Student Name: _____

LAB 11 – AC Circuits

Objectives: After completing this lab you will be able to
- Create and observe RL and RLC circuits AC response
- Demonstrate basic measurements using oscilloscope

Required Equipment:
- Oscilloscope,
- AC power supply,

Components:
- Breadboard, Wire Strippers and 22awg Wire,
- Resistors, 1KΩ X1
- Capacitors, 1µF X1
- Inductors, 1mH X1

Reference: Oscilloscope presentation,
Chapter 15, Chapter 16, Chapter 17

LAB 10 – RL and RLC Circuits, Steady State Response

Lab Schematic: Part A – RC Circuit

Procedure: Part A

Calculations: in circuit of Figure L11-1, find the voltages at nodes A and B. Using these voltages, find the voltage across each impedance. Using calculated voltages, amplitude across each resistor and the capacitor, find the amplitude of current for each impedance.

Experiment: Assemble the circuit of Figure L11-1. Using oscilloscope, apply a sinusoidal input with amplitude of 5v and measure voltages at nodes A and B for 500 Hz, 1 KHz and 5 KHz frequencies.

Voltages	Frequency	Amplitude	Average	RMS
Node **A**	500 Hz			
Node **B**				
Node **A**	1 KHz			
Node **B**				
Node **A**	5 KHz			
Node **B**				

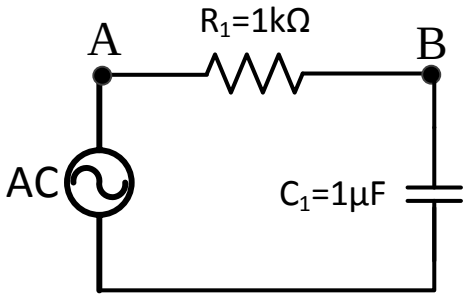
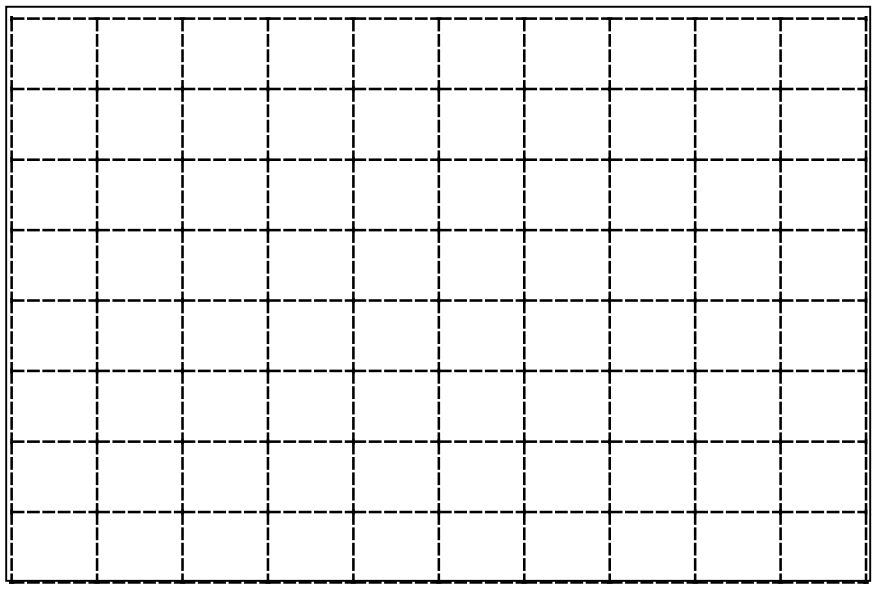


Figure L11-1 AC response of the RC circuit.

Impedance	Frequency	Voltage Amplitude	Voltage Effective
R1	500 Hz		
C1			
R1	1 KHz		
C1			
R1	5 KHz		
C1			

For the 1 KHz input, on oscilloscope, observe voltages at nodes A and B at the same time and measure the phase difference between them. Draw the XY (also called Lissajous) curve by applying node A to X input and Node B to the Y input of the oscilloscope and change the horizontal mode to XY.

Draw the XY (Lissajous) graph.



LAB 10 – RL and RLC Circuits, Steady State Response Continued…

Lab Schematic: Part B – RL Circuit

Procedure: Part B

Calculations: in circuit of Figure L11-2, find the voltages at nodes A and B. Using these voltages, find the voltage across each impedance. Using calculated voltages across each resistor and the inductor, find the current of each impedance.

Experiment: Assemble the circuit of Figure L11-2. Using oscilloscope, apply a sinusoidal input with amplitude of 5v and measure voltages at nodes A and B for 100 KHz, 1 MHz and 5 MHz frequencies.

Voltages	Frequency	Amplitude	Average	RMS
Node **A**	100 KHz			
Node **B**				
Node **A**	1 MHz			
Node **B**				
Node **A**	5 MHz			
Node **B**				

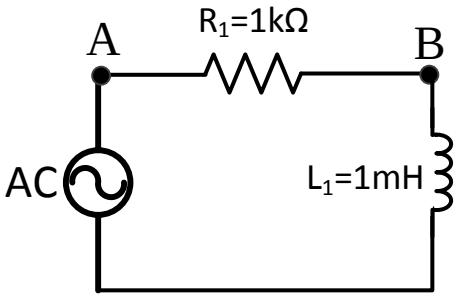
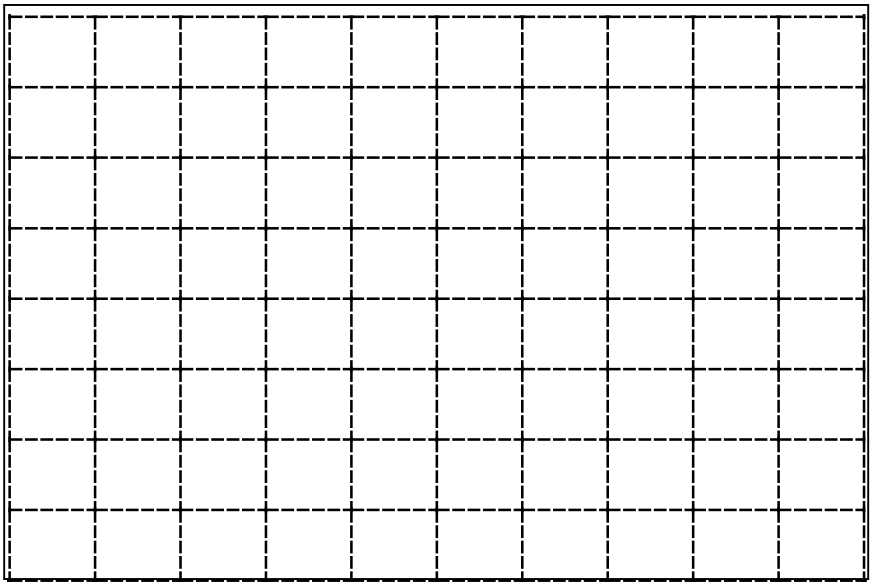


Figure L11-2 AC response of the RL circuit.

Impedance	Frequency	Voltage Amplitude	Voltage Effective
R1	100 KHz		
L1			
R1	1 MHz		
L1			
R1	5 MHz		
L1			

For the 5 MHz input, on oscilloscope, observe voltages at nodes A and B at the same time and measure the phase difference between them. Draw the XY (also called Lissajous) curve by applying node A to X input and Node B to the Y input of the oscilloscope and change the horizontal mode to XY. **Draw the XY (Lissajous) graph**.



Instructor's Initials: _____

(MM/DD/YY): _____ / _____ / _____