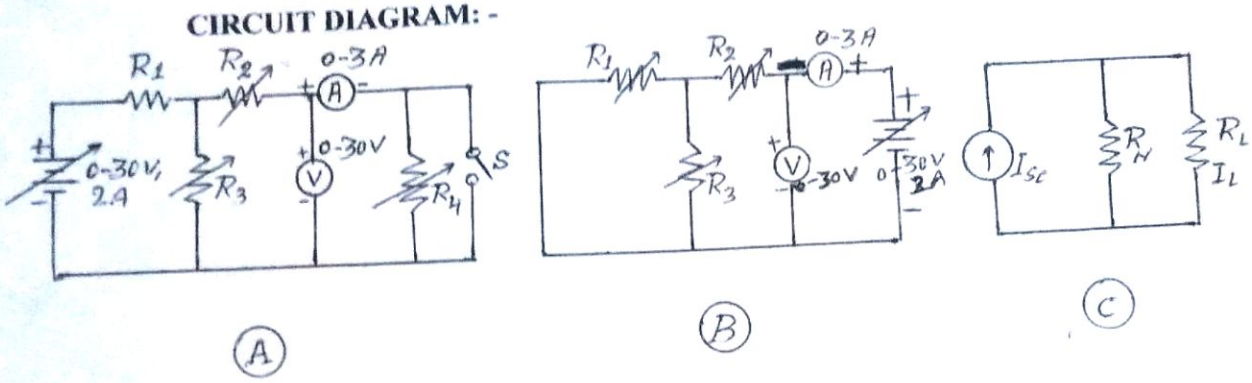
OBJECT: - To verify Norton's Theorem.

APPARATUS: -

Regulated D.C. Power supply	0-30V, 3A	1 No.
Rheostats	50Ω, 2.3A	4 No.
M.C. Voltmeter	0-30V	1 No.
M.C. Ammeter	0-3A	1 No.
One - way key		
Connecting leads		

CIRCUIT DIAGRAM: -



THEORY: -

This theorem states that the current flowing through a resistance connected across any two terminal of a network can be determined by replacing the whole network by an equivalent circuit of a constant current source I_{SC} in parallel with a resistance R_N.

Where ,

I_{SC} is the short circuit current supplied by the source that would flow between the two selected terminals when they are short circuited. It is called Norton current (I_{SC} or I_N).

R_N is the equivalent resistance of the network as seen from the two terminals with all other e.m.f. sources are replaced by their internal resistances and current sources replaced by open circuit. It is called Norton resistance.

$$I_{LC} = (I_{SC} \times R_N)/(R_N + R_L)$$

PROCEDURE: -

1. Make the circuit diagram as shown in figure A.
2. Switch on the power supply. Keep the switch S open, note down the reading of ammeter(I_L)and voltmeter(V_L) . This gives load current I_L & value of load resistance $R_L = V_L / I_L$
3. Next short the load resistance (when the switch S closed). Note down the reading of ammeter. This gives short-circuit current I_{SC}.
4. Next connect the circuit as shown in figure B. Note down the readings of voltmeter and ammeter. This gives value of R_N.

   R_N = Voltmeter reading/Ammeter reading
5. Switch off the power supply.

OBSERVATIONS: -

The observations made in the experiments are recorded as under:

1. When switch S is open (from step 2 of the procedure)

   I_L = ……..A , V_L = ……V

2. When switch S is closed (from step 3 of the procedure)

   I_{SC} = ……..A

3. From step 4 of the procedure

   V =……..Volts, I = ……Amp.

CALCULATIONS: -

1. $R_L = V_L / I_L$ (From observation first)

2. $R_N = V / I$ (From observation third)

3. $I_{LC} = (I_{SC} \times R_N)/(R_N + R_L)$

RESULT: - The actual value of the load current I_L (From observation first) and calculated value of the load current I_{LC} (from calculation third) are equal. Hence Norton's theorem is verified.

PRECAUTIONS: -

1. All the connections must be tight.
2. The rheostats should be set at suitable position so that the current in the ammeter is less than the rheostat current ratings.
3. Before connecting the instruments check their zero setting.
4. The terminals of the rheostats should be connected properly.
5. At no instant of time the current in the ammeter should exceed the current rating of rheostats.