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Course Code : Cse 250

Experiment No. : 2

Experiment Name :

Introduction to Series and Parallel circuit

Ans:

(1) Objective:

The experiment is to ~~acquire~~ acquaint us with series-parallel circuits and to give us the idea about how to connect different circuits in bread board.

(2) Apparatus:

↳ DC power supplies

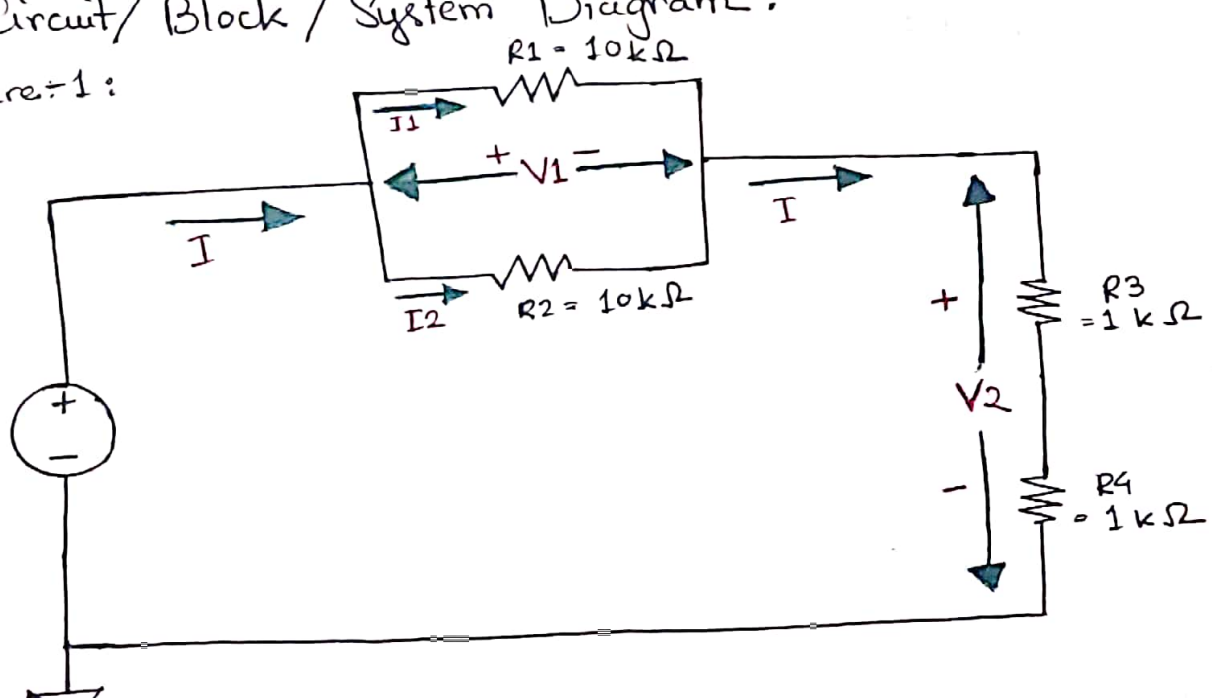
↳ Resistors

↳ Bread board / Trainer board

↳ Multimeter

(3) Circuit/ Block / System Diagram:

Figure-1:

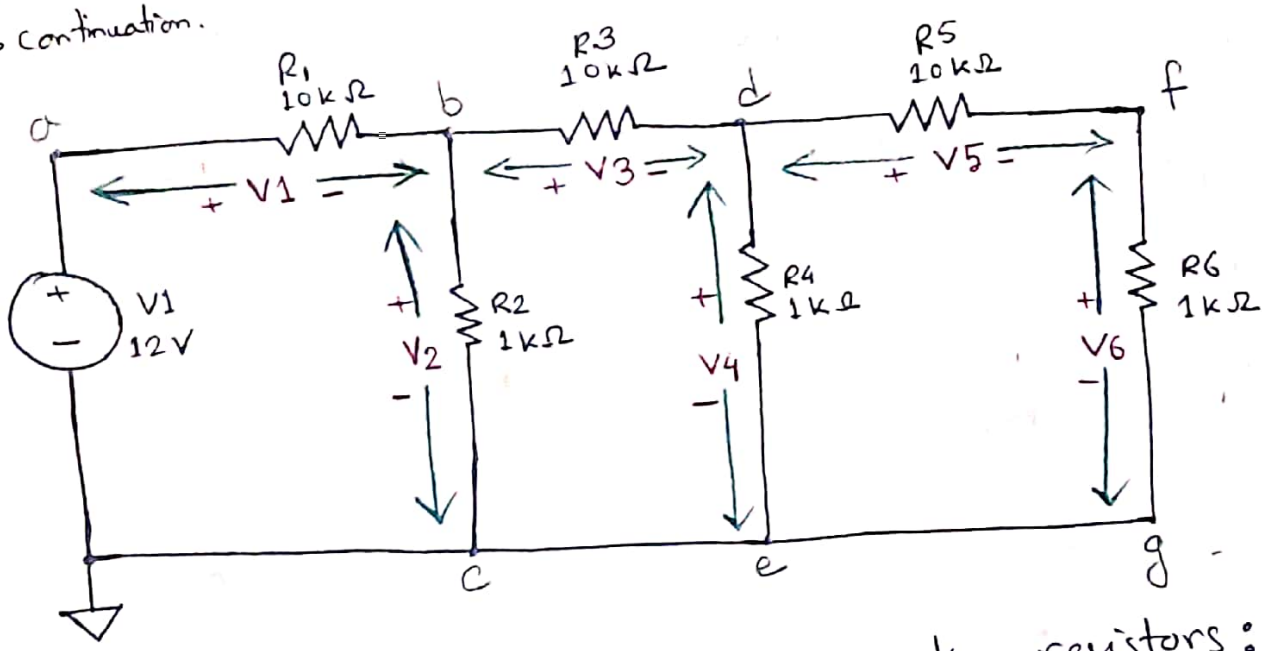


$V_1 = (12 - 3.429) = 8.571$,

$V_2 = 1.714 \times 2$
$= 3.428.$

Figure 2:

(3) → continuation.



Measurement of voltages across the resistors:

→ from PSpice simulator.

$V_1 = 12.00\ V - 1.007\ V = 10.993\ V$

$V_2 = 1.007\ V$

$V_3 = 1.007\ V - 0.08456\ V = 0.92244\ V$

or $1.007\ V - 84.56\ mV$

$V_4 = 0.08456\ V$ or $84.56\ mV$

$V_5 = 84.56\ mV - 7.687\ mV = 76.873\ mV$

or $0.08456\ V - 0.007687\ V = 0.076873\ V$

$V_6 = 7.687\ mV$ or $0.007687\ V$

(3) → Continuation.

In series, Current same. $V = IR$

In parallel, voltage same. $I = \frac{V}{R}$.

For figure 2:

$$I_1 = \frac{V_1}{R_1} = \frac{10.993}{10 \times 10^3} = 1.0993 \times 10^{-3} \text{ A}$$

$$I_2 = \frac{V_2}{R_2} = \frac{1.007}{1 \times 10^3} = 1.007 \times 10^{-3} \text{ A}$$

$$I_3 = \frac{V_3}{R_3} = \frac{0.92244}{10 \times 10^3} = 9.2244 \times 10^{-5} \text{ A}$$

$$I_4 = \frac{V_4}{R_4} = \frac{0.08456}{1 \times 10^3} = 8.456 \times 10^{-5} \text{ A}$$

$$I_5 = \frac{V_5}{R_5} = \frac{0.076873}{10 \times 10^3} = 7.6873 \times 10^{-6} \text{ A}$$

$$I_6 = \frac{V_6}{R_6} = \frac{0.007687}{1 \times 10^3} = 7.687 \times 10^{-6} \text{ A}.$$

$$I = \frac{V}{R}.$$

$V = IR$ $\quad I = \frac{V}{R}$

For figure 1:

$V_1 = 8.571$ V , $V_2 = 1.714$ V.

$$I_1 = \frac{V_1}{R_1} = \frac{8.571}{10 \times 10^3} = 8.571 \times 10^{-4} \text{ A}$$

$$I_2 = \frac{V_1}{R_2} = \frac{8.571}{10 \times 10^3} = 8.571 \times 10^{-4} \text{ A}.$$

$$I = V_2 \left(R_3 + R_4 + \frac{R_1 \times R_2}{R_1 + R_2} \right)$$

$$\Rightarrow I = 1.714 \left(1k + 1k + \frac{10k \times 10k}{10k + 10k} \right)$$

$$\Rightarrow I = 1.714 * 7k = 11.998 \times 10^3 \text{ A}.$$

$$I = \frac{V_2}{R}$$

$$R = R_3 + R_4 + \frac{R_1 \times R_1}{R_1 + R_2} = 7k = 7 \times 10^3 \, \Omega$$

$$I = \frac{1.714}{7 \times 10^3} = 2.449 \times 10^{-4} \text{ A}.$$

Ans: $I_1 = I_2 = 8.571 \times 10^{-4}$ A.

$I = 1.714 \times 10^{-3}$ A

(8) ~~cont.~~

(4) ~~For figure 2:~~ Report : i) Tabular form.

For Figure 1 :

V_1 (V)	V_2 (V)	$V_1 + V_2$ (V)	I_1 (mA)	I_2 (mA)	I (mA)
8.571	~~1.714~~ 3.428	11.999	0.8571	0.8571	1.7142

For figure 2 :

V_1 (V)	V_2 (V)	V_3 (V)	V_4 (V)	V_5 (V)	V_6 (V)	$V_1+V_2+V_3+V_4+V_5+V_6$ (V)	I_1 (mA)	I_2 (mA)	
10.9983	1.007	0.92244	0.08456	0.076873	0.007687	13.091	1.0993	1.007	

I_3 (mA)	I_4 (mA)	I_5 (mA)	I_6 (mA)	I (mA)
92.244×10^{-3}	84.56×10^{-3}	7.687×10^{-3}	7.687×10^{-3}	2.2984

ii) Due to decimal places, accuracy is not obtained.

~~answered before.~~

(5) Discussion / Question

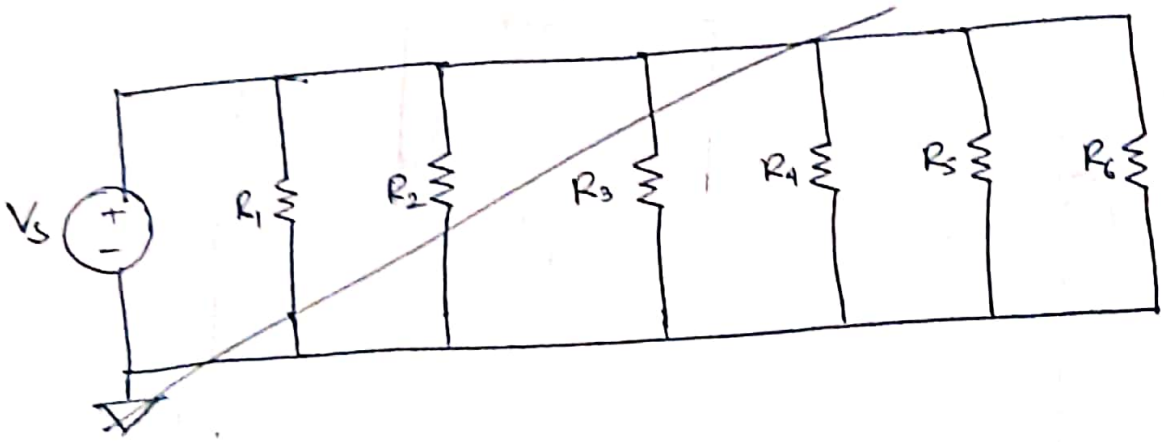
1) Voltage Source = 12

Calculated total Voltage = 13.09

i.e there are discrepancies.

2) $R_1 = R_2 = R_3 = R_4 = R_5 = R_6 = 100\ \Omega$

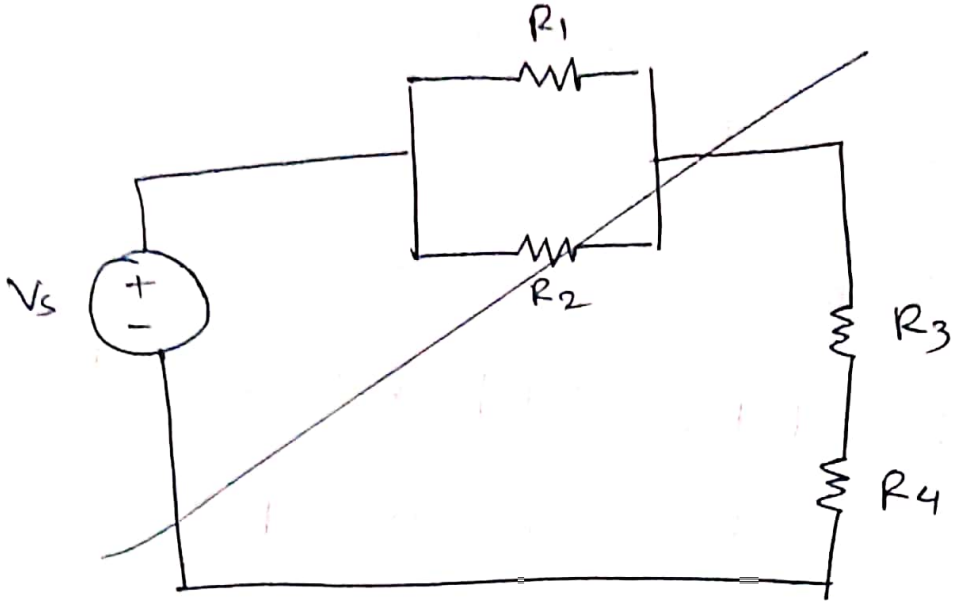
~~all in parallel~~.



3) $R_1 = R_2 = 1.5\ k\Omega = 1.5 \times 10^3\ \Omega$

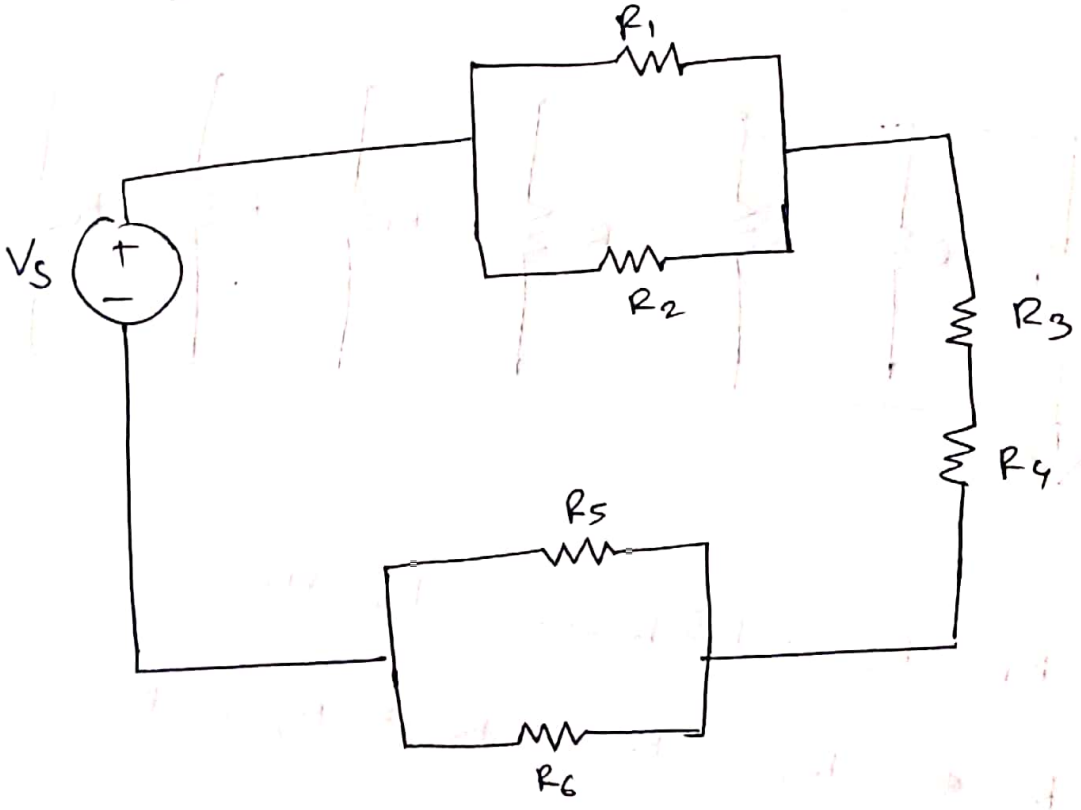
$R_3 = R_4 = R_5 = R_6 = R_7 = R_8 = 15\ k\Omega$

2)



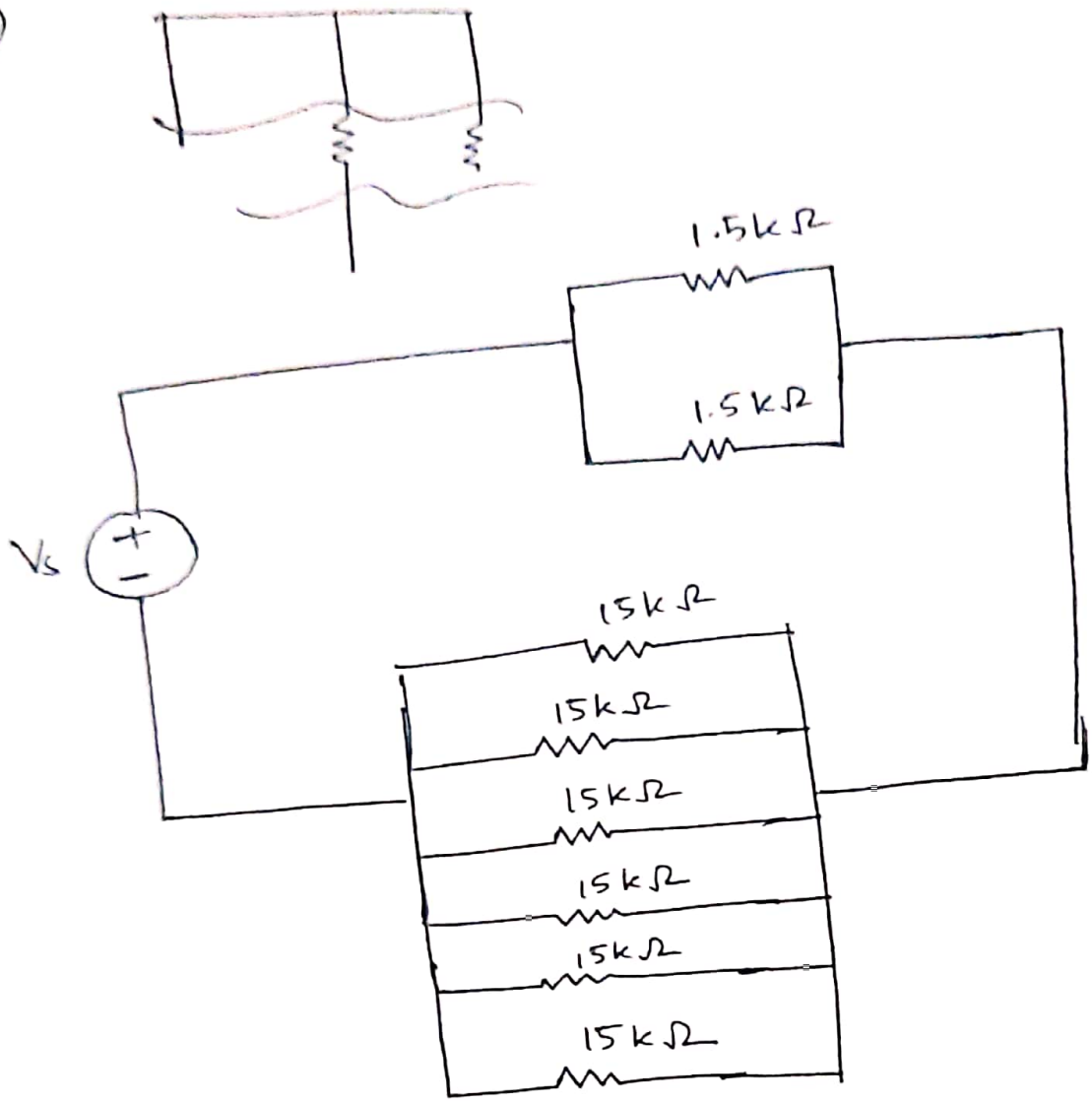
$$R = \left(\frac{100 \times 100}{100 + 100}\right) + 100 + 100 + \left(\frac{100 \times 100}{100 + 100}\right)$$

$$= 50 + 200 + 50 = 300$$



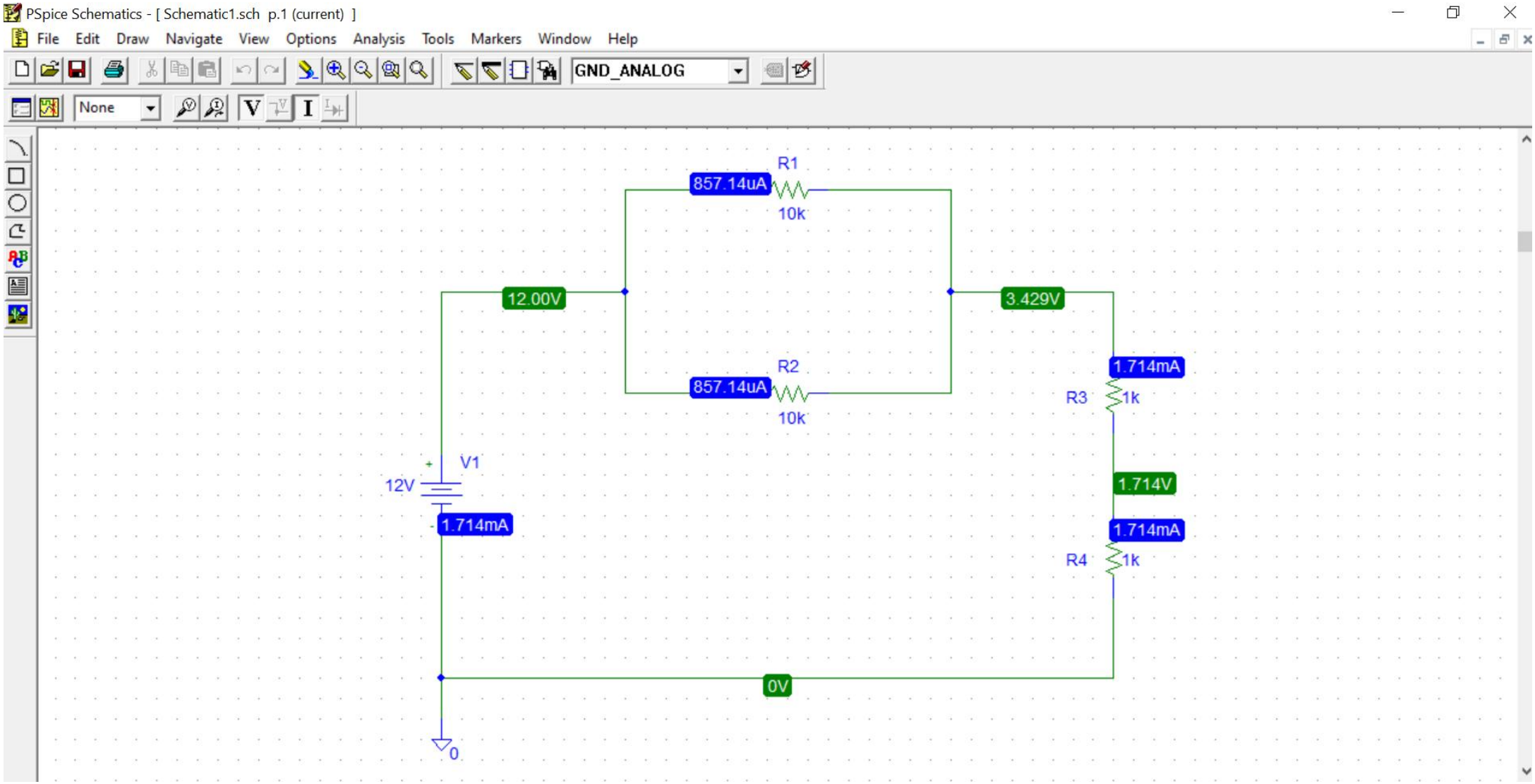
all parallel.

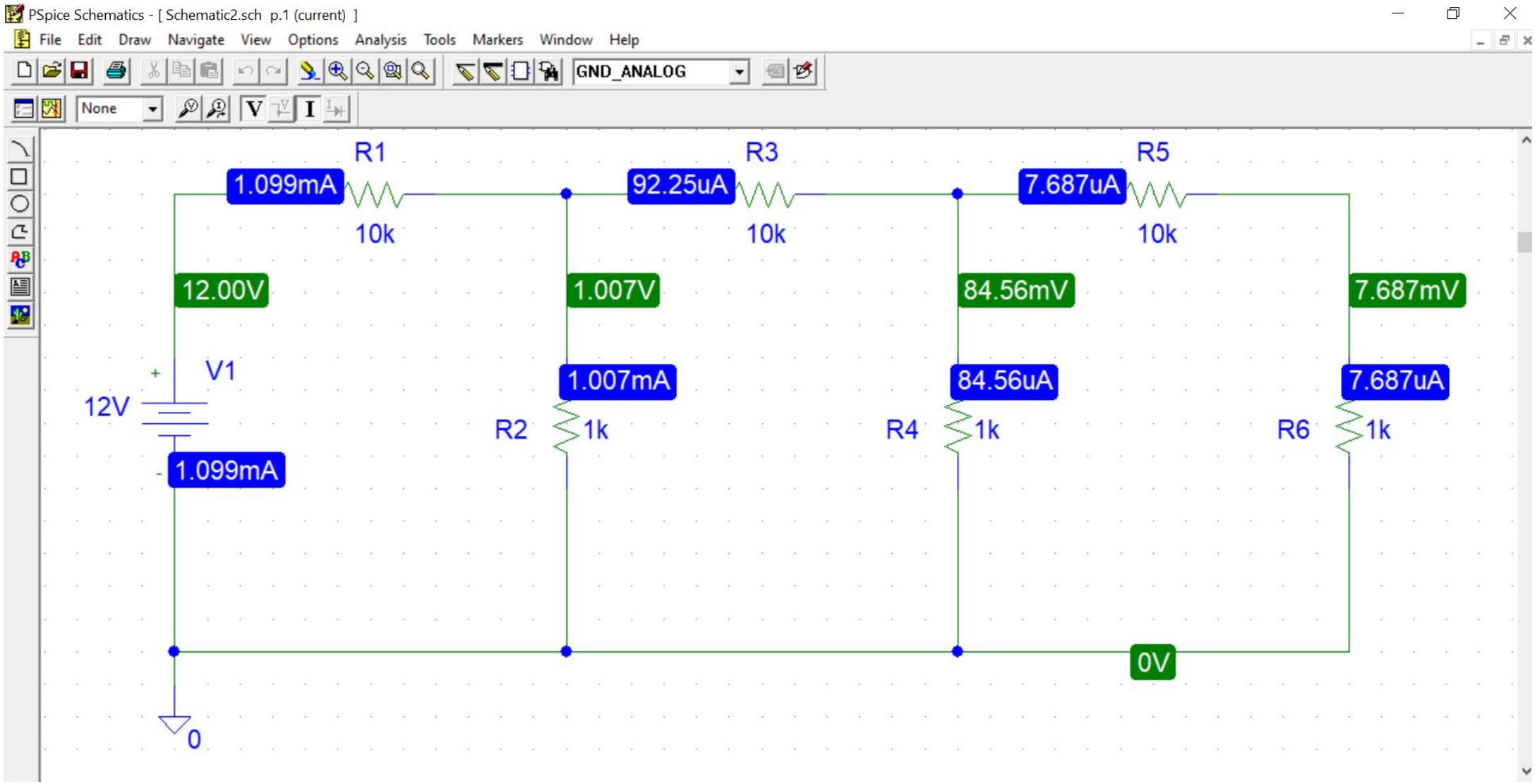
3)



Parallel: $\frac{15k}{6} = 2.5k$, $\frac{1.5k}{2} = 0.75k$

Series: $2.5k + 0.75k = 3.25k$.


PSpice Schematics - [Schematic1.sch p.1 (current)]
File Edit Draw Navigate View Options Analysis Tools Markers Window Help
GND_ANALOG
None
R1
857.14uA
10k
12.00V
3.429V
R2
857.14uA
10k
1.714mA
R3
1k
V1
12V
1.714V
1.714mA
1.714mA
R4
1k
0V
0


PSpice Schematics - [Schematic2.sch p.1 (current)]
File Edit Draw Navigate View Options Analysis Tools Markers Window Help
GND_ANALOG
None
R1
1.099mA
10k
R3
92.25uA
10k
R5
7.687uA
10k
12.00V
1.007V
84.56mV
7.687mV
V1
12V
1.007mA
84.56uA
7.687uA
R2
1k
R4
1k
R6
1k
1.099mA
0V
0