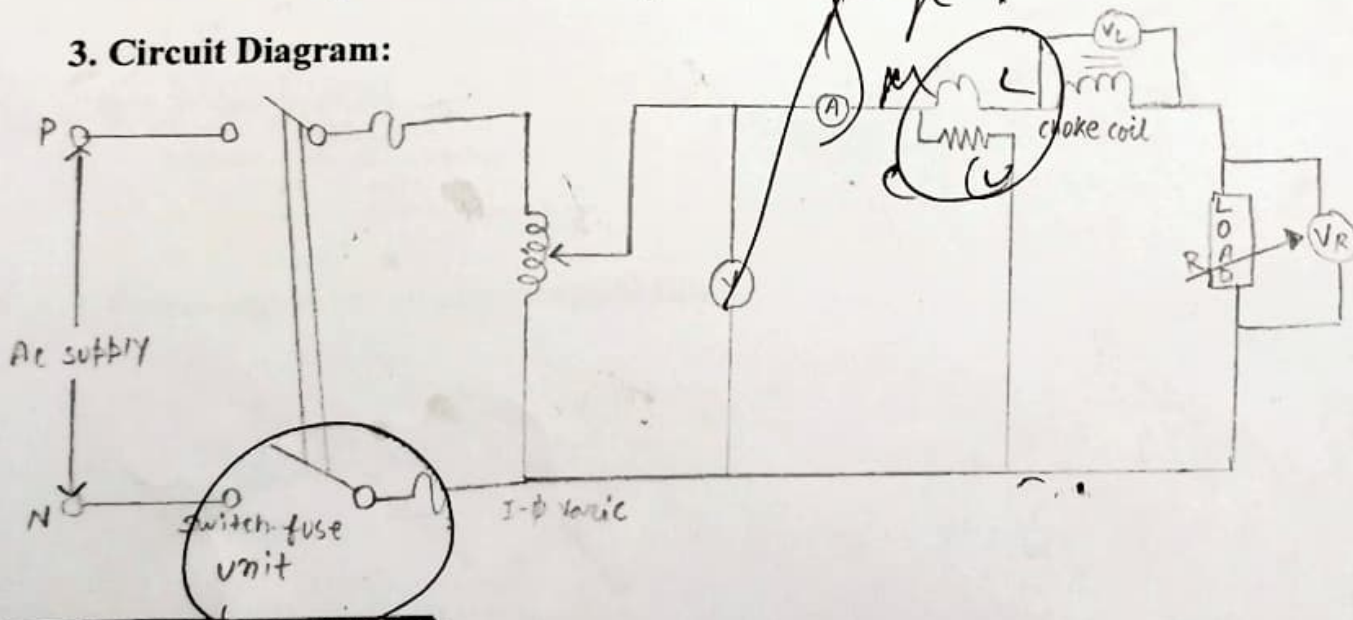


1. Aim: To study voltage-current relationship in an R-L series circuit and to determine the power factor of the circuit.

2. Apparatus:

- 1. 1- AC supply (230V)
- 2. 1- Variac (0-270V, 15A)
- 3. AC wattmeter (0-300V, 5A, 750W)
- 4. AC Ammeter (0-5A)
- 5. AC Analog Voltmeter (0-300V)
- 6. Variable resistive load (230V, 1KW)
- 7. Variable inductive load (230V)
- 8. Connecting wires (As per requirement)

3. Circuit Diagram:





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4. Steps for experiment:

1. Connect the circuit as shown in Figure.
2. Vary the 1- ϕ AC supply voltage with the help of 1- ϕ Variac.
3. Switch on the resistive load by switching various lamps in resistive lamp bank and vary the tappings of choke coil.
4. Take readings of V_s, I, V_L, V_R and P .
5. Increase resistive and inductive load by switching and repeat the procedure as stated in steps 1 to 4.
6. Take at least 5 set of readings and record the readings in table.
7. Calculate impedance of circuit, impedance of coil, internal resistance of coil, inductive reactance of coil, inductance of coil and power factor from readings.

5. Calculations/Theorems /Formulas used etc

$$W = VI \cos \phi$$

$$\text{Power factor, } \cos \phi = [W / (VI)]$$

Therefore,

$$\phi = \cos^{-1} [W / (VI)]$$

6. Observations/Discussions:

Sr.No	Volt (V)	Ampere (I)	Power (W)	$\cos \phi = P / VI$
1.	50V	0.8 mA	5.6 W	0.14
2.	100V	1.3 mA	16.4 W	0.12615
3.	150V	1.7 mA	30.9 W	0.12117
4.	200V	2.0 mA	48.5 W	0.12125
5.	220V	2.2 mA	56.6 W	0.11694

7. Percentage error (if any or applicable):

8. Result/Output/Writing Summary:

At the end we have observed values of voltage, current and power and determine power factor of each value. The value of power factor must be less than one. Theoretically, for R-L series load, current will always lag behind. The applied voltage and power factor will always be less than unity.

9. Graphs (If Any): Image /Soft copy of graph paper to be attached here**Learning outcomes (What I have learnt):**

1. Able to calculate impedance of the circuit.
2. Able to measure current and voltage.
3. Familiar with circuit components like wattmeter, ammeter & voltmeter.
4. Able to make series connections.
5. Able to measure power of the circuit.