Experiment No: 1

AIM: TO VERIFY THE THEVENIN THEOREM.

APPARATUS REQUIRED:

SL NO.	NAME OF COMPONENT	SPECIFICATION	QUANTITY
1	Ac/Dc Source	0-230 V / 50Hz	1
2	Voltmeter	0-230V	1
3	Ammeter	0-10A	1
4	Resistances	1k, 47ohm	2
5	Capacitor	22µf,63V	1
6	Choke coil	1H	1
7	Breadboard	-	1
8	Wire	Single Stranded copper wires	As per required

CIRCUIT DIAGRAM:

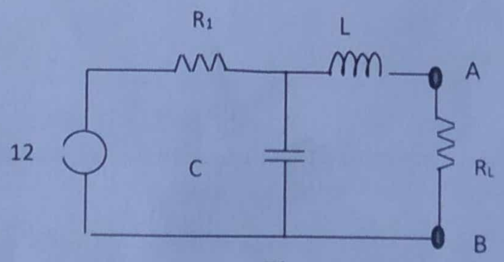


Figure-1

THEORY:

According to Thevenin Theorem, a linear active network constituting of independent and/or dependent voltage and current sources and linear passive elements can be replaced at any pairs of terminals by an equivalent voltage source V_{th} in series with an equivalent resistance R_{th}.

HOW TO THEVENIZE A GIVEN CIRCUIT:

1. Temporarily, remove the load resistance.
2. Find the open circuit voltage which appears across the 2 terminals from where load resistance has been removed.
3. Compute the resistance of the network as looked into from these two terminals after all voltage sources have been removed leaving behind internal resistances and current sources have been replaced by open circuit.
4. Replace the entire network by a single thevenin source, whose voltage is V_{th} & whose resistance is R_{th}.
5. Connect R_L back to its terminals from where it was previously removed.
6. Finally, calculate the current flowing through R_L by using the equation,

$$I = V_{th} / (R_{th} + R_L).$$

PROCEDURE:

1. Remove R_L from the circuit terminals A and B and redraw the circuit.
2. Calculate the open circuit voltage Voc which appears across terminals Aand B when they are open i.e, when R_L is removed.
3. Now the battery is removed leaving the internal resistance. When viewed inwards from terminals A and B the equivalent resistance is given by; $R_i = R_2 \parallel (R_1 + r)$
4. Remove load from the circuit terminals A and B and redraw the circuit.
5. Calculate the open circuit voltage Voc which appears across terminals A and B when they are open i.e, when is removed.
6. R_L is now connected back across terminals A and B from where it was temporarily removed. Connect an ammeter to determine I_L.

OBSERVATION TABLE:

Sl No	Supply Voltage (Vs)	Voc/Vth (Measured)	Voc/Vth (Calculated)	I_l (Measured)	I_l (Calculated)	Deviation
1						
2						
3						
4						
5						

RESULT:

PRECAUTIONS:

1. Connect the circuit as per diagram
2. Handle the instruments carefully.
3. Note down the readings properly.

CONCLUSION: Thevenin Theorem has been verified.

Experiment No: 2

AIM: TO VERIFY THE RESONANCE CONDITION OF A SERIES RLC CIRCUIT.

APPARATUS REQUIRED:

SL. NO.	NAME OF COMPONENTS	SPECIFICATIONS	QUANTITIES
1.	Resistance	47ohm	1
2.	Inductor	1H	1
3.	Capacitor	22µf, 63V	1
4.	Breadboard	-	1
5.	Voltage source (A.C)	Signal generator, 0-20V	1
6.	Connecting wires	Single stranded copper wires	As per required
7.	Voltmeter, Ammeter or Multimeter	as per ratings, Analogue/Digital	1

THEORY:

Resonance in electrical circuits consisting of passive & active elements represents a particular state of the circuit when the current or voltage in the circuit is maximum or minimum with respect to the magnitude of excitation at a particular frequency, the circuit impedances being either minimum or maximum at the power factor unity.

In parallel resonance, the current at resonance is minimum & the net impedance at resonance is maximum.

Let, f_o or ω_o be the frequency at which $X_L=X_c$,

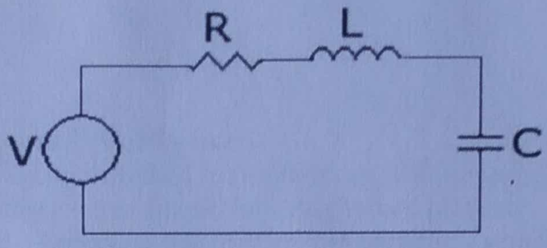
So, $\omega_0 = \frac{1}{\omega_0 C}$

Or, $\omega_0^2 = \frac{1}{LC}$

Or, $f_0 = \frac{1}{2\pi\sqrt{LC}}$

Where, f_0 is the resonant frequency.

CIRCUIT DIAGRAM:



PROCEDURE:

1. Connect the circuit as per circuit diagram.
2. Keeping voltage source constant say at 7V, measure the current through the circuit using an ammeter at different steps by varying the frequency.
3. After that the voltage drop is measured from the relation, V_R =IR volt.
4. Plot the graph between current and frequency of Series Resonance RLC circuit.
5. Find out the resonant frequency from the observation which can be s calculated as,
   $f_0 = \frac{1}{2\pi\sqrt{LC}}$
6. Mentioned the current at resonant frequency.

CALCULATION:

Resonant frequency, $f_0 = \frac{1}{2\pi\sqrt{LC}}$

OBSERVATIONS: Source voltage V_S (in volts) =

Sl No	Frequency, F (KHz)	Voltage Across Resistance, V_r	Current Across Resistance, I

RESULTS:

PRECAUTIONS:

1. All the connections should be tightly fixed.
2. The power supply should be switched off after taking the readings.
3. The ends of the connecting wires should be straightened properly.
4. The multimeter should be checked whether it works properly or not.

CONCLUSIONS:

Hence, the Series Resonance of RLC circuit is verified and the graph of current versus frequency is plotted.