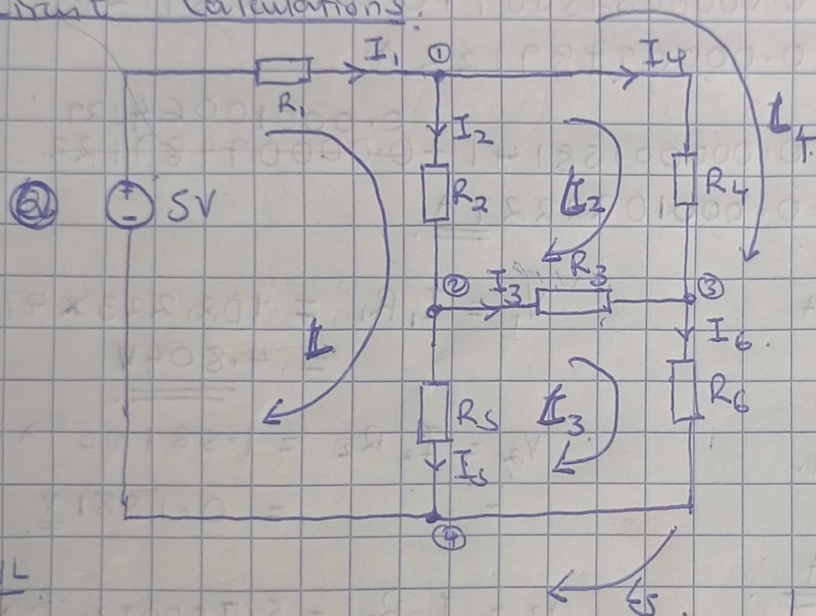


A \rightarrow Resistor	A \Rightarrow	47×10^3	$= 47,000 \Omega$	Tolerance $= \pm 5\%$
	B \Rightarrow	10×10^5	$= 100,000 \Omega$	Tolerance $= \pm 10\%$
	C \Rightarrow	10×10^3	$= 10,000 \Omega$	Tolerance $= \pm 10\%$
	D \Rightarrow	10×10^2	$= 1,000 \Omega$	Tolerance $= \pm 5\%$
	E \Rightarrow	10×10^2	$= 1,000 \Omega$	Tolerance $= \pm 5\%$
	F \Rightarrow	51×10^2	$= 5,100 \Omega$	Tolerance $= \pm 5\%$

Circuit Calculations



By KVL

$$\begin{aligned}
 I_1 R_1 + I_2 R_2 + I_5 R_5 &= 5 \\
 I_4 R_4 - I_3 R_3 - I_2 R_2 &= 0 \\
 I_6 R_6 - I_5 R_5 + I_3 R_3 &= 0 \\
 I_1 R_1 + I_4 R_4 + I_6 R_6 &= 5 \\
 I_4 R_4 + I_6 R_6 - I_5 R_5 - I_2 R_2 &= 0
 \end{aligned}$$

Solution

$$\begin{aligned}
 R_6 [I_3 + I_4] - I_5 R_5 + I_3 R_3 &= 0 \\
 I_3 R_6 + I_4 R_6 - I_5 R_5 + I_3 R_3 &= 0 \\
 (R_3 + R_6) I_3 + I_4 R_6 - I_5 R_5 &= 0 \quad \text{--- (1)}
 \end{aligned}$$

$$\begin{aligned}
 (I_2 + I_4) R_1 + I_2 R_2 + I_5 R_5 &= 5 \\
 I_2 R_1 + I_4 R_1 + I_2 R_2 + I_5 R_5 &= 5 \\
 (R_1 + R_2) I_2 + I_4 R_1 + I_5 R_5 &= 5 \\
 (R_1 + R_2) [I_3 + I_4] + I_4 R_1 + I_5 R_5 &= 5 \\
 R_1 I_3 + R_2 I_3 + I_5 R_1 + I_5 R_2 + I_4 R_1 + I_5 R_5 &= 5 \\
 (R_1 + R_2) I_3 + I_4 R_1 + (R_1 + R_2 + R_5) I_5 &= 5 \quad \text{--- (2)}
 \end{aligned}$$

By KCL

$$\begin{aligned}
 I_1 &= I_2 + I_4 \\
 I_2 &= I_3 + I_5 \\
 I_6 &= I_3 + I_4 \\
 I_1 &= I_5 + I_6
 \end{aligned}$$

$$(I_3 + I_4) R_6 - I_5 R_5 + I_3 R_3 = 0$$

$$(R_3 + R_6) I_3 + I_4 R_6 - I_5 R_5 = 0 \quad \text{--- (3)}$$

$$\begin{aligned}
 11000 I_3 + 1000 I_4 - 5100 I_5 &= 0 \\
 147000 I_3 + 47000 I_4 + 52100 I_5 &= 5 \\
 11000 I_3 + 1000 I_4 - 5100 I_5 &= 0
 \end{aligned}$$

$$(I_2 + I_4) R_1 + I_4 R_4 + (I_3 + I_4) R_6 = 5$$

$$I_2 R_1 + (R_4 + R_1) I_4 + I_3 R_6 = 5$$

$$(I_3 + I_5) R_1 + (R_4 + R_1 + R_6) I_4 + I_3 R_6 = 5$$

$$\begin{aligned}
 (R_1 + R_6) I_3 + (R_4 + R_1 + R_6) I_4 + I_5 R_1 &= 5 \\
 48000 I_3 + 49000 I_4 + 47000 I_5 &= 5
 \end{aligned}$$

$$11000 I_3 + 1000 I_4 - 5100 I_5 = 0$$

$$147000 I_3 + 47000 I_4 + 152100 I_5 = 5$$

$$48000 I_3 + 49000 I_4 + 47000 I_5 = 5$$

$$\begin{bmatrix} 11000 & 1000 & -5100 \\ 147000 & 47000 & 152100 \\ 48000 & 49000 & 47000 \end{bmatrix} \begin{bmatrix} I_3 \\ I_4 \\ I_5 \end{bmatrix} = \begin{bmatrix} 0 \\ 5 \\ 5 \end{bmatrix}$$

$$I_3 = -0.00000575007 \text{ A}$$

$$I_4 = 0.00010064129 \text{ A}$$

$$I_5 = 0.00000733148 \text{ A}$$

$$I_2 = -0.00000575007 + 0.00000733148 \\ = 0.00000158141 \text{ A}$$

$$I_6 = -0.00000575007 + 0.00010064129 \\ = 0.00009489122 \text{ A}$$

$$I_1 = 0.00000158141 + 0.00010064129 \\ = 0.0001022227 \text{ A}$$

$$I_1 = 102.223 \text{ mA}$$

$$I_2 = 1.581 \text{ mA}$$

$$I_3 = -5.75007 \text{ mA}$$

$$I_4 = 100.641 \text{ mA}$$

$$I_5 = 7.332 \text{ mA}$$

$$I_6 = 94.891 \text{ mA}$$

$$V_1 = I_1 R_1 = 102.223 \times 47000 \times 10^{-6} \\ = 4.804 \text{ V}$$

$$V_2 = I_2 R_2 = 1.581 \times 10^{-3} \times 100,000 \\ = 0.1581 \text{ V}$$

$$V_3 = I_3 R_3 = -5.75007 \times 10^{-3} \times 10,000 \\ = -0.0575 \text{ V}$$

$$V_4 = I_4 R_4 = 100.641 \times 10^{-3} \times 1000 \\ = 0.100641 \text{ V}$$

$$V_5 = I_5 R_5 = 7.332 \times 10^{-3} \times 5.1 \times 10^3 \\ = 0.0373932 \text{ V}$$

$$V_6 = I_6 R_6 = 94.891 \times 10^{-3} \times 1000 \\ = 0.094891 \text{ V}$$

Design the circuit ✓

1) Current ^{and voltage} ~~over~~ through resistor C $\Rightarrow R_3 =$

$$V_3 = 0.069 \underline{\underline{V}} \quad I_3 = 6.4 \underline{\underline{\mu A}}$$

2) Resistor D $\Rightarrow R_4$

$$V_4 = 0.089 \underline{\underline{V}} \quad I_4 = 70.2 \underline{\underline{\mu A}}$$

No they are not similar because of errors during measurements.