CSE250

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Section: 2
Experiment no: 3
Experiment name: Verification of KCL and KVL

Name of the experiment:

Verification of KCL and KVL.

KVL

Objective:

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

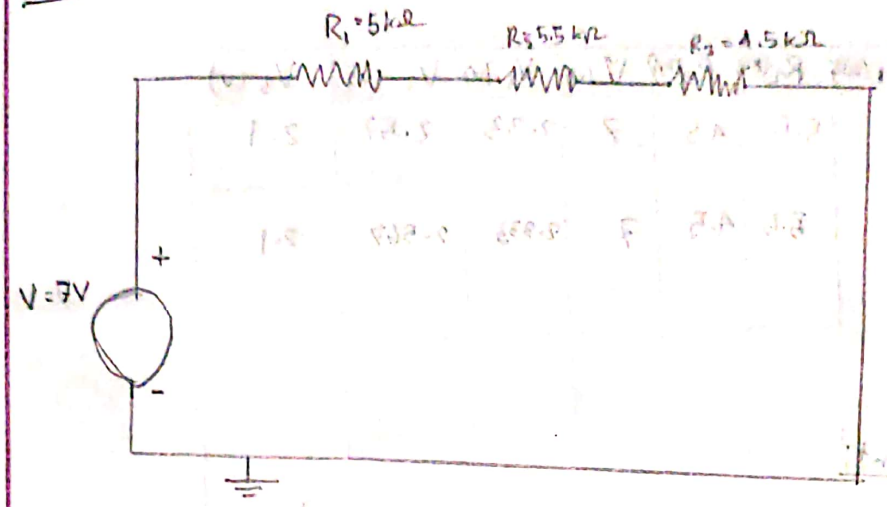
Theory:

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

Apparatus:

- DC Ammeter.
- Multimeter
- Three resistors.
- DC power supply.

Circuit Diagram:



Result Analysis:

$V = 7V$

$R_1 = 5k\Omega$

$R_2 = 5.5k\Omega$

$R_3 = 4.5k\Omega$

$R_1 + R_2 + R_3 = 15k\Omega$

Now,

$V_1 = \frac{R_1}{R} \times V_A = \frac{5}{15} \times 7 = (7/3)\,V = 2.333\,V.$

$V_2 = \frac{R_2}{R} \times V_A = \frac{5.5}{15} \times 7 = (\frac{77}{33})\,V = 2.567\,V$

$V_3 = \frac{R_3}{R} \times V_A = \frac{4.5}{15} \times 7 = (\frac{21}{10})\,V = 2.1\,V$

~~$\therefore V = (\frac{7}{3} + \frac{77}{33} + \frac{21}{10})\,V = 7V$~~

$\therefore V = (2.333 + 2.567 + 2.1) = 7V.$

Table : 1:

Observation	R_1 (Ω)	R_2 (Ω)	R_3 (Ω)	V (V)	V_1 (V)	V_2 (V)	V_3 (V)
Experimental	5	5.5	4.5	7	2.33	2.57	2.1
Theorotical	5	5.5	4.5	7	2.333	2.567	2.1

Questions and report:

1) An ammeter is ~~connected~~ used to measure current and voltmeter is measured to used to measure the potential difference. An ammeter will be always connected in series in a circuit as it have a low resistance while a voltmeter is connected in parralel as it have high resistance.

2) The results obtained in both experimental and theorotical observation in same. Therefore there is no discrepancies.

KCL

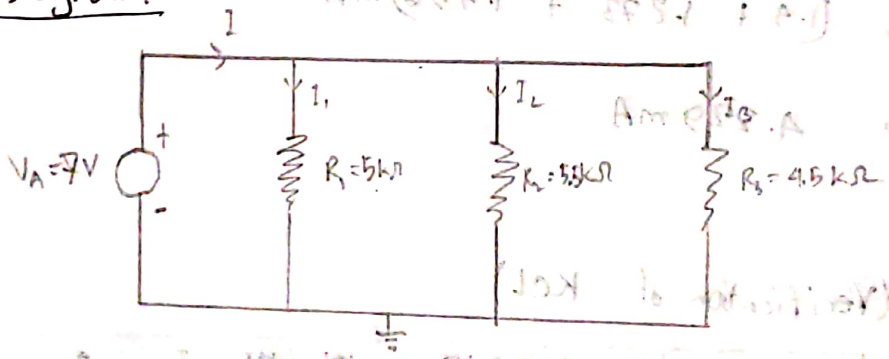
Objective:

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

Apparatus:

a) A DC Ammeter.
b) Three resistors
c) One Multimeter
d) One DC supply.

Circuit Diagram:



Result:

Given,

$V_A = 7V$

$R_1 = 5k\Omega$

$R_2 = 5.5k\Omega$

$R_3 = 4.5k\Omega$

Now,

$$R = \left(\frac{1}{5} + \frac{1}{5.5} + \frac{1}{4.5}\right)^{-1}$$

$$= 1.6555\ k\Omega$$

Now,

$$I = \frac{V_A}{R} = \frac{7}{1.6559} = 4.229\ mA$$

$$I_1 = \frac{V_A}{R_1} = \frac{7}{5} = 1.4\ mA$$

$$I_2 = \frac{V_A}{R_2} = \frac{7}{5.5} = 1.273\ mA$$

$$I_3 = \frac{V_A}{R_3} = \frac{7}{4.5} = 1.556\ mA$$

$$\therefore I_0 = I_1 + I_2 + I_3$$

$$= (1.4 + 1.273 + 1.556)\ mA$$

$$= 4.229\ mA$$

Table : (Verification of KCL)

Observation	R_1 (kΩ)	R_2 (kΩ)	R_3 (kΩ)	V	I_1 (mA)	I_2 (mA)	I_3 (mA)	I (mA)
Experimental	5	5.5	4.5	7	1.4	1.27	1.56	4.23
Theoretical	5	5.5	4.5	7	1.4	1.273	1.556	4.229

Report:

1) Here, the two results in experimental and theoretical setups are similar. Therefore, there is no discrepancies.