Ex no – E2 (Study of series circuit)

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Theory: Kirchhoff's Voltage Law (KVL) in a DC circuit states that, "the algebraic sum of the voltages around any closed path is zero."

In other words "the sum of the voltage rises is equal to the sum of voltage drops around any closed loop." In symbolic form KVL can be expressed as

$\sum V = 0$ i

i

Where i is used for different voltage rises and drops around the loop. KCL in a DC circuit states that the algebraic sum of the currents entering and leaving a node is zero."

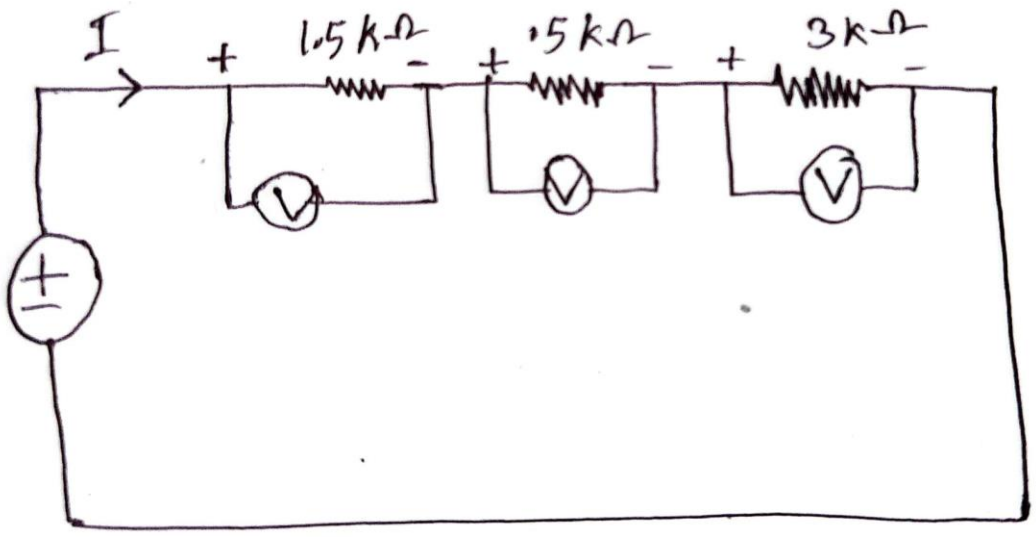
In other words, the sum of the currents entering anode must be equal to the sum of the currents leaving the node.

In equation form $\sum I = 0$ n

n

Where n is used for different currents entering and leaving the node.

Circuit Diagram :



Data table :

Supply voltage	V1	V2	V3
5V	1.5V	.5V	3V
10V	3V	1V	6V
15V	4.5V	1.5V	9V

Calculation :

$$V_1 = \frac{1.5 \times 5}{5} = 1.5\,V$$

$$V_2 = \frac{0.5 \times 5}{5} = 0.5\,V \qquad [V = 5]$$

$$V_3 = \frac{3 \times 5}{5} = 3\,V$$

$$V_1 = \frac{1.5 \times 10}{5} = 3\,V$$

$$V_2 = \frac{0.5 \times 10}{5} = 1\,V \qquad [V = 10]$$

$$V_3 = \frac{3 \times 10}{5} = 6\,V$$

$$V_1 = \frac{1.5 \times 15}{5} = 4.5\,V$$

$$V_2 = \frac{0.5 \times 15}{5} = 1.5\,V \qquad [V = 15]$$

$$V_3 = \frac{3 \times 15}{5} = 9\,V$$

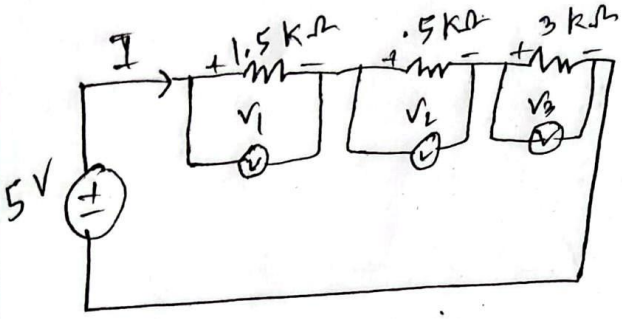
Discussion : Series circuit: components connected end to end, same current flows through each, voltage splits.

NOTE : Error [There is no error on this experiment because we used online simulator]

Signed data sheet:

Exp: 2

Study of series circuit:



$$V_1 = \frac{R_1}{R_1+R_2+R_3} \times V$$

$$V_2 = \frac{R_2}{R_1+R_2+R_3} \times V$$

$$V_3 = \frac{R_3}{R_1+R_2+R_3} \times V$$

Supply voltage	V_1	V_2	V_3
5 V	1.5	0.5	3
10 V	3	1	6
15 V	4.5	1.5	9

V = 5

$$V_1 = \frac{1.5 \times 5}{5} = 1.5\ V$$

$$V_2 = \frac{0.5 \times 5}{5} = 0.5\ V$$

$$V_3 = \frac{3 \times 5}{5} = 3\ V$$

V = 10

$$V_1 = \frac{1.5 \times 10}{5} = 3\ V$$

$$V_2 = \frac{0.5 \times 10}{5} = 1\ V$$

$$V_3 = \frac{3 \times 10}{5} = 6\ V$$

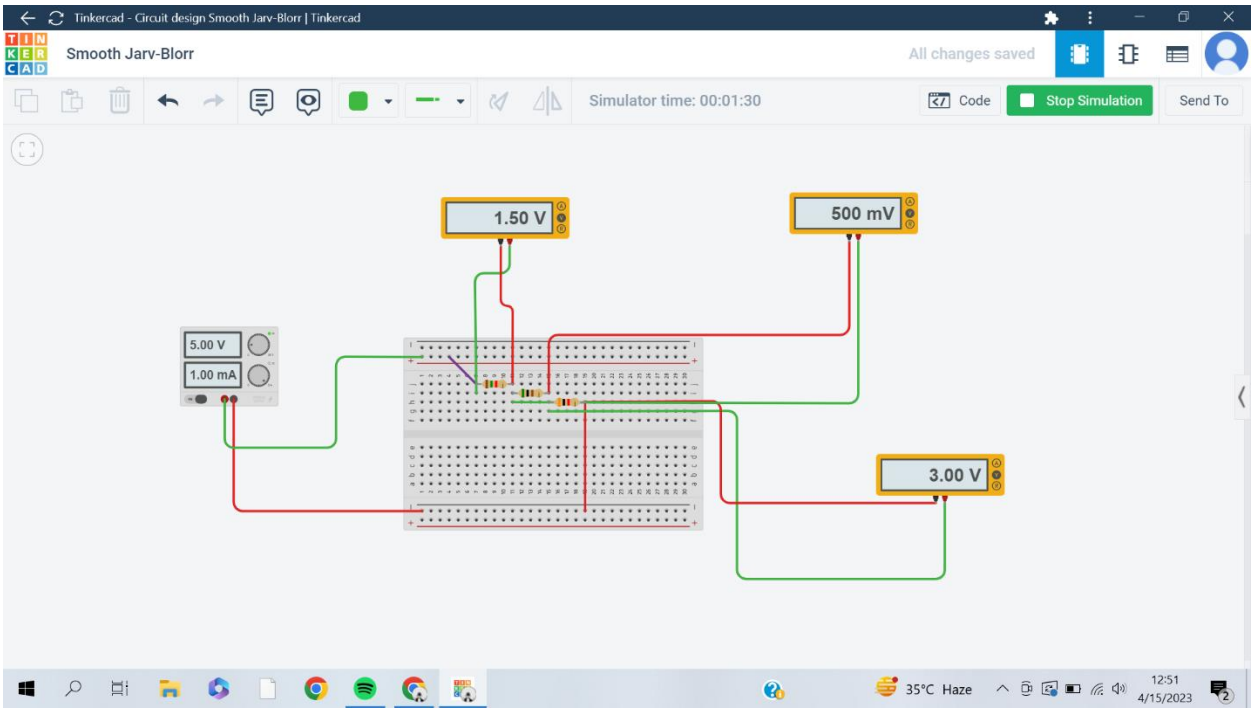
V = 15

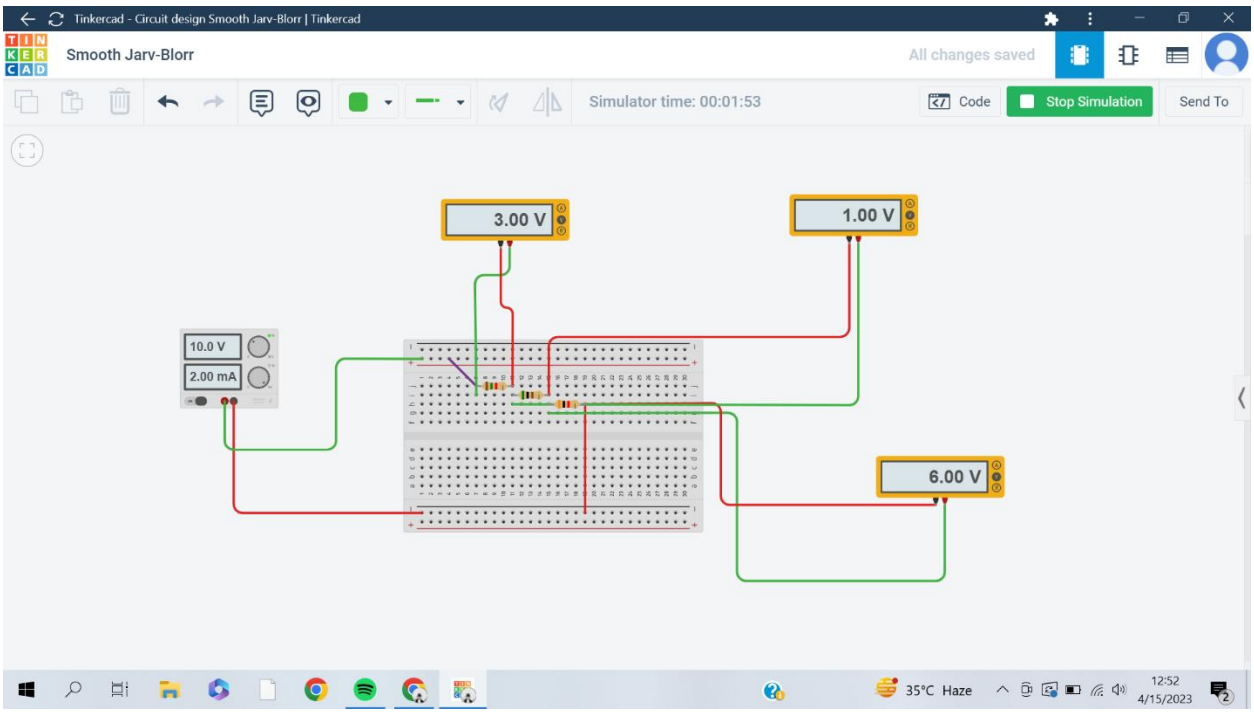
$$V_1 = \frac{1.5 \times 15}{5} = 4.5\ V$$

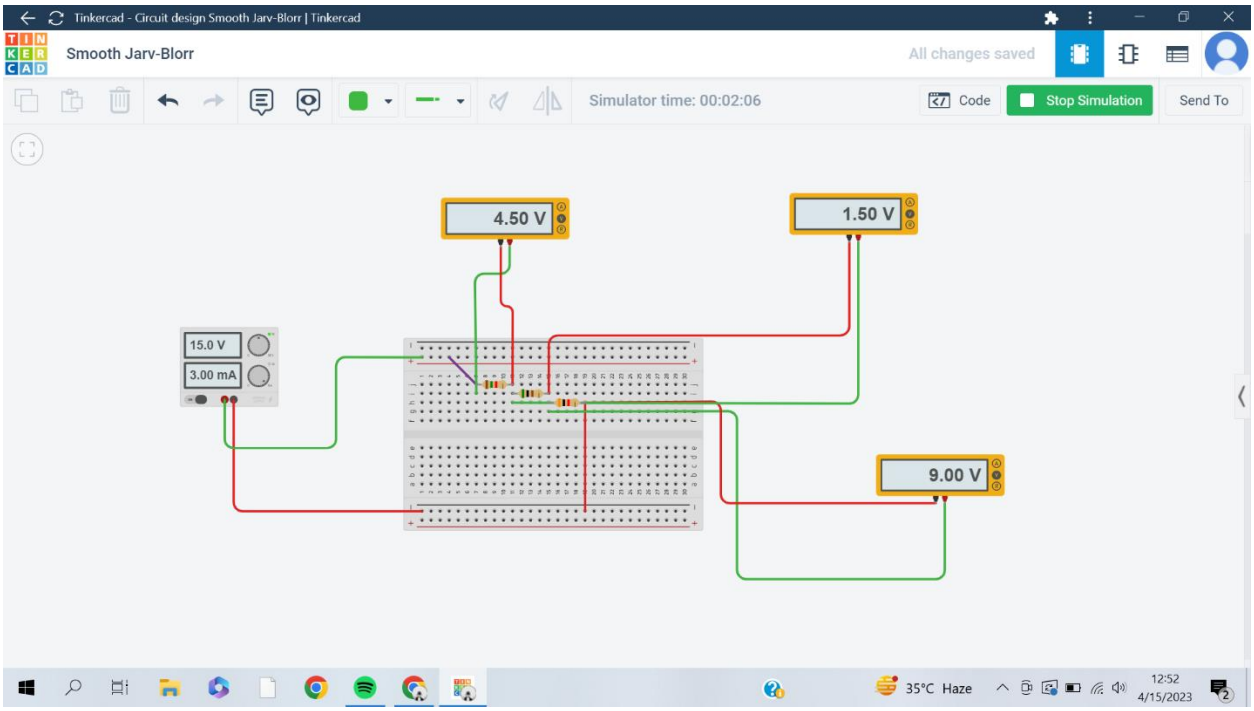
$$V_2 = \frac{0.5 \times 15}{5} = 1.5\ V$$

$$V_3 = \frac{3 \times 15}{5} = 9\ V$$

Screenshot of tinkercad:






Tinkercad - Circuit design Smooth Jarv-Blorr | Tinkercad
Smooth Jarv-Blorr
All changes saved
Simulator time: 00:02:06
Code
Stop Simulation
Send To
4.50 V
1.50 V
15.0 V
3.00 mA
9.00 V
35°C Haze
12:52
4/15/2023