EXPERIMENT NO. 6

DEMONSTRATION & VERIFICATION OF SUPERPOSITION THEOREM

Objectives

To verify the Superposition theorem theoretically and practically for a given circuit

EQUIPMENTS REQUIRED:

- DC Regulated Power Supply (RPS)
- DMM (Digital Multi Meter)
- Resistors with different Resistances
- Breadboard
- Connecting Wires

THEORY:

Statement

The theorem states that the response in any element of a linear bilateral network having two or more sources is the algebraic sum of the responses obtained by each source acting individually while all other sources are set equal to zero

"The superposition principle states that the voltage across (or current through) an element in a linear circuit is the algebraic sum of the voltages across (or currents through) that element due to each independent source acting alone."

The principle of superposition helps us to analyze a linear circuit with more than one independent source by calculating the contribution of each independent source separately. However, to apply the superposition principle, we must keep two things in mind:

1. We consider one independent source at a time while all other independent sources are turned off. This implies that we replace every voltage source by 0 V (or a short circuit), and every current source by 0 A (or an open circuit). This way we obtain a simpler and more manageable circuit.

2. Dependent sources are left intact because they are controlled by circuit variables.

Procedure

Determination Of I_l' By Removing V_2

1. Make connections as per the circuit diagram. Figure 5.3 (iii)

2. Remove V_2 by short circuiting the terminal.

3. Apply voltage V_1 by using RPS and note down the current I_L'.

Determination Of I_l'' By Removing V_1

1. Make connections as per the circuit diagram. Figure 5.4 (iv).

2. Remove V_1 by short circuiting the terminal.

3. Apply voltage V_2 by using RPS and note down the current I_L''.

Determination Of I_l' When Both V_1 Andv$_2$ Are Active

1. Make connections as per the circuit diagram Figure 5.2 (ii).

2. Apply the voltage V_1, V_2 and note down the current I_L'

Formula Used

$$I_L=I_L'+I_L''$$

I_L'- current through Ammeter by removing V_2

I_L''- current through Ammeter by removing V_1

Circuit Diagram

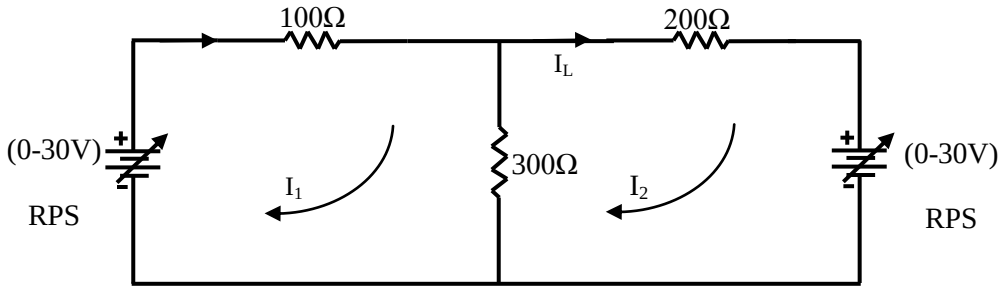

Figure 5.1 **Circuit (i)**

Determination of I_l when both V_1 andv$_2$ are Active

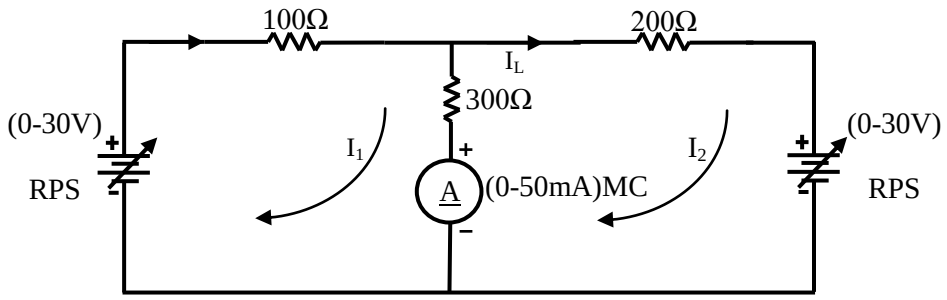

Figure 5.2 **Circuit (ii)**

Determination Of I_l' By Removing V_2

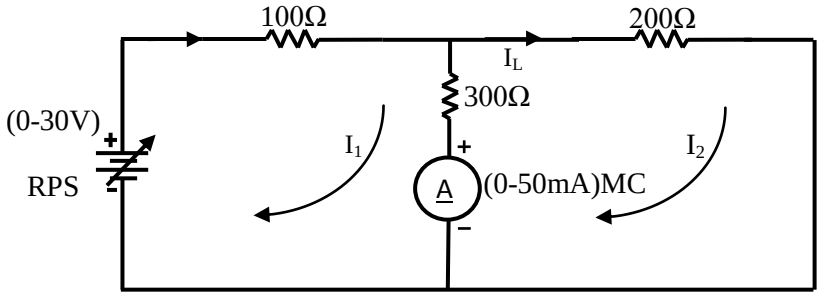

Figure 5.3 **Circuit (iii)**

Determination Of I_l'' By Removing V_1

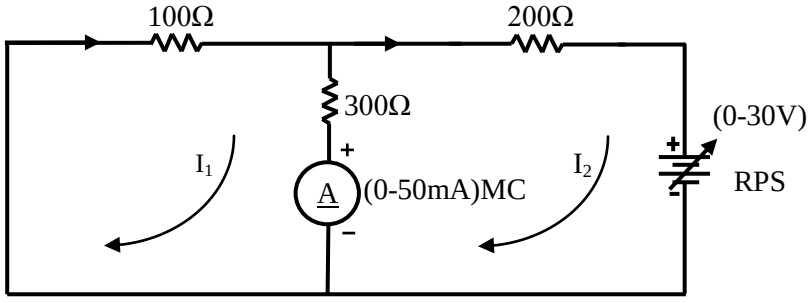

Figure 5.4 **Circuit (iv)**

Table 5.1 (Results)

S.No	Supply Voltage (Volts)		Current in mA (Practical Value)			Theoretical Value
	V_1	V_2	I_L	I_L	I_L	I_L in mA

DISCUSSION AND CONCLUSION

Evaluation Chart

	Total Marks	Obtained Marks
Participation in the Lab	3	
Accuracy of Results Obtained	4	
Viva	3	
Total	10	

Comments from Lab Instructor:

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Date Instructor's Signature