EXPERIMENT NO : 5

ELECTRICAL ENGINEERING

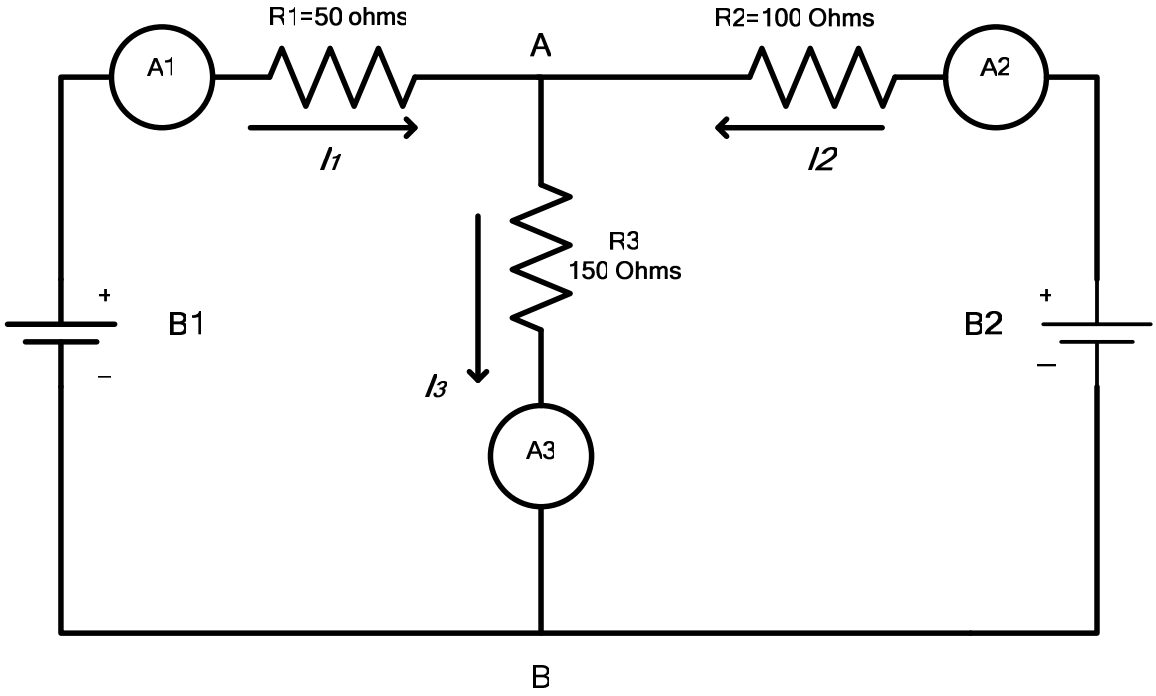
OBJECT: To verify

(a) Kirchoff's current and voltage laws.
(b) Super position theorem.
(c) Thevenin's theorem.

APPARATUS REQUIRED:

(a) Power supplies – Two no's (12 volts)
(b) Ammeters- Three no's ;Two no's 0-100mA ×2; One no 0-25 mA
(c) Voltmeter – one no (0-15 volt)
(d) Resistance network.

CIRCUIT DIAGRAM:



PROCEDURE:

(a) With help of the board, make the connections as shown in the figure.
(b) For Kirchhoff's current law verification:
Measure the current in the circuit and ensure that at the node A,
Total incoming current = total out going current
i.e.

$$I_1+I_2 = I_3$$

Check by varying $V_{B1,}$ $V_{B2.}$

(c) For Kirchhoff's voltage law verification:
Calculate the voltage drop across R_1 and R_3 and verify that sum of these drops is

Equal to the voltage V_{B1} of the battery B_1 for the first loop. Check the same for other loop also.

i.e.

$I_1 R_1 + I_3 R_3 = V_{B1,}$

$I_2 R_2 + I_3 R_3 = V_{B2}$

(d) For verifying superposition theorem:

(1) With the circuit as before note the current in $A_3(I_3)$

(2) Take off power supply B_2 and complete the circuit .Note the current in $A_3(I_3')$

(3) Restore power supply B_2 and remove powersupplyB_1 note the current in $A_3(I_3'')$

(4) Verify that :

$I_3' + I_3'' = I_3$

Also account for the voltage drops across the ammeter which may be significant.

(e) For verifying thevenin's theorem:

(1) Take R_3 out of the circuit by removing A_3. Measure the open circuit voltage

Between terminal A and B. this is $V_{TH.}$

(2) for obtaining thevenin's equivalent resistance of the circuit, assume internal resistance of the battery negligible. Neglecting batteries in the circuit calculate resistance looking into from terminals A, B i.e. R_{TH}

(3) for any resistance R_3 between terminals A and B the current in the resistor R_3 is given by thevenin's theorem as follows

$$I_o = V_{TH} / (R_{TH} + R_3)$$

(4) Confirm that this is equal to the current measured by ammeter A_3 i.e. I_3 Calculate the % error.

RESULTS:

PRECAUTIONS: