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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

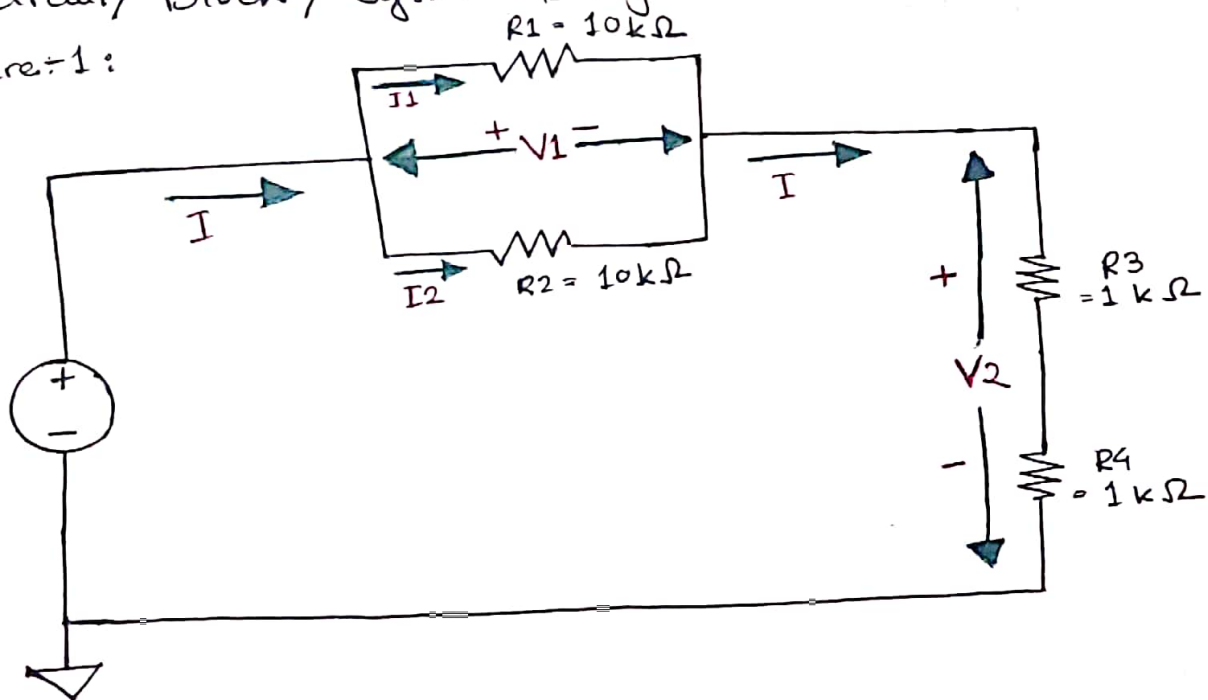
↳ Resistors

↳ Bread board / Trainer board

↳ Multimeter

③ Circuit/Block/System Diagram:

Figure-1:



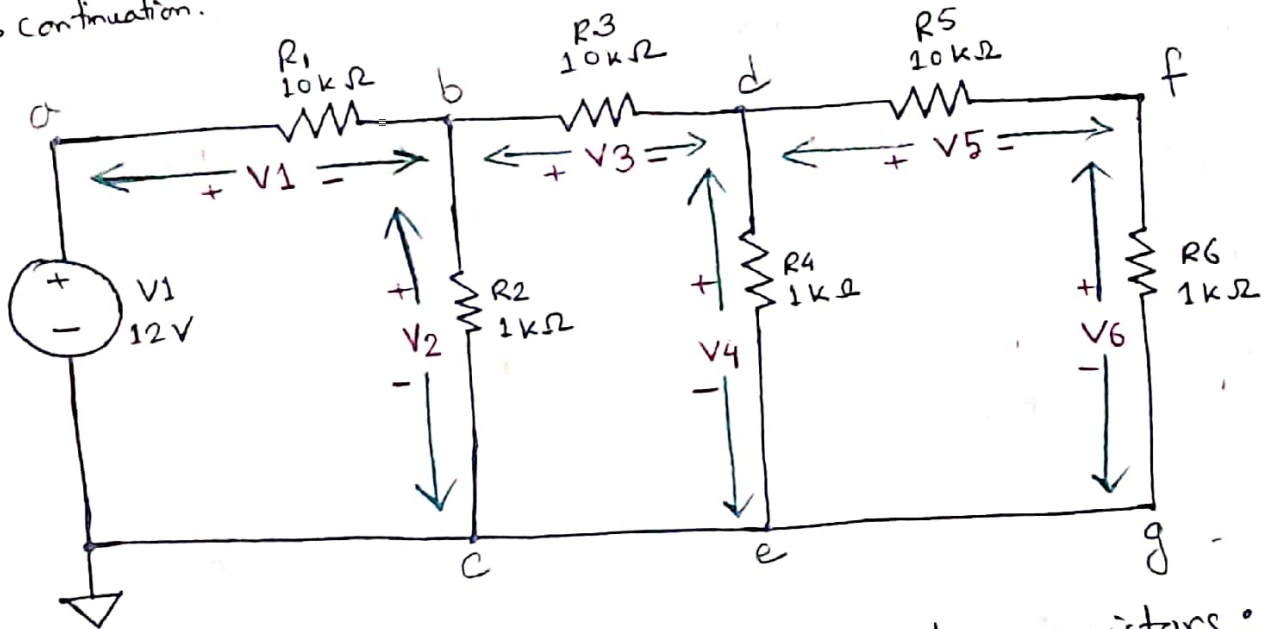
$$V_1 = (12 - 3.429) = 8.571$$

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

Figure 2:

(3)

(3) → continuation.



Measurement of voltages across the resistors:
 → from PSpice simulator.

$$V_1 = 12.00 \text{ V} - 1.007 \text{ V} = 10.993 \text{ V}$$

$$V_2 = 1.007 \text{ V}$$

$$V_3 = 1.007 \text{ V} - 0.08456 \text{ V} = 0.92244 \text{ V}$$

or $1.007 \text{ V} - 84.56 \text{ mV}$

$$V_4 = 0.08456 \text{ V} \text{ or } 84.56 \text{ mV}$$

$$V_5 = 84.56 \text{ mV} - 7.687 \text{ mV} = 76.873 \text{ mV}$$

or $0.08456 \text{ V} - 0.007687 \text{ V} = 0.076873 \text{ V}$

$$V_6 = 7.687 \text{ mV} \text{ or } 0.007687 \text{ V}$$

③ → Continuation.

In series, Current same.

$$V = IR$$

In parallel, voltage same.

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

For figure 2:

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

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

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

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

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

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

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

continuation.

$$V = IR$$

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

(5)

For Figure 1:

$$V_1 = 8.571 \text{ V} \quad , \quad V_2 = 1.714 \text{ V}.$$

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

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

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

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

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

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

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

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

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

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

cont.

③ For Figure 2: Report : i) Tabular Form.

④ 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:

$V_1 (V)$	$V_2 (V)$	$V_3 (V)$	$V_4 (V)$	$V_5 (V)$	$V_6 (V)$	$V_1 + V_2 + V_3 + V_4 + V_5 + V_6 (V)$	$I_1 (mA)$	$I_2 (mA)$	
10.9993	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.

~~1 answered before.~~

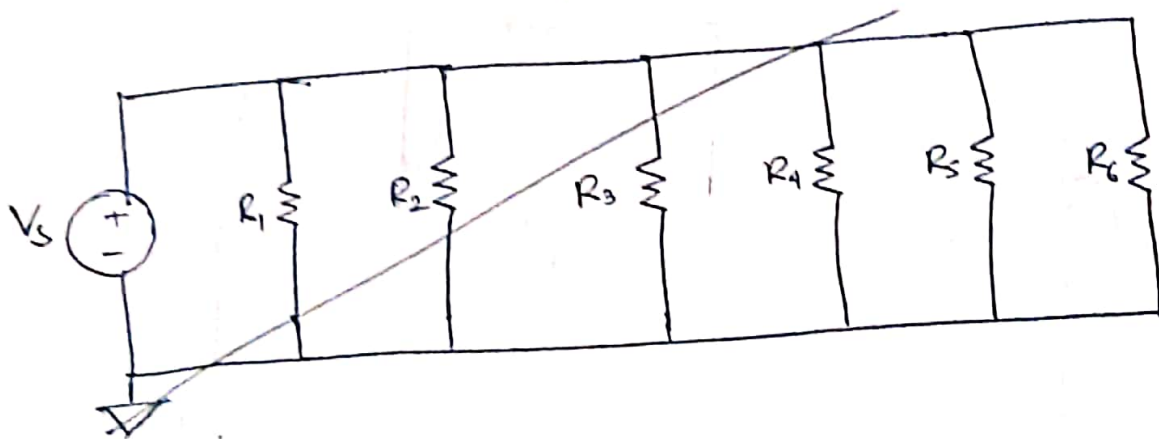
⑤ Discussion / Question

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.~~



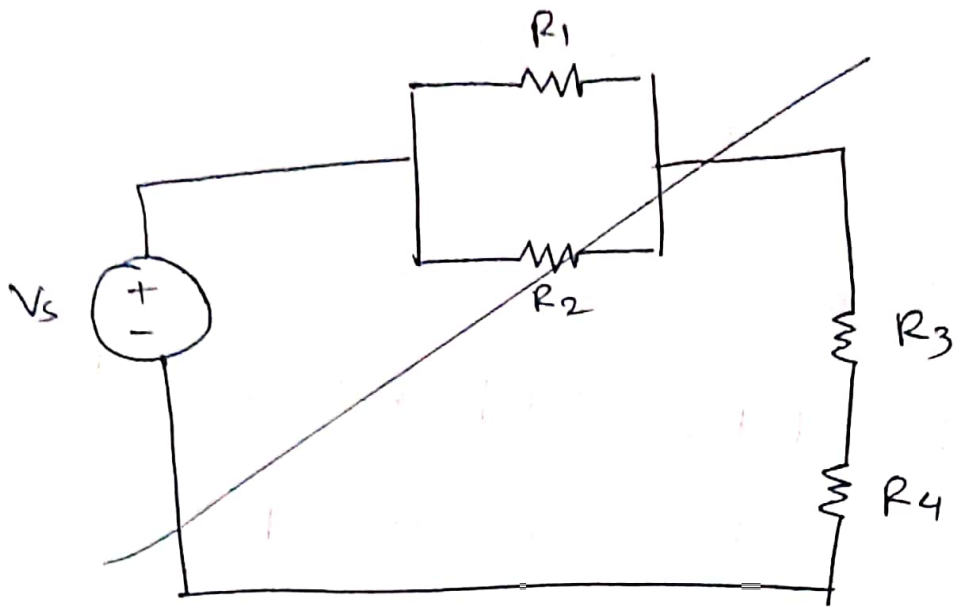
3) $R_1 = R_2 = 1.5 \text{ k} \Omega = 1.5 \times 10^3 \Omega$

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

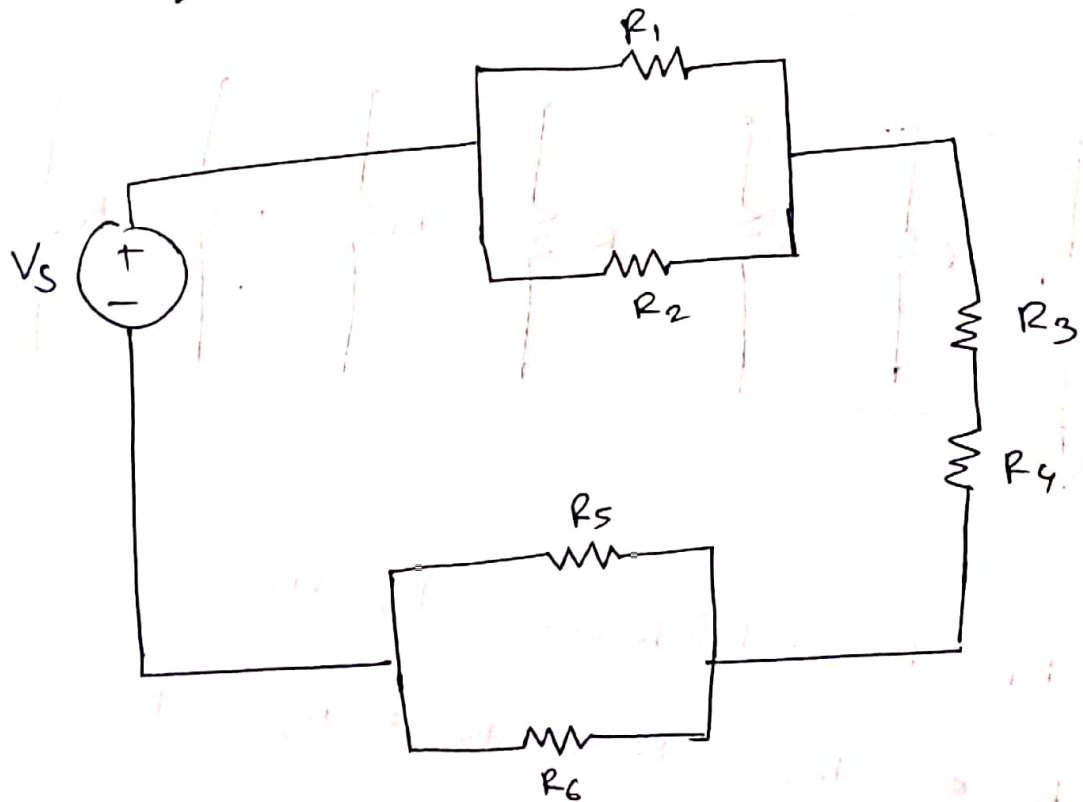
5) → Cont.

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2)



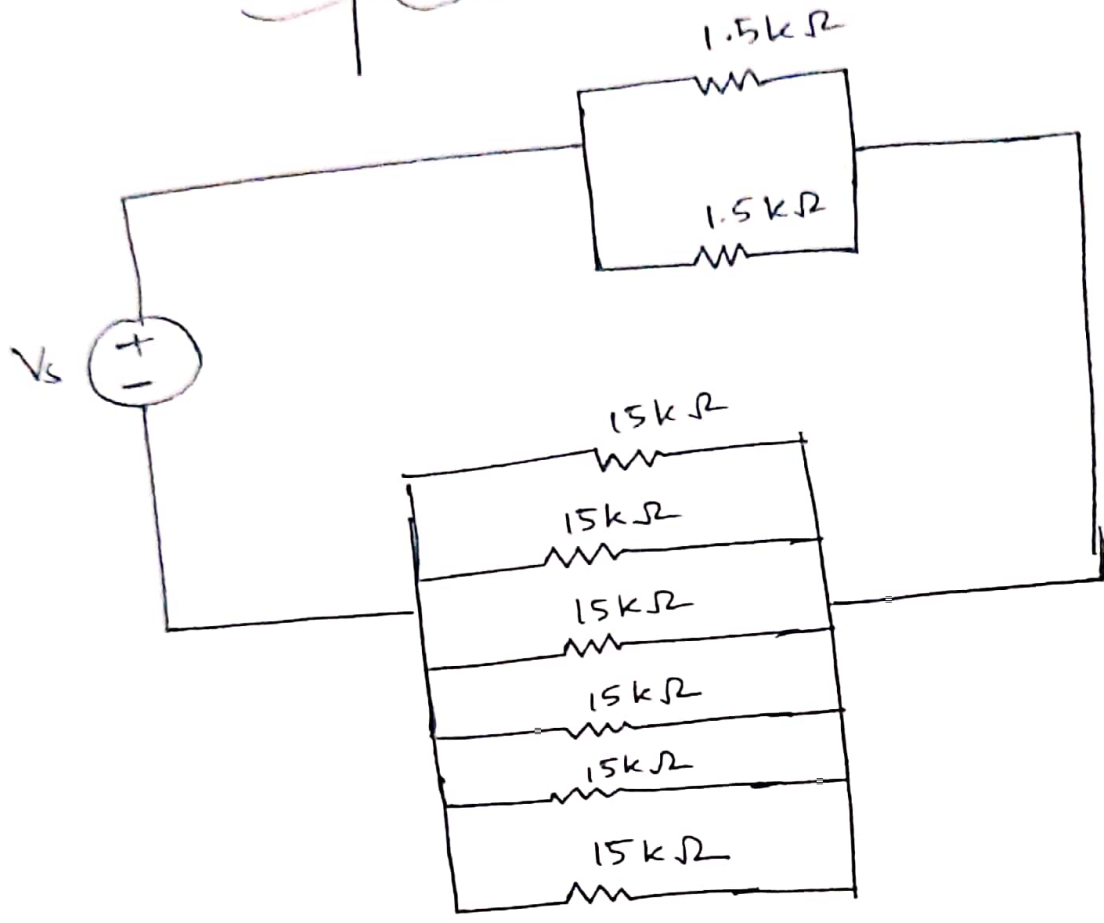
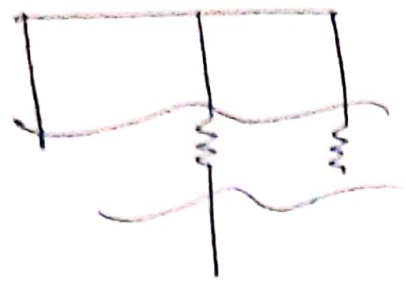
$$R = \left(\frac{100 \times 100}{100 + 100} \right) + 100 + 100 + \left(\frac{100 \times 100}{100 + 100} \right) \\ = 50 + 200 + 50 = 300$$



5) \rightarrow Cont.
3)

all parallel.

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

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