BRAC University

CSE250 : Circuit and Electronics Laboratory

Experiment No : 3

Name of the Experiment: Verification of KCL and KVL

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

Apparatus:

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

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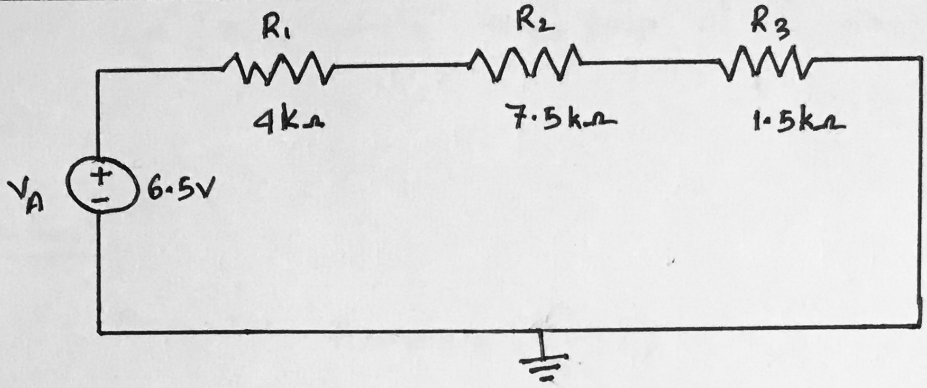
Section : 20

Circuit Diagram:



Result Analysis:

$V_A = 6.5V$, $R_1 = 4k\Omega = 4\times10^3\Omega$, $R_2 = 7.5k\Omega = 7.5\times10^3\Omega$

$R_3 = 1.5\,k\Omega = 1.5\times10^3\Omega$

$\therefore R = R_1 + R_2 + R_3 = (4 + 7.5 + 1.5)\,k\Omega = 13\,k\Omega = 13\times10^3\Omega$

$\therefore I = \frac{V}{R} = \frac{6.5}{13\times10^3} = 5\times10^{-4}\,A$

$\therefore V_1 = I R_1 = (5\times10^{-4} \times 4\times10^3)V = 2V$

$V_2 = I R_2 = (5\times10^{-4} \times 7.5\times10^3)V = 3.75V$

$V_3 = I R_3 = (5\times10^{-4} \times 1.5\times10^3)V = 0.75V$

$\therefore V = V_1 + V_2 + V_3 = (2 + 3.75 + 0.75)V = 6.5V$

KVL verification:

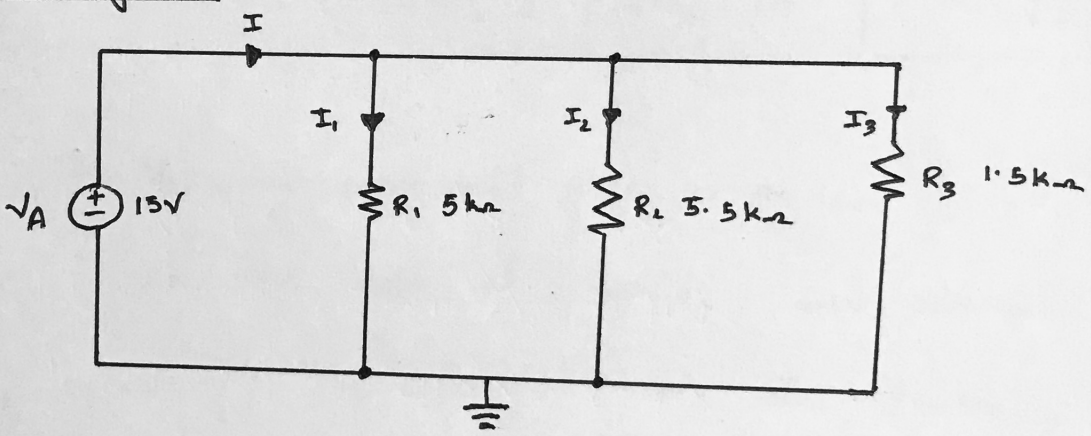
Observation	R_1 (kΩ)	R_2 (kΩ)	R_3 (kΩ)	V_A (kΩ)	V_1 (V)	V_2 (V)	V_3 (V)	$V_1 + V_2 + V_3$ (V)
Simulation	4	7.5	1.5	6.5	2	3.75	0.75	6.5
Theoritical	4	7.5	1.5	6.5	2	3.75	0.75	6.5

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

Apparatus:

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

Circuit Diagram:



Result Analysis: $V_A = 15V$, $R_1 = 5k\Omega$ $R_2 = 5.5k\Omega$ $R_3 = 1.5k\Omega$

$$\therefore R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}} = \frac{1}{\frac{1}{5} + \frac{1}{5.5} + \frac{1}{1.5}} = 0.95k\Omega$$

$$\therefore I = \frac{V}{R} = \frac{15}{0.95 \times 10^3} = 15.73mA$$

$$\therefore I_1 = \frac{V}{R_1} = \frac{15}{5\times10^3} = 3\,mA$$

$$\therefore I_2 = \frac{V}{R_2} = \frac{15}{5.5\times10^3} = 2.73\,mA$$

$$\therefore I_3 = \frac{V}{R_3} = \frac{15}{1.5\times10^3} = 10\,mA$$

$$\therefore I = I_1 + I_2 + I_3 = (3 + 2.73 + 10)\,mA = 15.73\,mA$$

KCL Verification:

Observation	$R_{1(K\Omega)}$	$R_{2(K\Omega)}$	$R_{3(K\Omega)}$	$I_{(mA)}$	$I_{1(mA)}$	$I_{2(mA)}$	$I_{3(mA)}$	$I_1 + I_2 + I_{3(mA)}$
Simulation	5	5.5	1.5	15.73	3	2.73	10	15.73
Theoretical	5	5.5	1.5	15.73	3	2.73	10	15.73

Discussion: The following experiment gave us the idea of KVL and KCL with the help of series and parallel circuits accordingly. The experiment was done flawlessly and the values got from pSpice software simulation and theoratically was same. So it can be said that it was a successful experiment and the challanges were overcome so technically.

PSpice Schematics - [Schematic2.sch p.1 (current)]

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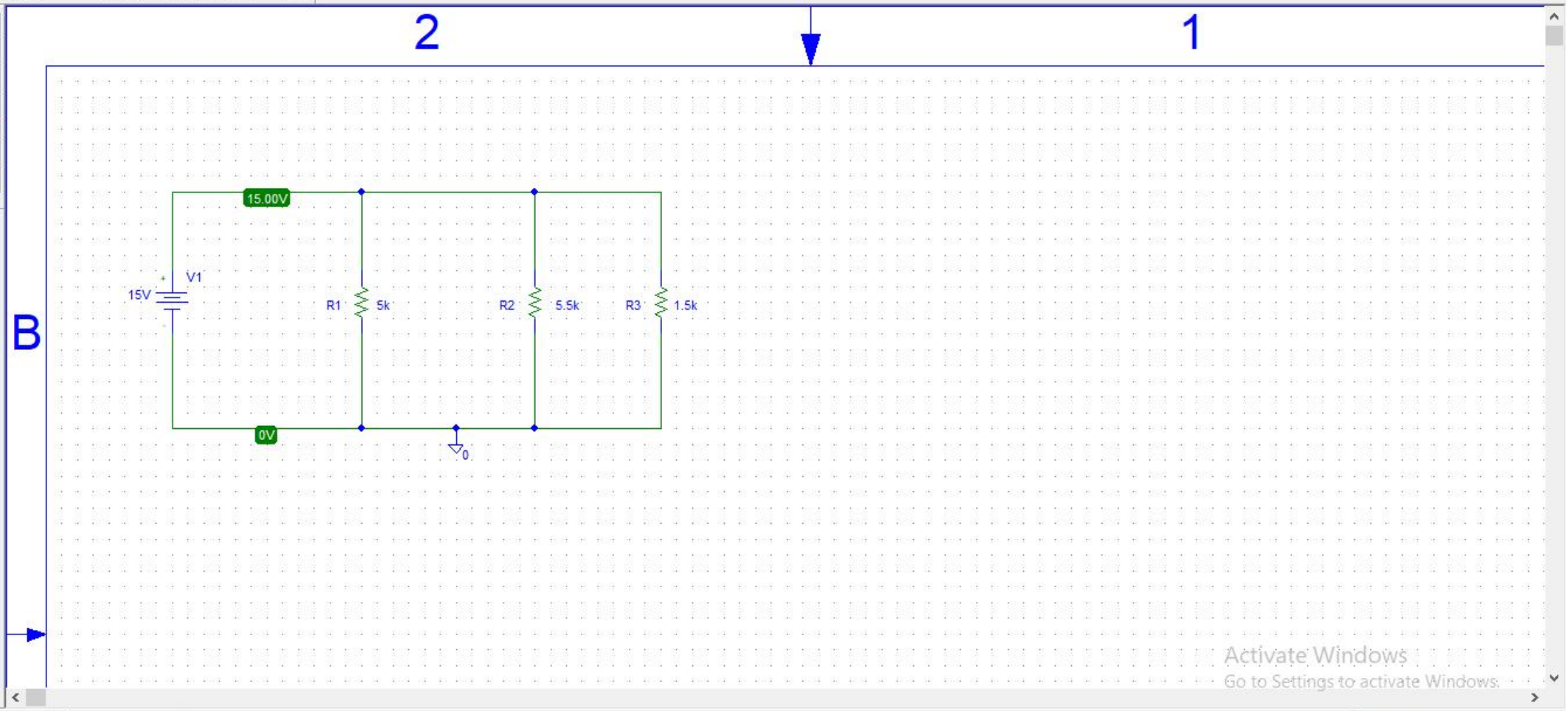

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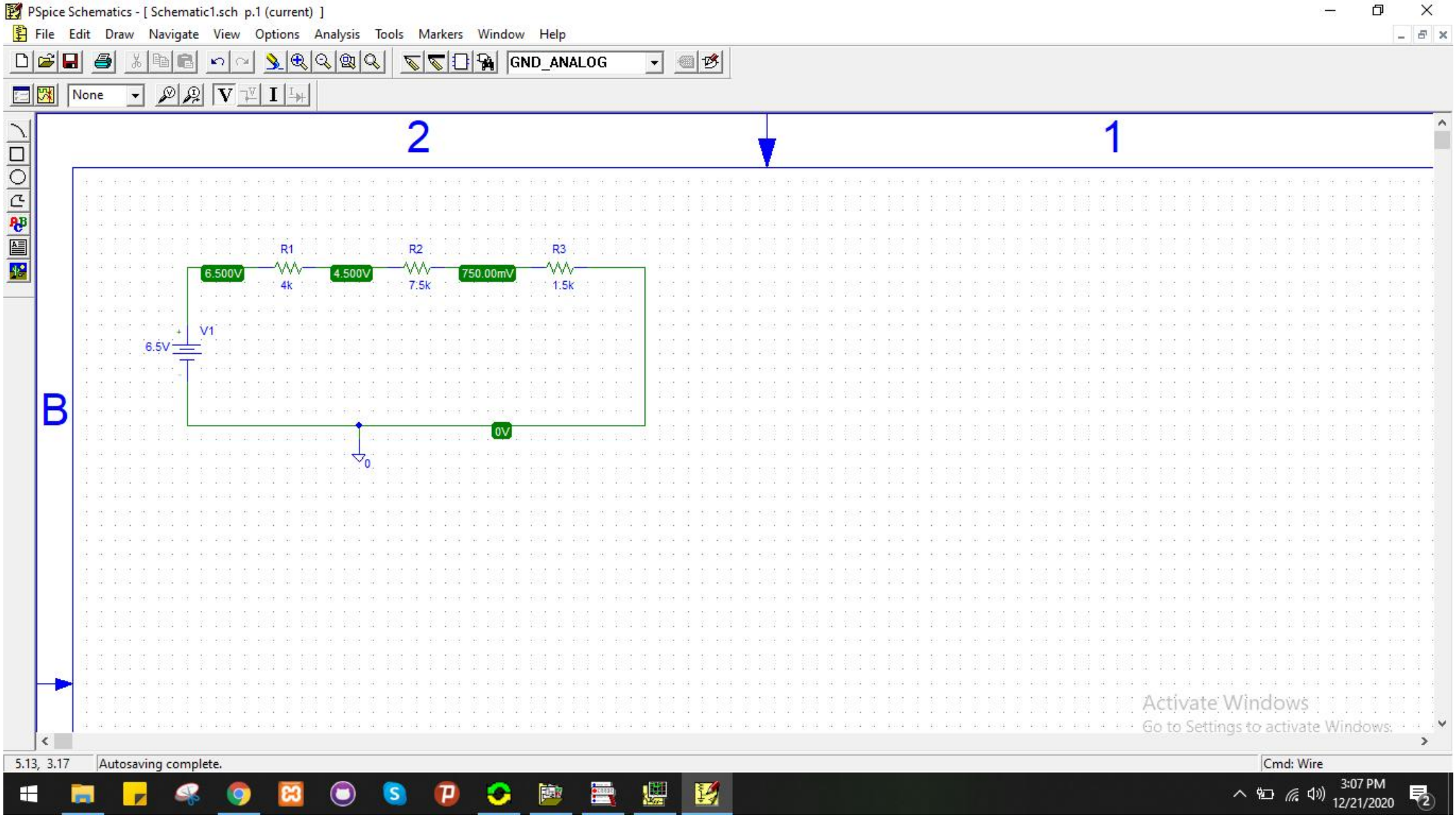
PSpice Schematics - [Schematic1.sch p.1 (current)]
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GND_ANALOG
None
2
1
B
R1
4k
R2
7.5k
R3
1.5k
6.500V
4.500V
750.00mV
V1
6.5V
0V
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