

MEE210 ELECTRICAL MACHINES – Experiment #1

**LABORATORY CONTENT:** Understanding AC characteristics on circuitry

**EQUIPMENT REQUIRED:** (students should bring electronic components)

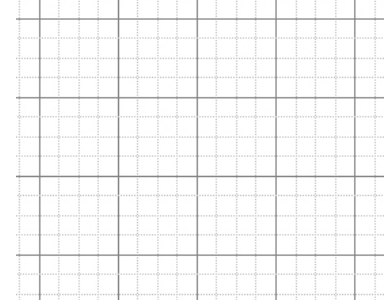
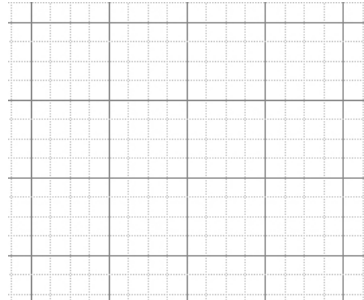
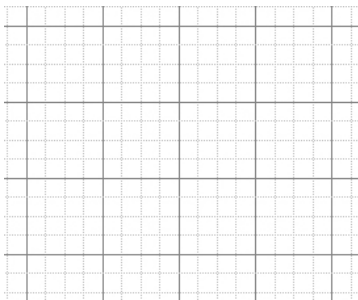
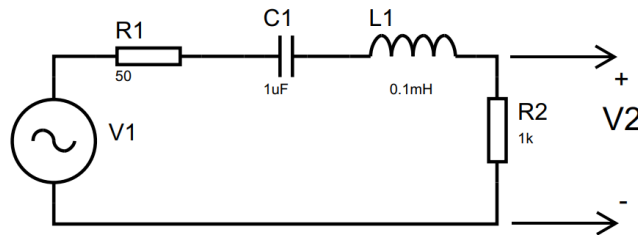
Qty	Description
1	Signal generator (will be ready at lab.)
1	Oscilloscope (will be ready at lab.)
1	Breadboard
1	1 kΩ resistor
1	1 μF capacitor
1	0.1 mH inductor
-	Wiring equipments (jumper cables, crocodiles, etc.)

**PRELIMINARY QUESTIONS:**

- 1) Analyze the circuit and find the equation for  $V_2$  in terms of other components.
- 2) Using a simulator, apply the circuit and print the output signal  $V_2$  and input voltage  $V_1 = 5\sin(2\pi ft)$  where  $f$  is 50, 500 and 5000 Hz (three different frequency values).

**EXERCISE STEPS:**

- 1) Apply the circuit below (R1 is the internal resistance of signal generator, so you do not apply any extra 50 ohm resistor).
- 2) Measure the requested values of  $V_2$  output voltage signal. Draw the signals and fill the boxes.



Frequency (Hz)	$V_2$ peak voltage	Is $V_2$ leading or lagging?	Lead/lag angle
50			
500			
5000			

**POSTLIMINARY QUESTIONS:**

- 1) For a 220 V@50Hz input voltage, an electric motor is driven. The values written on the motor are like this:

- Nominal current: 1A
- Mechanical output power: 500W

Depending on these values, find RL circuit parameters. Then, simulate in Proteus for two states: raw state and compensated circuit state (with a capacitor parallel to the output) of the circuit with 99%. Print the voltage and current curves for these two states.