VIETNAM NATIONAL UNIVERSITY HO CHI MINH CITY
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY
FACULTY OF COMPUTER SCIENCE AND ENGINEERING

Course name h

Report type h

Report title h

Advisor(s):	Advisor h	
Student(s):	Student 1	ID 1
	Student 2	ID 2
	Student 3	ID 3

HO CHI MINH CITY, OCTOBER 2025

Contents

1 Report of lab 1 **4**

1.1 Exercise 1 4

1.1.1 Calculation 4

1.1.2 simulation 5

1.2 Exercise 2 6

1.2.1 Rearrange the circuit 6

1.2.2 Calculation 6

1.2.3 Simulation 7

1.3 Exercise 3 8

1.3.1 Rearrange the circuit 8

List of Figures

1.1 Find the voltage and the current in the given circuit using KVL 4

1.2 Simulation result of the circuit in Figure 1.1 5

1.3 Find the equivalent resistance between terminals A and F 6

1.4 Rearranged circuit 6

1.5 Simulation results 7

1.6 Find the whole-circuit equivalent resistance and the voltages at A, B, C, D, and E 8

List of Tables

Listings

1 Report of lab 1

In lab 1, there are 10 problems to be solved. In each problem, we need to solve it first by hand and then verify the result by using simulation tools. In this report, we will use PSpice for TI to verify our results.

1.1 Exercise 1

Given the following circuit. Calculate the value of the voltage v_0 and the current i. Then, simulate the circuit to check it out.

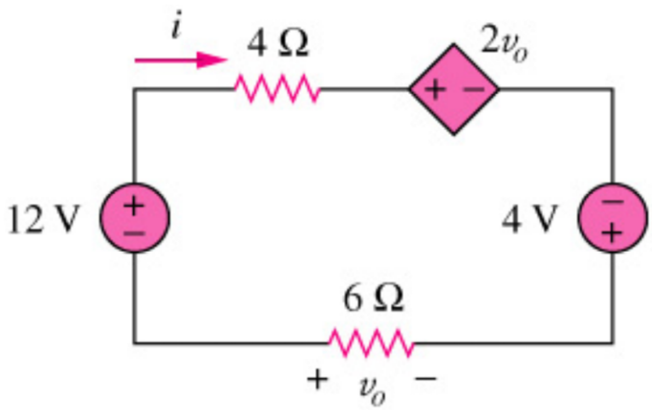


Figure 1.1: Find the voltage and the current in the given circuit using KVL

1.1.1 Calculation

Notes: *Explanations, formulas, and equations are expected rather than only results.*

According to the KVL (Kirchhoff's Voltage Law), we have the equations of the loops as follows:

$$12 - 0 = 4i + 2v_0 - 4 + 6i \tag{1.1}$$

According to the Ohm's Law, we have:

$$i = \frac{-v_0}{6} \tag{1.2}$$

From (1) and (2), we have:

$$12 = 4\left(\frac{-v_0}{6}\right) + 2v_0 - 4 + 6\left(\frac{-v_0}{6}\right) \Rightarrow v_0 = 48(V)$$

By substituting $v_0 = 48$ into (2), we have: $i = \dfrac{-48}{6} = -8(A)$

1.1.2 simulation

After redrawing the circuit in PSpice for TI, and run then simulation, we have the results as follows:

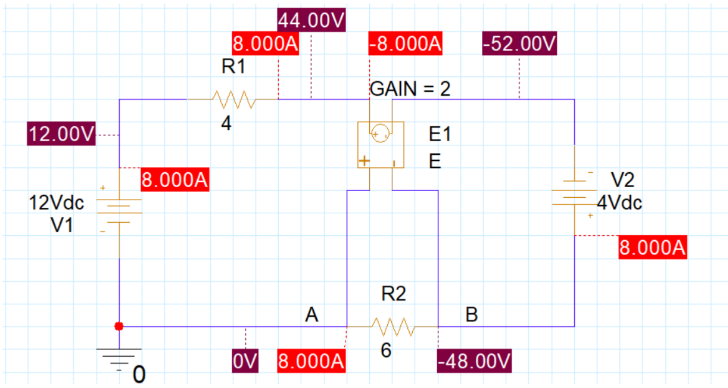


Figure 1.2: Simulation result of the circuit in Figure 1.1

Let A and B be the nodes across the voltage source v_0. From the simulation result in Figure 1.2, we have:

$$\begin{cases} v_0 = V_A - V_B = 48(V) \\ i = I = -8(A) \end{cases}$$

Even though the current i has a negative value, it is still correct because the direction of the current in the simulation is opposite to the assumed direction in the calculation.

Conclusion: The result of PSpice simulation matches the result of the calculation. Therefore, the calculation is correct.

1.2 Exercise 2

Given the following circuit, students rearrange the circuit to clarify its serial and/or parallel topology. Then, apply the knowledge you've learned to find the equivalent resistance value between two circuit terminals A and F. Finally, perform the simulation to check if the current through the whole circuit is correctly calculated.

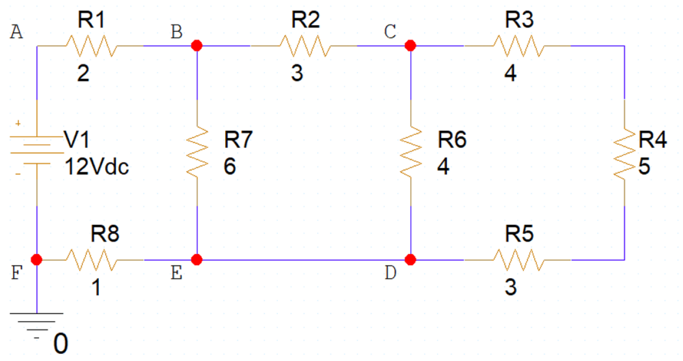


Figure 1.3: Find the equivalent resistance between terminals A and F

1.2.1 Rearrange the circuit

By extending wire between nodes B and E, we have the following rearranged circuit:

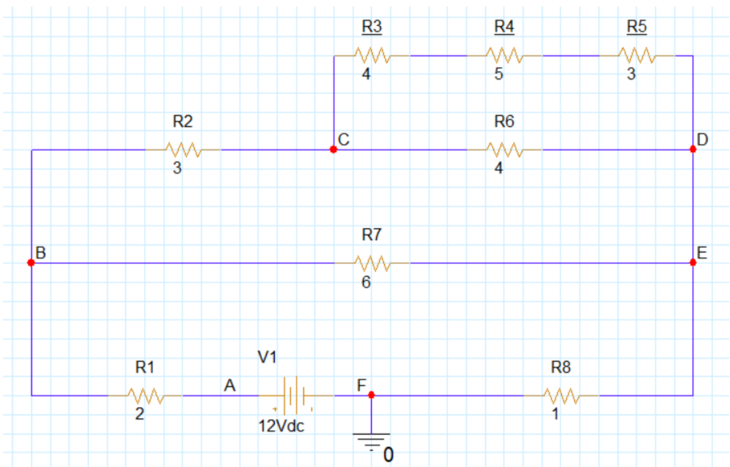


Figure 1.4: Rearranged circuit

1.2.2 Calculation

Convention: *The equivalent resistance between the two terminals A and B of a circuit segment containing only R1, R2, R3, and R4 may be named* R_{AB_1234}.

Belong to the rearranged circuit, we have: $R6 \parallel (R3 + R4 + R5)$. Thus, we calculate the equivalent resistance R_{CD_3456} as follows:

$$R_{CD\_3456} = \frac{1}{\dfrac{1}{R_6} + \dfrac{1}{R_3 + R_4 + R_5}} = \frac{1}{\dfrac{1}{4} + \dfrac{1}{4 + 5 + 3}} = 3(\Omega)$$

Next, looking at the circuit between B and E, we have: $R7 \parallel (R2 + R_{CD\_3456})$. Thus, we calculate the equivalent resistance R_{BE} as follows:

$$R_{BE} = \frac{1}{\dfrac{1}{R_7} + \dfrac{1}{R_2 + R_{CD\_3456}}} = \frac{1}{\dfrac{1}{6} + \dfrac{1}{3 + 3}} = \frac{1}{\dfrac{1}{2} + \dfrac{1}{6}} = 3(\Omega)$$

Now move to A and F, we have: $R1 + R_{BE} + R8$. Thus, we calculate the equivalent resistance R_{AF} as follows:

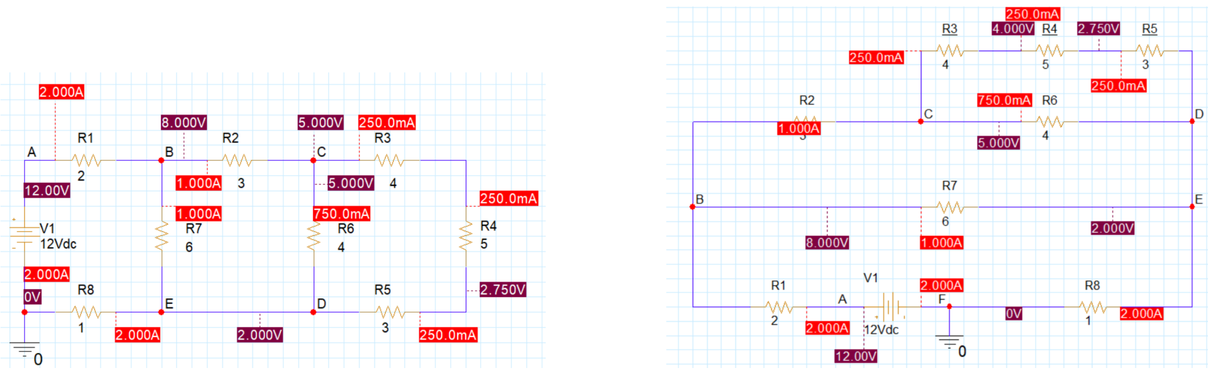
$$R_{AF} = R_1 + R_{BE} + R_8 = 1 + 3 + 2 = 6(\Omega)$$

By applying Ohm's law, we can find the current I_{AB} through the whole circuit:

$$I_{AB} = I = \frac{U}{R_{AF}} = \frac{12}{6} = 2(A)$$

1.2.3 Simulation

To verify the calculation above, we did perform the simulation twice: first, for original circuit; second, for rearranged circuit. The results are as follows:



(a) Simulation for original circuit

(b) Simulation for rearranged circuit

Figure 1.5: Simulation results

As shown, the value of current I and voltage V between corresponding terminals in both simulations are the same. Thus, our calculation and rearrangement are correct.

1.3 Exercise 3

Given the following circuit, students rearrange the circuit to clarify its serial and/or parallel topology. Next, apply the knowledge you've learned to find the equivalent resistance value between two circuit terminals A and F, the voltage values at A, B, C, D, and E. Finally, perform the simulation to check your calculation.

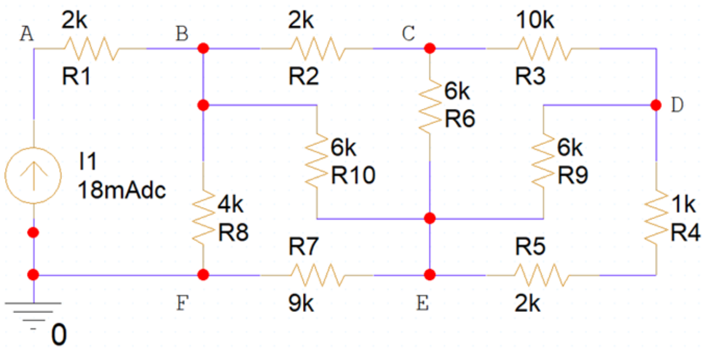


Figure 1.6: Find the whole-circuit equivalent resistance and the voltages at A, B, C, D, and E

1.3.1 Rearrange the circuit

By drawing a wire with current source $I1$, A, B, C, D, and E, we can clarify the circuit topology. As follows:

References

[1] Donald E. Knuth. Literate programming. *The Computer Journal*, 27(2):97–111, 1984.

[2] Donald E. Knuth. *The TEX Book*. Addison-Wesley Professional, 1986.

[3] Leslie Lamport. *LATEX: a Document Preparation System*. Addison Wesley, Massachusetts, 2 edition, 1994.

[4] Michael Lesk and Brian Kernighan. Computer typesetting of technical journals on UNIX. In *Proceedings of American Federation of Information Processing Societies: 1977 National Computer Conference*, pages 879–888, Dallas, Texas, 1977.

[5] Frank Mittelbach, Michel Gossens, Johannes Braams, David Carlisle, and Chris Rowley. *The LATEX Companion*. Addison-Wesley Professional, 2 edition, 2004.