CSE250

Circuits and Electronics Lab

Experiment-2

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Name of the Experiment: Verification of KVL.

Objective: This experiment is intended to verify Kirchhoff's voltage law (KVL) with the help of series circuits.

Circuit Drawing: After connecting resistors R_1, R_2, R_3 in series to a DC power supply, we get the circuit as shown below.

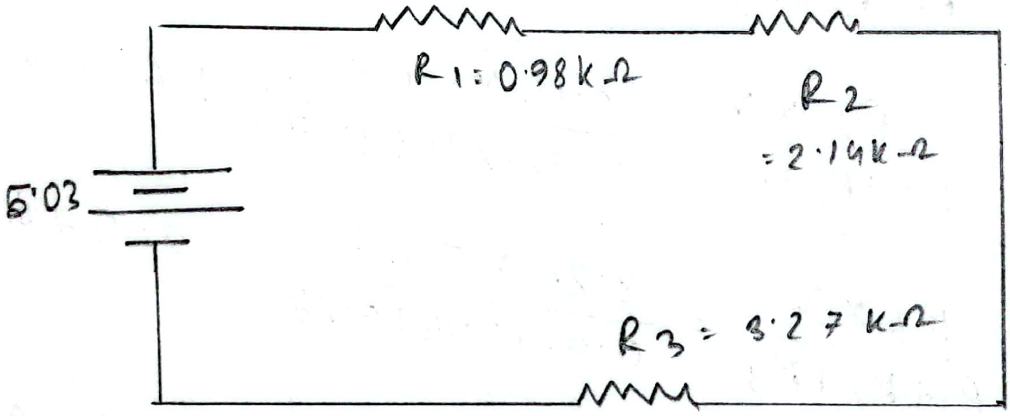

Table:

Observation	R_1	R_2	R_3	V	V_1	V_2	V_3
Experimental	0.98	2.14	3.27	5.03	0.76	1.67	2.57
Theoritical	0.98	2.14	3.27	5.03	0.771	1.684	2.574

Calculation:

Resistors that were used for this experiment are given below,

$R_1 = 0.98 k\Omega$

$R_2 = 2.14 k\Omega$

$R_3 = 3.27 k\Omega$

Using the voltage divider rule we get,

$$v_1 = \frac{R_1}{R_1+R_2+R_3} \times V = \frac{0.98 \times 5.03}{0.98+2.14+3.27} v = 0.771 v$$

$$v_2 = \frac{R_2 \times v}{R_1+R_2+R_3} = \frac{2.14 \times 5.03}{0.98+2.14+3.27} = 1.684 v$$

$$v_3 = \frac{R_3 \times v}{R_1+R_2+R_3} = \frac{3.27 \times 5.03}{0.98+2.14+3.27} = 2.574 v$$

From the theoritical values of v_1, v_2 and v_3 we get,

$$v_{s_1} = v_1+v_2+v_3 = 0.771+1.684+2.574 v$$
$$= 5.029 v$$

Now, the experimental values of v_1, v_2 and v_3 gives us,

$$v_{s_2} = v_1+v_2+v_3 = 0.76+1.67+2.57 = 5 v$$

Report : The execution of this experiment gives us two diffrent resulting valus for theoritical calculation and experimental measurement which being very close numerical values show the successability of our experiment However, in the resulting voltage a diffrence of $\Delta V_s = (5.029 - 5)V = 0.029$ V show some discrepancies between the experimental and theoritical calculation. It is because we do not consider some minor factors while calculating theoritically that we have to encounter in real life experiments. Below is given the reasons why we lack behind in accuracy while measuring voltage in this experiment :

(1) The Jumper wires the we use to connect the resistors with the power source has some resistance itself which consumes ~~and~~ current flowing through the circuit. However, due to slight resistance we take these to have no resistance while calculating.

(2) The breadboard that we use to construct the circuit has shorted connections both horizontally and vertically. This connection in the breadboard is implimented through wires inside this device that has some slight resistance as well. Even though we do not consider the resistance of the bread-board, it consumes current and gives us less voltage for the resistors.

(3) We connect multimeter parally to the resistors while measuring the voltage of the resistors. Now, current flow depends on the resistance of the elements in parallel connection. The lower the resistane, the more current will flow from that element. It is ideally assumed that multimeter has a resistance of infinity. So no current should flow ~~in~~ through this device. However, it is not possible to have infinite resistance in real life. So a small amount of current flows in the multimeter while measuring v_1, v_2, v_3 which hampers the accuracy of result.

(4) While measuring the values we couldn't hold the devices properly and steadly to the resistors, so our result was fluctuating. as the manual process involes natural human behaviour that hampers the results.

(5) When we use a multimeter to measure values, it gives us voltage upto two decimal points. However, we get more decimal points while calculating theoritically. So this nature of the multimeter gives us less accurate values.

Above was the reasons of the discrepancies between the experimental and theoritical values. This experiment of kirchoff's voltage law was successfully carried out by our team with ignorable errors.

BRAC UNIVERSITY
DEPT. OF COMPUTER SCIENCE AND ENGINEERING
COURSE NO.: CSE250
Circuits and Electronics Laboratory

Experiment No. 2

Name of the Experiment:

Verification of KCL and KVL

KVL

OBJECTIVE:
This experiment is intended to verify Kirchhoff's voltage law (KVL) with the help of series circuits.

THEORY:
KVL states that around any closed circuit the algebraic sum of the voltage rises equals the algebraic sum of the voltage drops.

APPARATUS:
- One DC Ammeter (0 - 1A)
- One multimeter
- Three Resistors
- One DC power supply

PROCEDURE:

- Connect the resistors R_1, R_2 and R_3 in series to a DC power supply as shown in Fig 1.

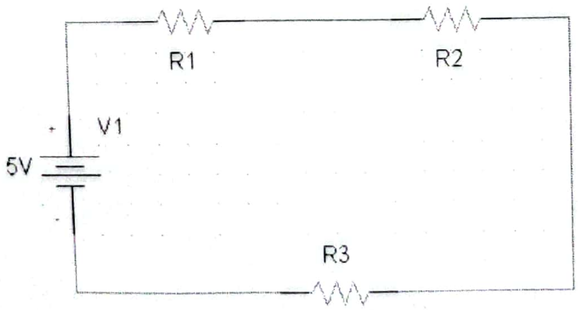

Fig. 1

- Take readings of V_1, V_2, V_3, V_s using multimeter . Take two sets of reading and enter them in the table shown below

- ➢ Verify KVL as $V_S = V_1+V_2+V_3$ for each set of readings.
- ➢ Calculate the theoretical values of V_1, V_2 & V_3 & note them down in 'Theoretical Observation' row in table
  Use voltage divider rule as stated below to get these values:

  $V_1= (R_1/ R_e)^* V$; $V_2= (R_2/R_e)^* V$; $V_3= (R_3/R_e)^* V$

  Where, $R_e= R_1+R_2+R_3$

TABLE 1: Verification of KVL.

Observation	R1	R2	R3	V	V1	V2	V3
Experimental	0·98	2·14	3·27	5·03	0·76	1·67	2·57
Theoretical	0·98	2·14	3·27	5·03	0·77	1·68	2·57

REPORT:

1. State the rules of connecting voltmeter and ammeter in the circuit.
2. Comment on the results obtained and discrepancies (if any).

KCL

OBJECTIVE:

This experiment is intended to verify Kirchhoff's current law (KCL) with the help of a simple parallel circuit.

THEORY:

KCL states that the algebraic sum of the currents entering any node equals the sum of the currents leaving the node.

APPARATUS:

- ➢ One DC Ammeter (0 - 1A)
- ➢ Three resistors
- ➢ One multimeter
- ➢ One DC supply

PROCEDURE:

- Connect the resistors in parallel across the power supply as shown in figure2

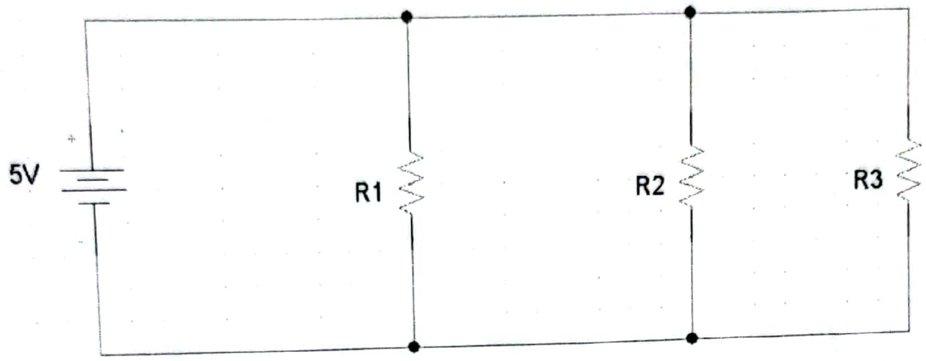

Fig.2

- Measure V_S, I_O, I_1, I_2, I_3. Take two sets of reading.
- Verify KCL as $I_S = I_1+I_2+I_3$ for each set of readings.
- Calculate the theoretical values of I, I1, I2 & I3 & note them down in 'theoretical observation' row in table

  Use the following to get these values:

  I1=V/R1; I2=V/R2; I3=V/R3; I=I1+I2+I3

TABLE 1: Verification of KCL.

Observation	R1	R2	R3	V	I	I1	I2	I3
Experimental								
Theoretical								

REPORT:

1. Comment on the obtained results and discrepancies (if any).

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