

Solve the following circuit showing the current in, and the voltage across, every element.

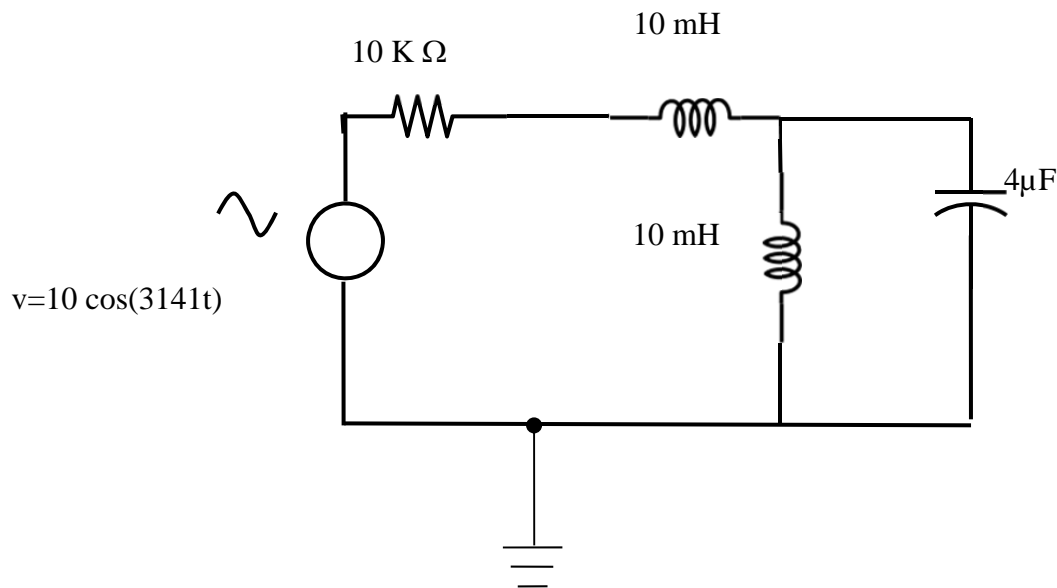


Figure L5.1: A simple RC circuit.

Simulate the above circuit using SPICE. Show the following graphs (use time domain analysis)

- Current vs. voltage across every circuit element
- Voltage across the capacitor, the inductor and the power supply

From the graph calculate the phase shift between these voltages and compare it with the phase shift you got it by solving the circuit above.

LAB

Construct the circuit in Fig. L5.2, set the power supply to 5-V P-P with a frequency of 250Hz.

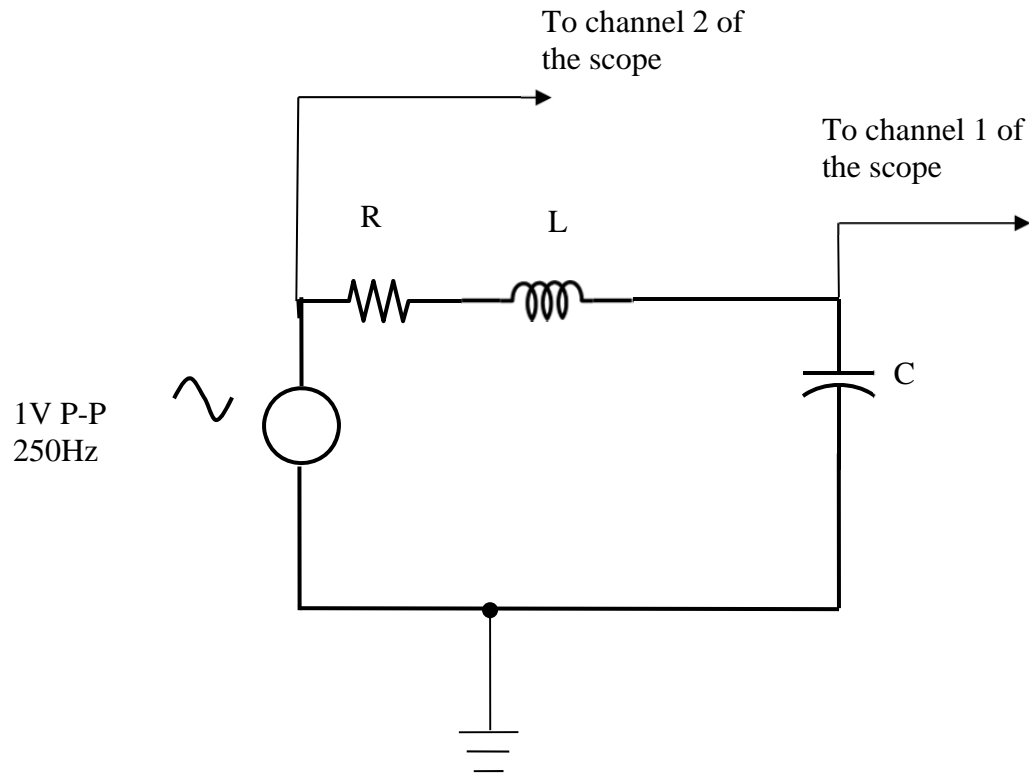


Figure L5.2 A simple RC circuit with the connection to the scope.

- Measure the actual values of the components and compare it with the nominal values. What is the error? Is it within the tolerance?
- Display the voltage across the power supply and the capacitors on the scope. The way to do so is shown in the Figure. Sketch it in your lab notebook.
- Find a way to display the voltage across the inductor and the power supply on the scope. What are the difficulties you faced? Can we just do that by connecting one end of the conductor to the scope? Why or why not.
- What are the phase shifts for the three voltages (take the source as a reference).
- Solve this circuit using the actual values for the components and compare the results with the values obtained in the lab