Fall 2020

EEE/ETE 241L

Electrical Circuits-II Lab(Sec-4)

Faculty : Md. Abu Obaidah (AbO)

Instructor: Md. Rabiul Karim Khan

Lab No. :4

Date of Performance :13-12-20 Date of Submission : 20-12-20	**Name: Israth Jahan Sumona** **ID:1722003643**

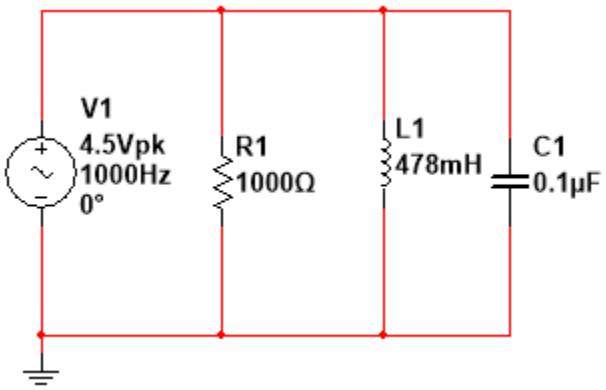
- **Experiment 1:** Parallel RLC circuits
- **Objective:**

To analyze the relationship between the voltage and phase of reactive elements and the source in parallel RC, RL, and RLC circuits.

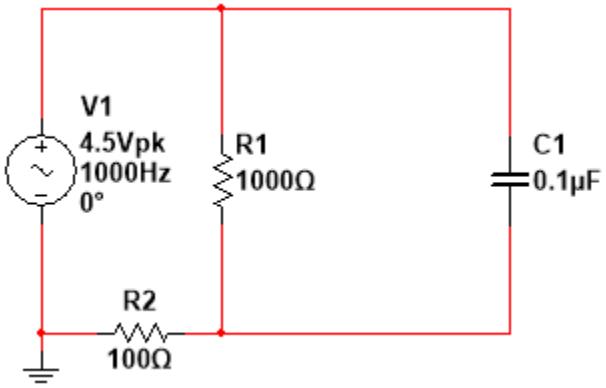
- **Apparatus:**

• **Components**	• **Instruments**
Resistors: 1×1000Ω Capacitors: 1×0.1µF Inductor: 1x478µH	1× Trainer Board 1× Audio Generator 1× Dual Channel Oscilloscope Connecting wires and probes

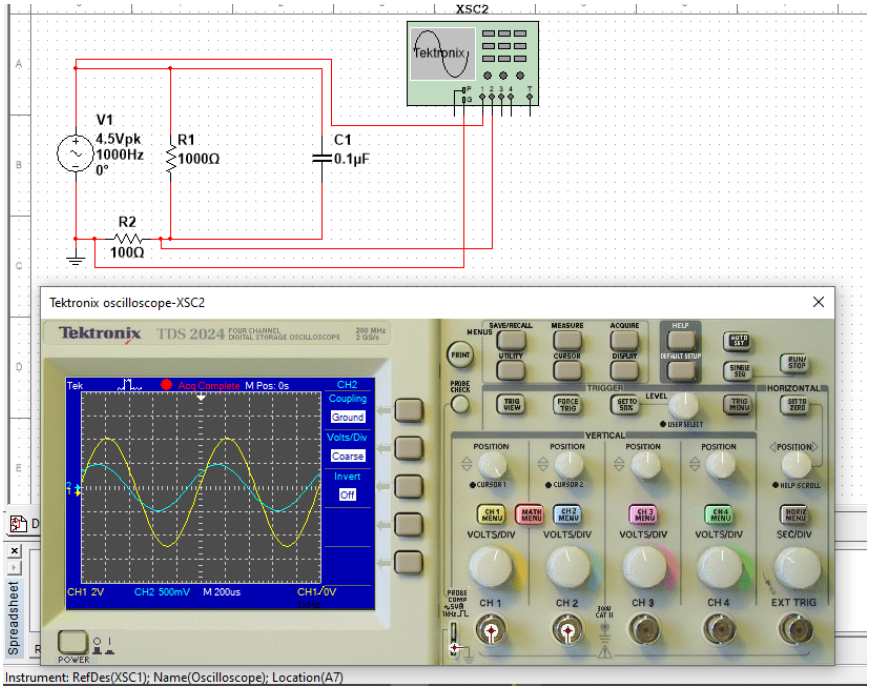
- **Constructing Circuit(Parallel RLC):**



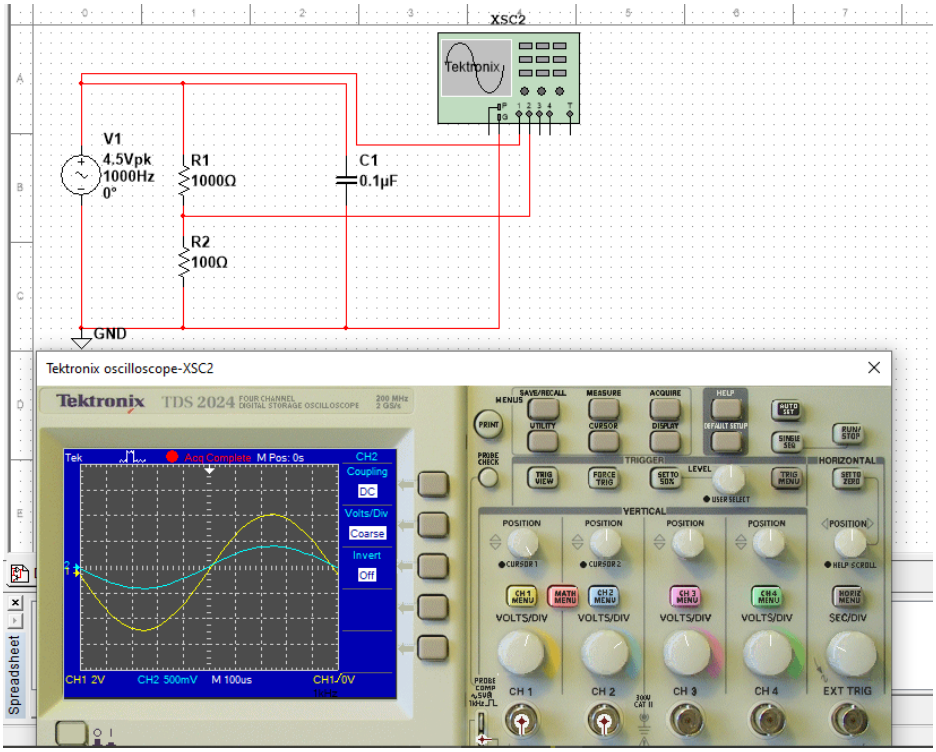
- **Constructing Circuit(Parallel RC):**



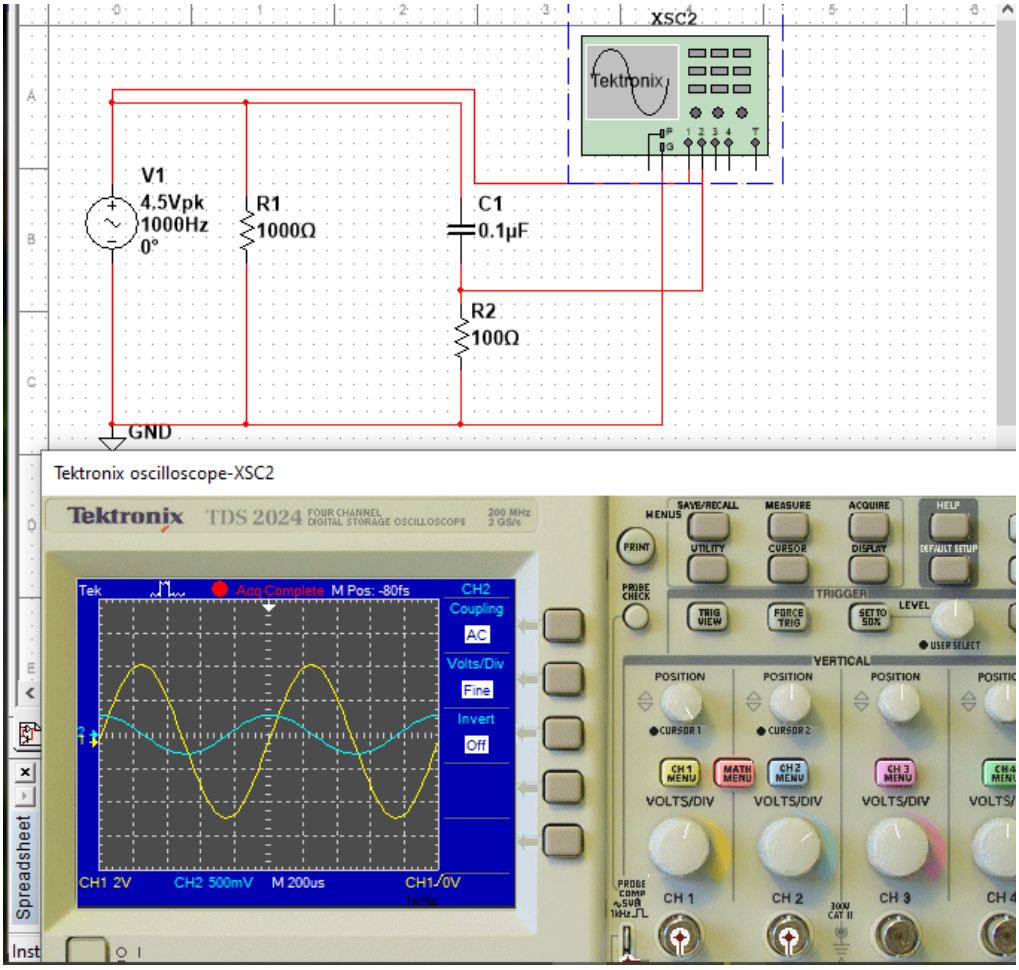
- **Measuring Is:**



- **Swapping R2 and connect with R1 :**
- **Measuring IR1** :



- **Swapping R2 and connect with C:**
- **Measuring Is :**



- **Comparing magnitudes and phases of VC and VR :**

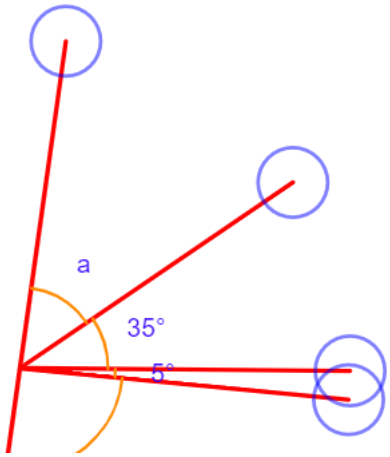
	|ipeak| (Theory)	θ (Theory)	Vsense(peak) (Measured) (V)	|ipeak| (Practical) (mA)	Delay ΔT (Measured) (us)	θ (Practical) [ΔT x f x 360] (Deg)	% Difference |i|	% Difference θ
ic			**0.716**	**7.16**	**232**	**83.53**		
ir			**1.58**	**12.6**	**16**	**5.75**		
is			**1.56**	**16.54**	**97**	**35.2**		

IS =Θ= ΔT x f x 360=(97*10-6)(1*1000)(360)= 35.2

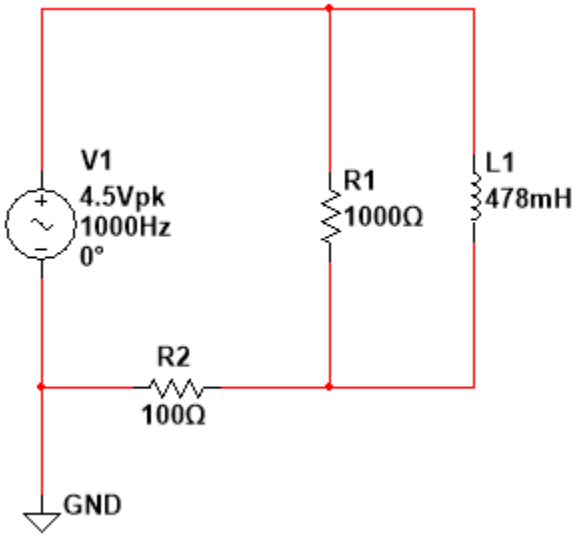
IR =Θ= ΔT x f x 360=(16*10-6)(1*1000)(360)=5.76

Ic =Θ= ΔT x f x 360=(232*10-6)(1*1000)(360)= 83.53

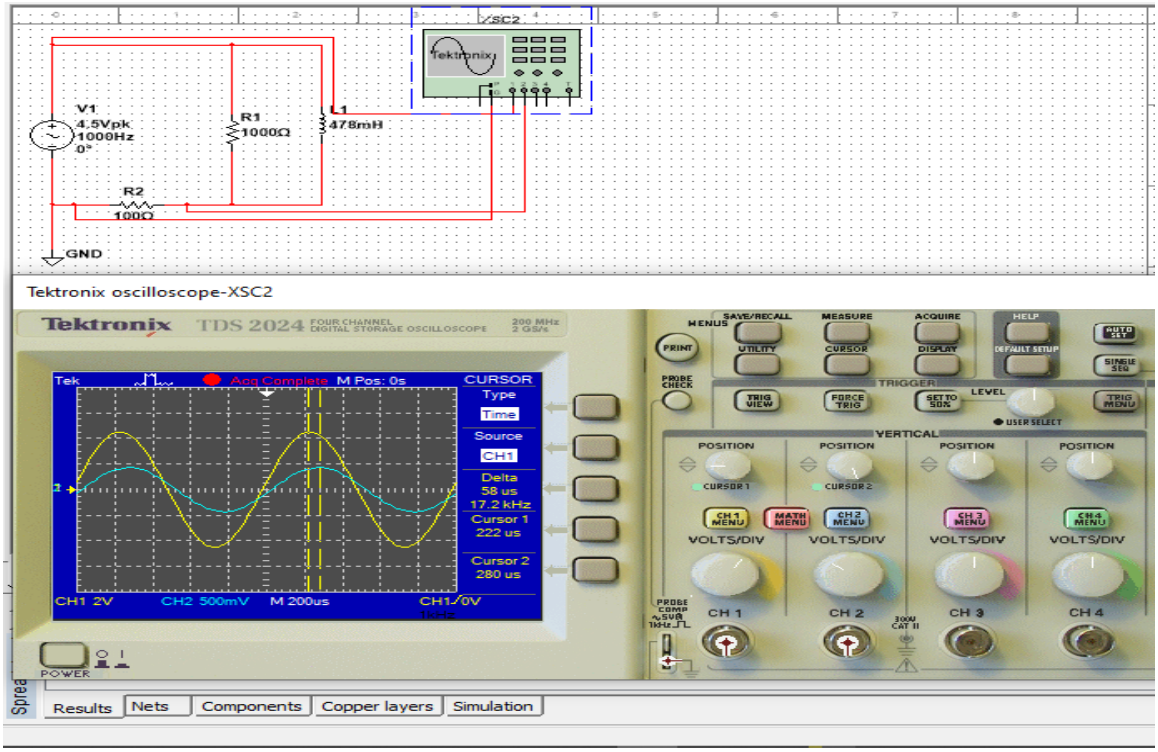
- **Phasor diagram:**



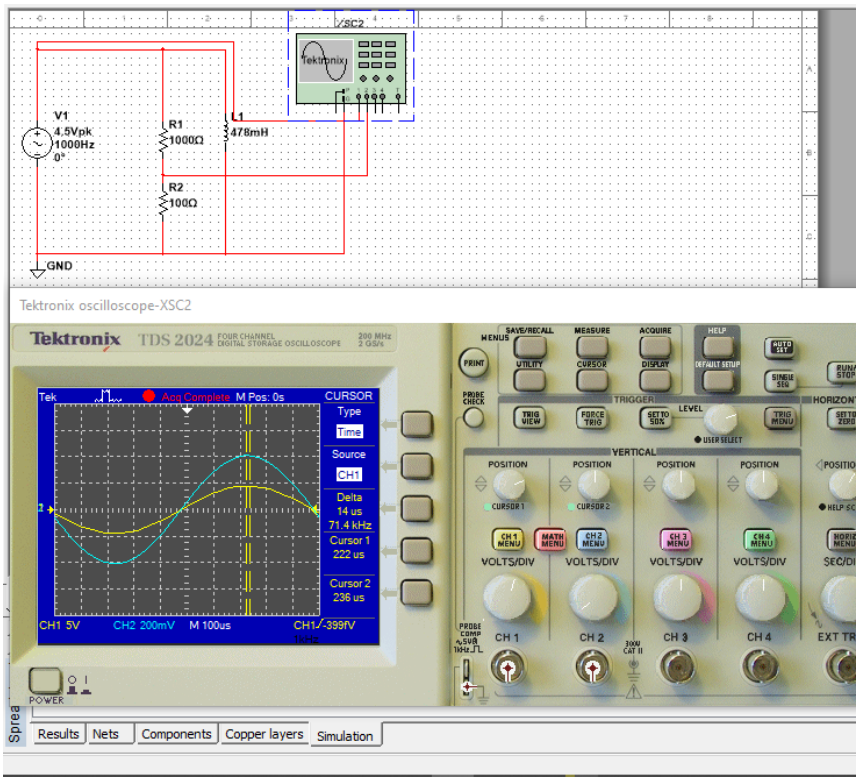
- **Constructing Circuit (Parallel RL):**



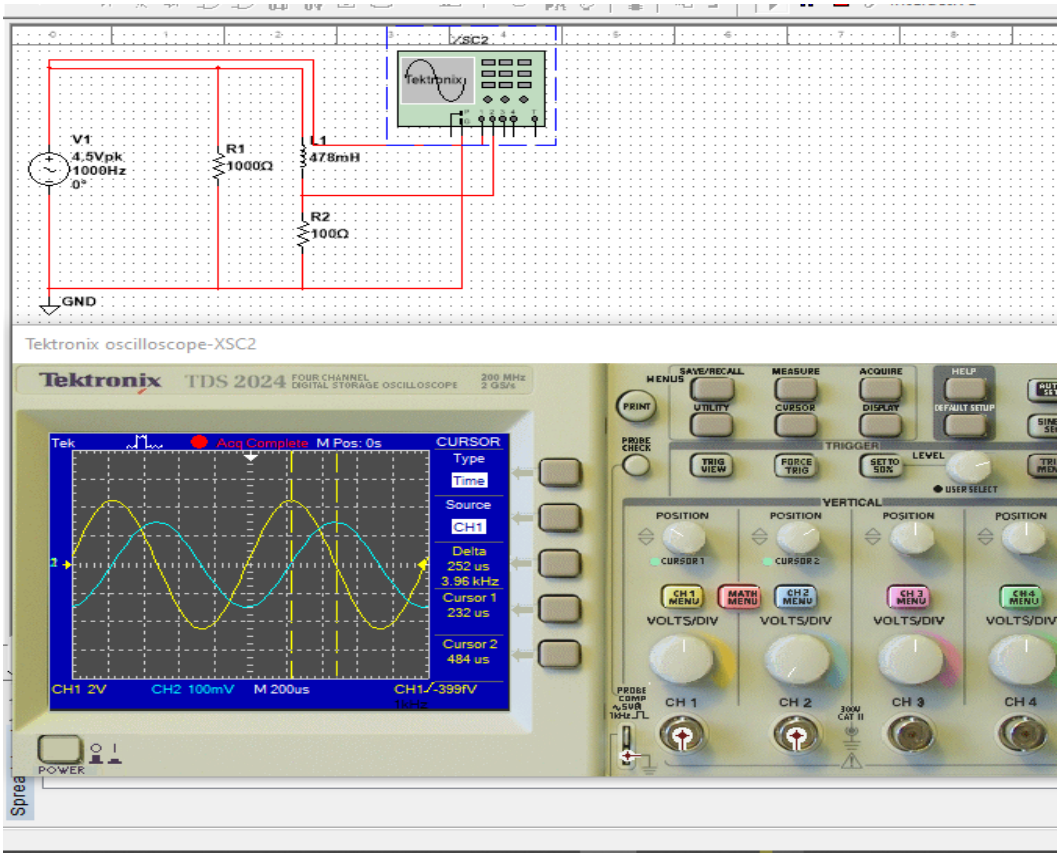
- **Measuring Is:**



- **Swapping R2 and connect with R1 :**
- Measuring IR1:



- **Swapping R2 and connect with L1 :**
- **Measuring IL:**



- **Comparing magnitudes and phases of VL and VR:**

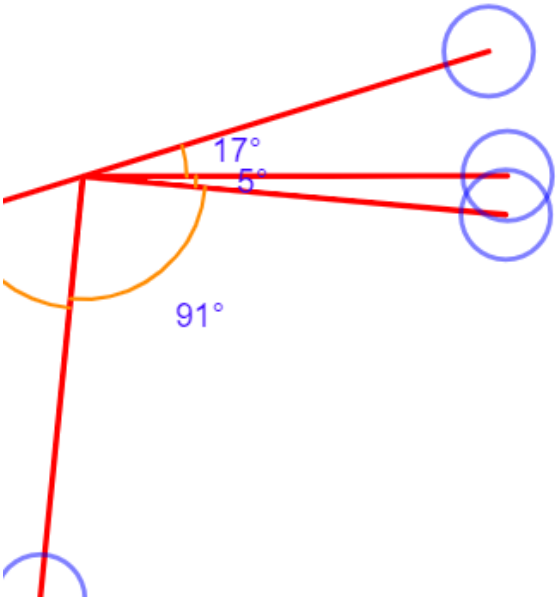
	|ipeak| (Theory)	θ (Theory)	Vsense(peak) (Measured) (V)	|ipeak| (Practical) (mA)	Delay ΔT (Measured) (us)	θ (Practical) [ΔT x f x 360] (Deg)	% Difference |i|	% Difference θ
ic			**0.380**	**3.80**	**252**	**90.72**		
ir			**1.02**	**10.2**	**14**	**5.04**		
is			**1.5**	**15**	**58**	**20.88**		

IS =Θ= ΔT x f x 360=(252*10-6)(1*1000)(360)= 90.72

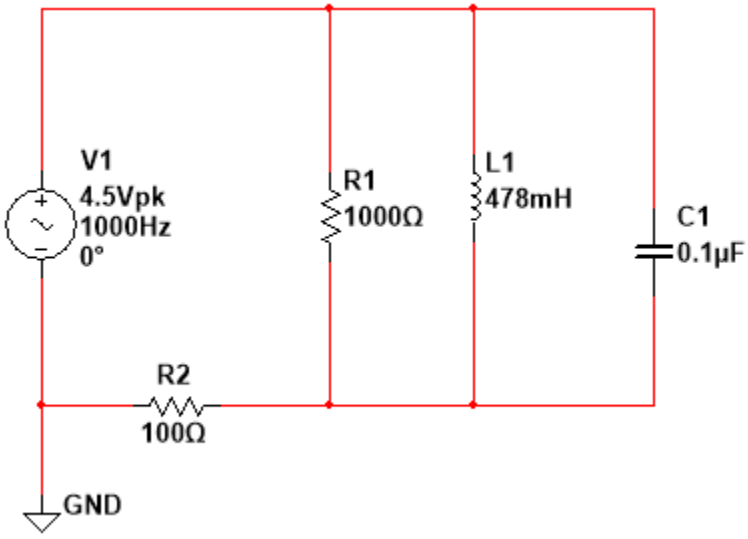
IR =Θ= ΔT x f x 360=(14*10-6)(1*1000)(360)=5.04

Ic =Θ= ΔT x f x 360=(58*10-6)(1*1000)(360)= 20.88

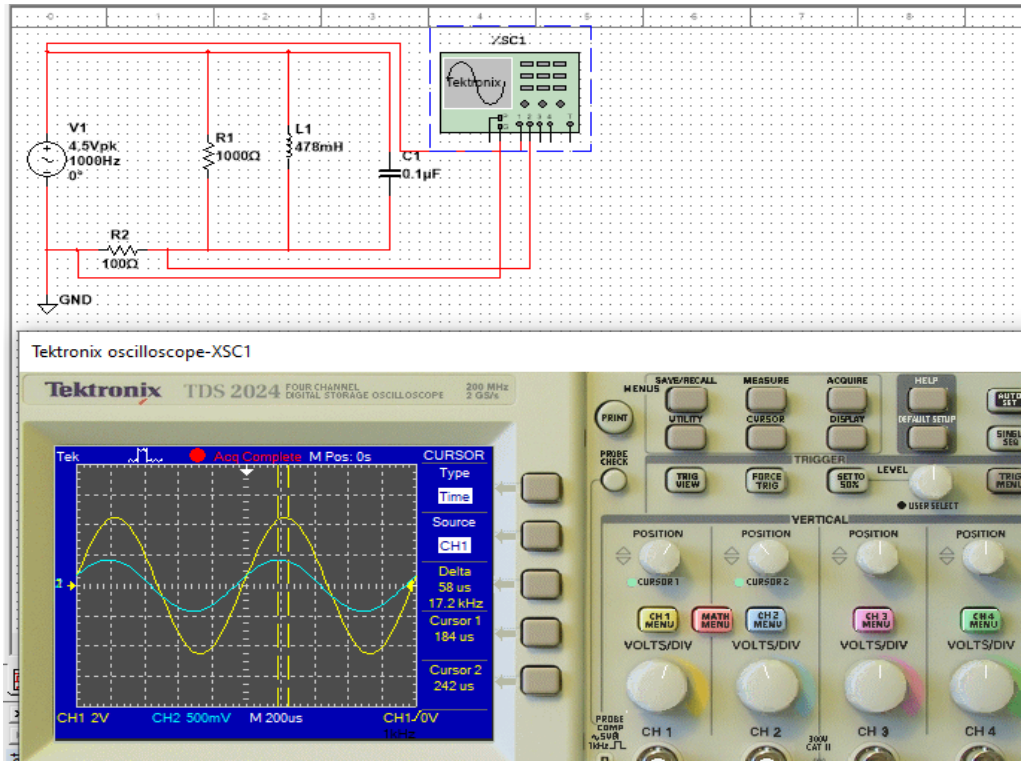
- Phasor diagram:



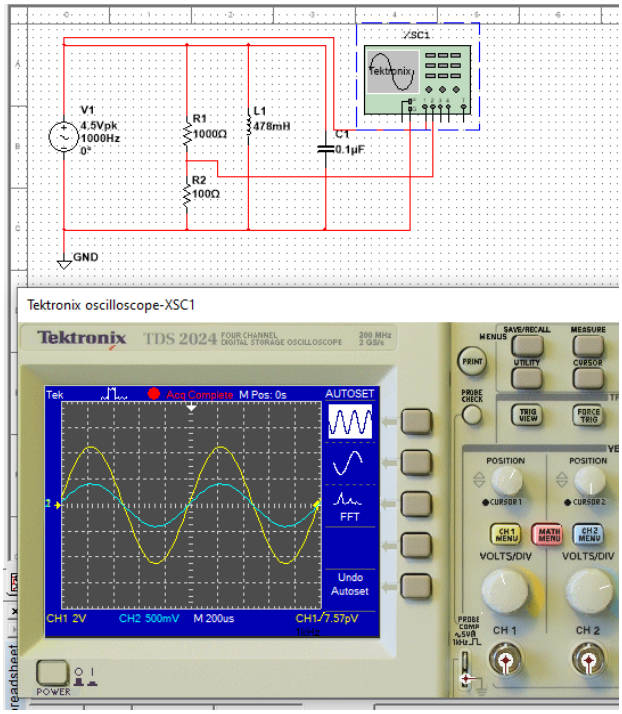
- **Constructing Circuit(Parallel RLC):**



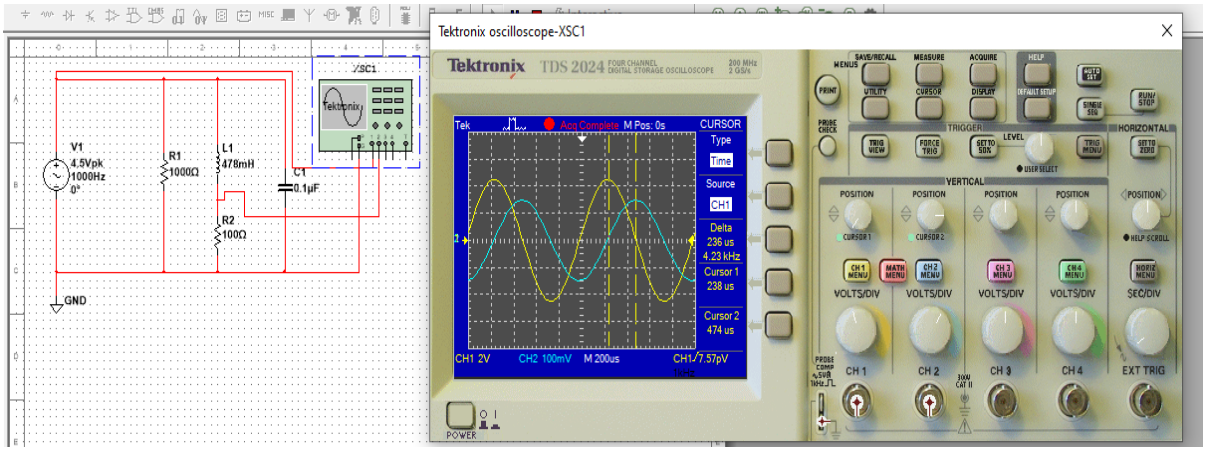
- **Measuring IS:**



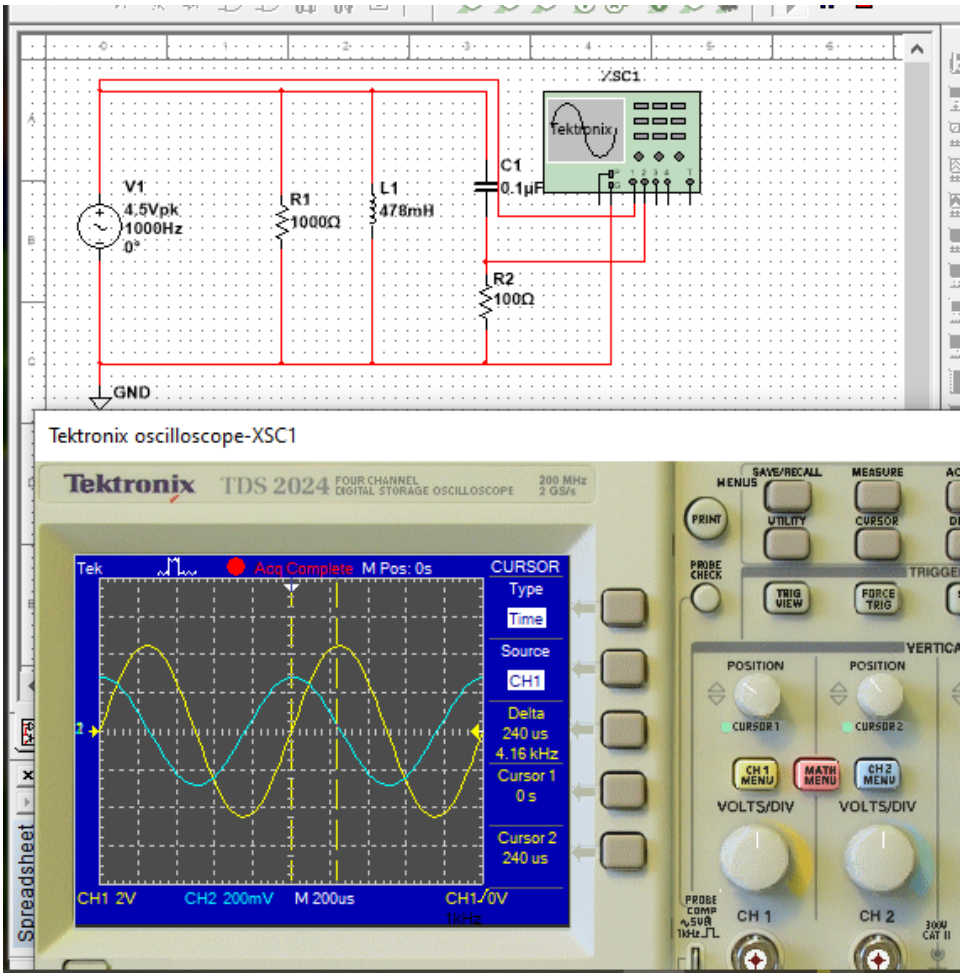
- **Swapping R2 and connect with R1 :**
- **Measuring IR:**



- **Swapping R2 and connect with L1 :**
- **Measuring IL:**



- **Swapping R2 and connect with L1 :**
- **Measuring IC:**



- **Comparing magnitudes and phases of VL and VR and vc:**

	|ipeak| (Theory)	θ (Theory)	Vsense(peak) (Measured) (V)	|ipeak| (Practical) (mA)	Delay ΔT (Measured) (us)	θ (Practical) [ΔT x f x 360] (Deg)	% Difference |i|	% Difference θ
ic			**0.725**	**7.02**	**240**	**86.4**		
iL			**0.388**	**3.88**	**247**	**88.92**		
ir			**1.05**	**10.5**	**0**	**0**		
is			**1.01**	**10.1**	**58**	**20.88**		

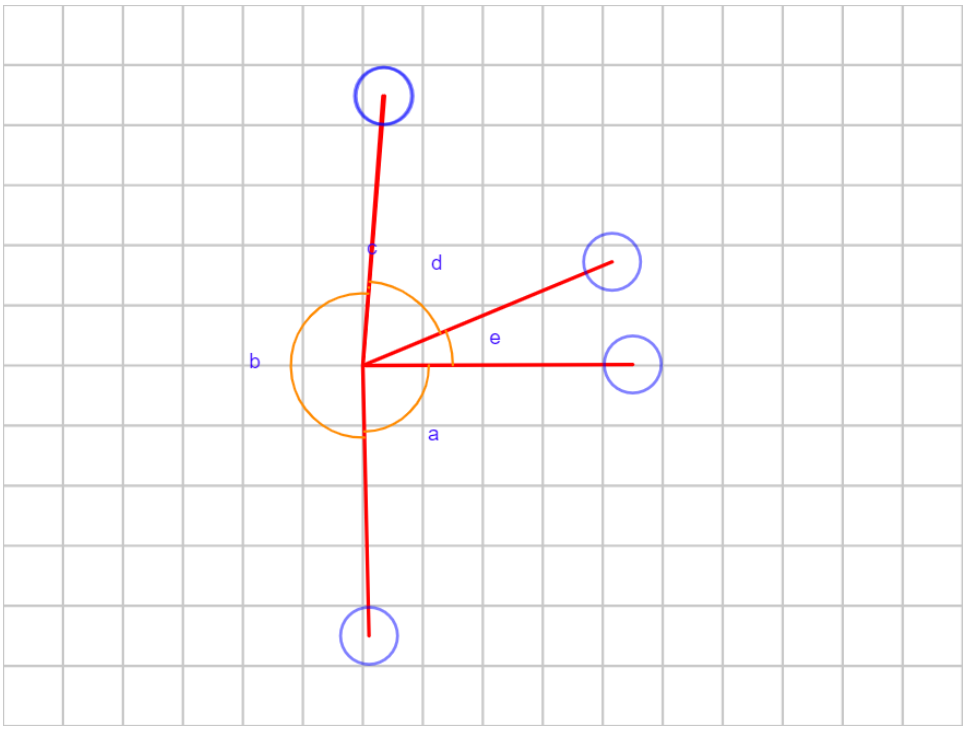
IS =Θ= ΔT x f x 360=(58*10-6)(1*1000)(360)= 20.88

IR =Θ= ΔT x f x 360=(0*10-6)(1*1000)(360)=0

IR =Θ= ΔT x f x 360=(240*10-6)(1*1000)(360)=86.4

Ic =Θ= ΔT x f x 360=(247*10-6)(1*1000)(360)= 88.92

- **Phasor diagram:**



- **Question and Ans :**

1. The advantage of the sense resistor is easy to measure branch current from the oscilloscope voltage. The disadvantage is it takes time to calculate the value.
2. Phasor diagrams were drawn above.
3. If the source frequency was raised, value of each phasor diagram will increase.

Discussion:

There are three types of error. There are mechanical errors, Divine errors, personal errors. To minimize all errors, we have to measure three times and use the average value in the experiment. In all experiments, theoretical and experimental values are almost the same. Sometimes those values were not the same. I have learned about the sense resistor which helps to measure the branch current, have used an AC power source and Oscilloscopes to measure the peak voltage of the resistor, capacitor, and inductor. On Oscilloscopes, we found the waveforms of voltage which is in the time domain.