

AMERICAN INTERNATIONAL UNIVERSITY BANGLADESH

408/1, Kuratoli, Khilkhet, Dhaka 1229, Bangladesh



Lab Exp Name: **Analysis of series R-L-C circuit with AC source & verification of KVL.**

Lab Report No: **04.**

Date of Submission: 07 – 08 – 22

Course Title: **Introduction to Electrical Circuit Lab**

Course Teacher: **DR.MD. HASAN IMAM**

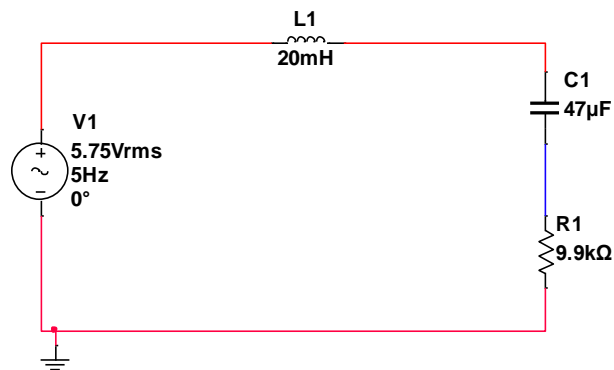
Section: **M**

Semester: Summer **2021-22**

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Circuit-Diagram:



Simulation-Diagram:

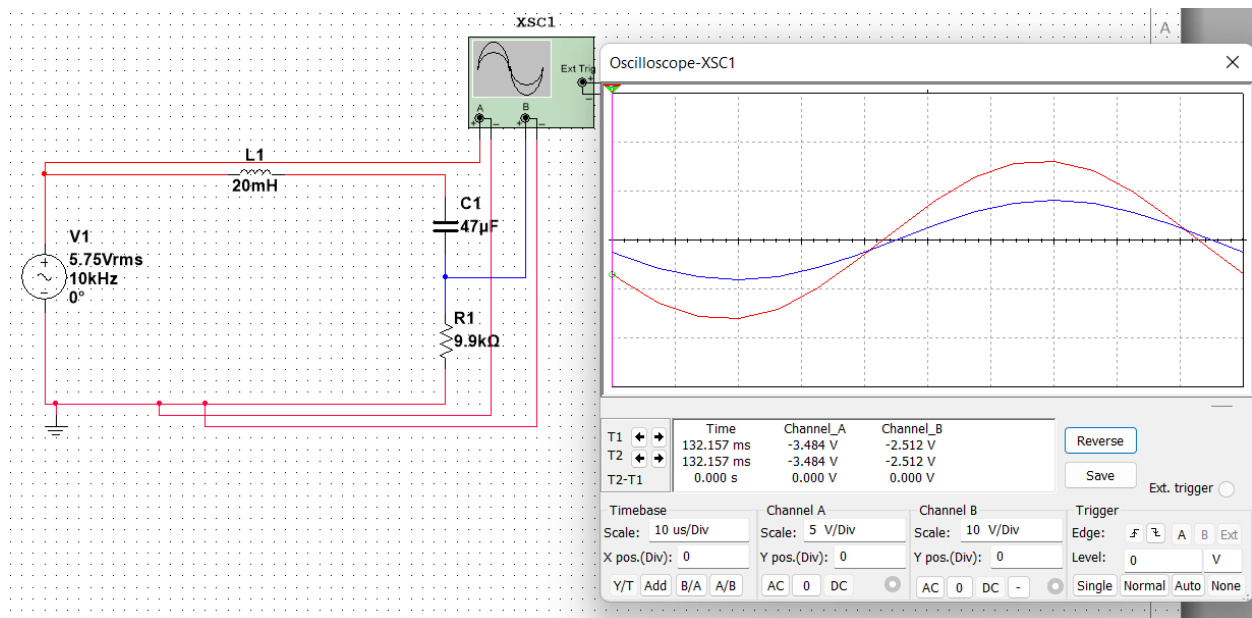


Fig-1: R-L Circuit.

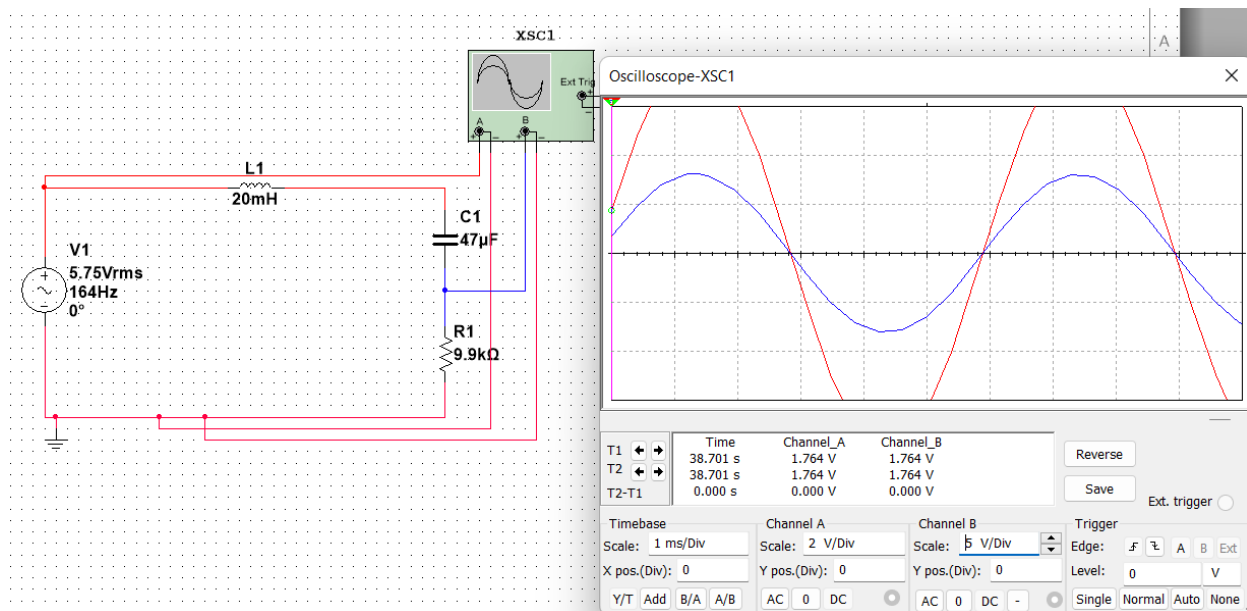


Fig-2: R or Resonance Circuit.

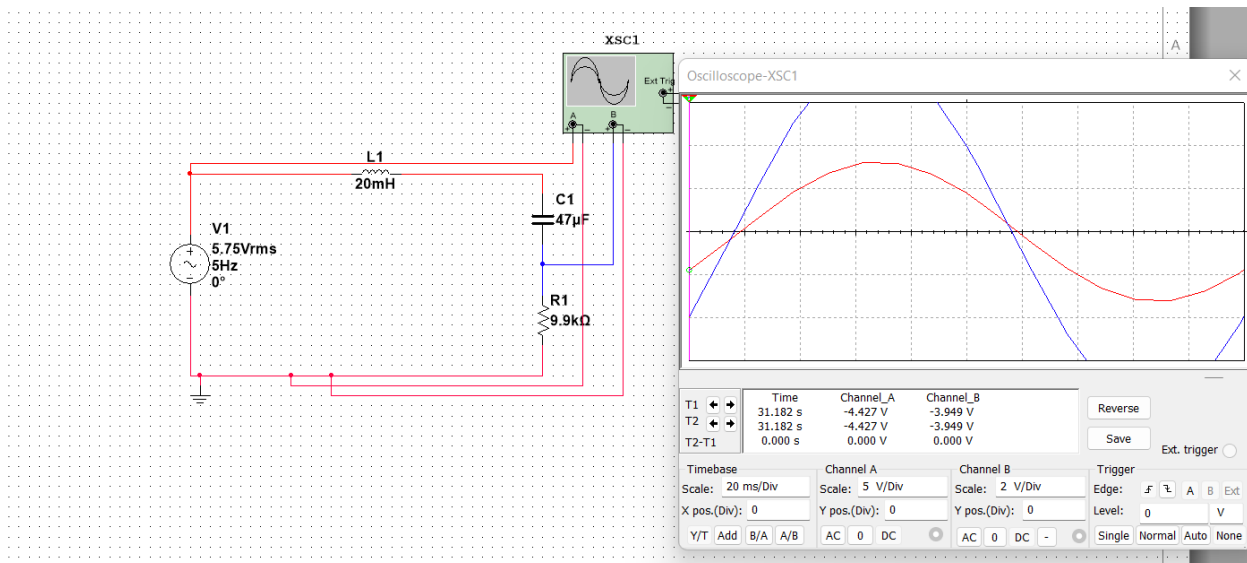


Fig-3: R-C Circuit

Data Table:

V_s	F_r	V_L	V_C	V_R
5.75 V	100 Hz	0.018 V	0.020 V	5.74 V
5.75 V	500 Hz	0.052 V	0.004 V	5.73 V
5.74 V	1 kHz	0.099 V	0.01 V	5.73 V
5.66 V	5 kHz	0.0355 V	0.036 V	5.64 V
3.26 V	10 kHz	0.0452 V	0.044 V	3.233 V
7.32 V	164.14 Hz	0.028 V	0.013 V	7.30 V

Calculation:

KVL for $E_1=5.75$ V

$$V_L = 0.018 \text{ V}$$

$$V_C = 0.020 \text{ V}$$

$$V_R = 5.74 \text{ V}$$

$$V_{\text{total}} = V_L + V_C + V_R = 0.018 + 0.020 + 5.74 = 5.78 \approx 5.75 \text{ V}$$

$$\therefore V_{\text{total}} = E_1$$

\therefore KVL is proved.

KVL for $E_2=5.75$ V

$$V_L = 0.052 \text{ V}$$

$$V_C = 0.004 \text{ V}$$

$$V_R = 5.73 \text{ V}$$

$$V_{\text{total}} = V_L + V_C + V_R = 0.052 + 0.004 + 5.73 = 5.79 \approx 5.75 \text{ V}$$

$$\therefore V_{\text{total}} = E_2 \text{ (KVL is proved.)}$$

KVL for $E_3=5.74$ V

$$V_L = 0.099 \text{ V}$$

$$V_C = 0.01 \text{ V}$$

$$V_R = 5.73 \text{ V}$$

$$V_{\text{total}} = V_L + V_C + V_R = 0.099 + 0.01 + 5.73 = 5.83 \approx 5.74 \text{ V}$$

$$\therefore V_{\text{total}} = E_3$$

\therefore KVL is proved.

KVL for $E_4=5.66$ V

$$V_L = 0.0355 \text{ V}$$

$$V_C = 0.036 \text{ V}$$

$$V_R = 5.64 \text{ V}$$

$$V_{\text{total}} = V_L + V_C + V_R = 0.0355 + 0.036 + 5.64 = 5.71 \approx 5.66 \text{ V}$$

$$\therefore V_{\text{total}} = E_4$$

\therefore KVL is proved.

KVL for $E_5=3.26$ V

$$V_L = 0.0452 \text{ V}$$

$$V_C = 0.044 \text{ V}$$

$$V_R = 3.233 \text{ V}$$

$$V_{\text{total}} = V_L + V_C + V_R = 0.0452 + 0.044 + 3.233 = 3.32 \approx 3.26 \text{ V}$$

$$\therefore V_{\text{total}} = E_5$$

\therefore KVL is proved.

KVL for $E_6=7.32$ V

$$V_L = 0.028 \text{ V}$$

$$V_C = 0.013 \text{ V}$$

$$V_R = 7.3 \text{ V}$$

$$V_{\text{total}} = V_L + V_C + V_R = 0.028 + 0.013 + 7.3 = 7.32 \approx 7.34 \text{ V}$$

$$\therefore V_{\text{total}} = E_6$$

\therefore KVL is proved.

Discussion and Conclusion:

An RLC circuit (or LCR circuit or CRL circuit or RCL circuit) is an electrical circuit consisting of a resistor, an inductor, and a capacitor, connected in series or in parallel. The total impedance, Z of a parallel RLC circuit is calculated using the current of the circuit like that for a AC parallel circuit. In the diagram the circuit inductor is 20 mH, capacitor is 47 μ F and resistance is 9.9k Ω . The inductor, capacitor and resistor are in series connection.

The circuit was implemented carefully where necessary. While connecting AC source that was checked that. While measuring current Digital multimeter was placed in series with the branch of the circuit where the current is to be measured, multimeter was in ammeter mode. The AC source was not switched on while implementing the circuit in the bread board.

In this experiment, first of all we checked the oscilloscope and if the probs were perfect and we started calibration. Then we converted the probs to the channel. In function generator and also right frequency in there. We saw that, the experimental value and the theoretical value has a small difference, it can be held for so many reasons- that can be the register we have used its value not exact as same as given value of register, wire's internal register, actual voltage from the power supplier and using of decimal after point.