

MEE210 ELECTRICAL MACHINES – Experiment #1

LABORATORY CONTENT: Understanding AC characteristics on circuitry

EQUIPMENT REQUIRED: (students should bring electronic components)

Qty Description

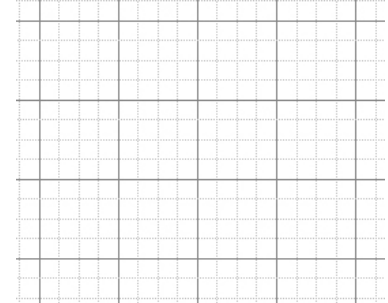
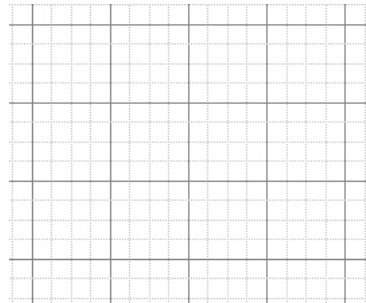
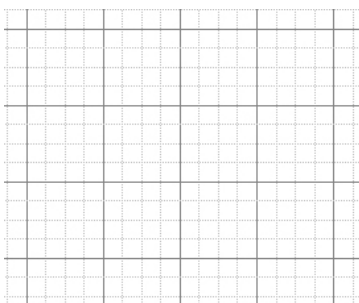
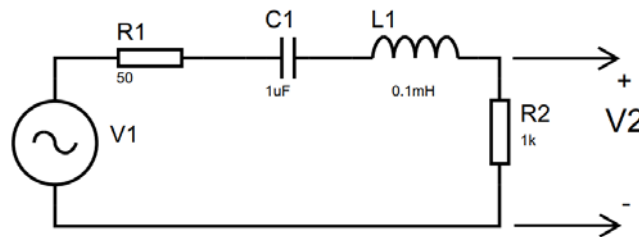
- 1 Signal generator (will be ready at lab.)
- 1 Oscilloscope (will be ready at lab.)
- 1 Breadboard
- 1 1 kΩ resistor
- 1 1 μF capacitor
- 1 0.1 mH inductor
- Wiring equipments (jumper cables, crocodiles, etc.)

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.