Exercício 4.

Determine a diferença de potencial aos terminais da resistência R da figura 4

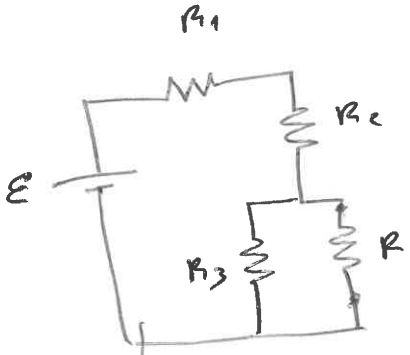
Considere $R_1 = 1\,k\Omega$

$R_2 = 500\,\Omega$

$R_3 = 1,2\,k\Omega$

$R = 800\,\Omega$

$\mathcal{E} = 25\,V$



$$d.d.p = U = V_A - V_B = \frac{T_{AB}}{q}$$

Ohm

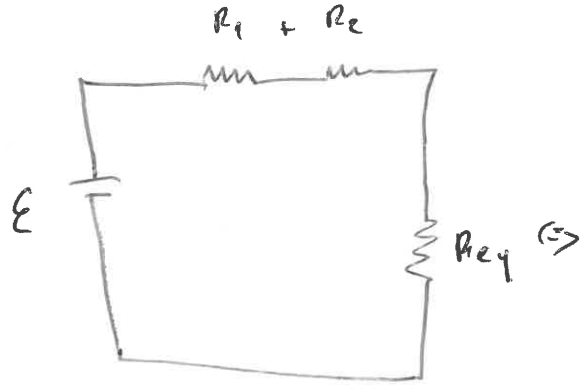
$V = R \cdot i$

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

$i = \frac{V}{R_1 + R_2}$

$i = \frac{25}{1 + 500}$

~~$i = 16,66\,A$~~



$R_{eq_{total}} = \begin{cases} R_{eq1} = 1500 \\ + R_{eq} = 480 \end{cases} = 1980\,\Omega$

$V = 1,5 \times 16,66 = 24,99$

$\frac{1}{R_{eq}} = \frac{1}{R} + \frac{1}{R_3} \Leftrightarrow \frac{1}{R_{eq}} = \frac{R_b + R_a}{R_a R_b}$

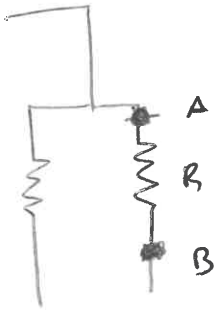
$\frac{1}{R_{eq}} = \frac{1}{1,2} + \frac{1}{800} = 0,83 + 1,25 = 1,04$

$R_{eq} = \frac{R_a R_b}{R_a + R_B} = \frac{800 \times 1200}{200 * 1200} = 480\,\Omega$

$V = 0,52 \times 16,66 \approx 8,6$

$V = R \cdot I$

$\mathcal{E} = R_{eq} I \iff I = \frac{\mathcal{E}}{R_{eq}} = \frac{25}{1980} = 1,26 \times 10^{-2}$

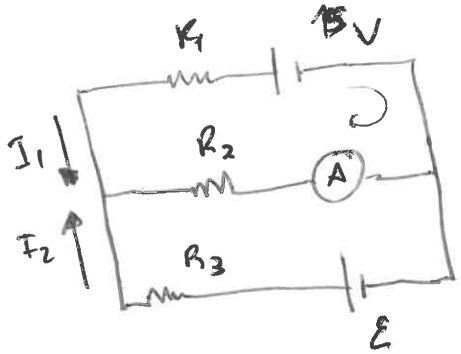


$V_{AB} = R_{eq_R} I = 480 \times 1,26 \times 10^{-2} = 6,06\,[V]$

Exercício 7

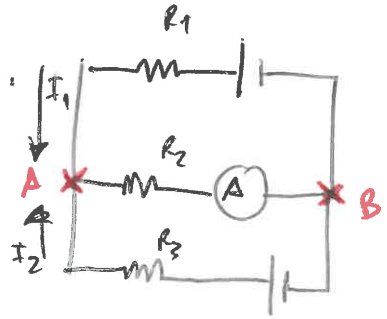
O Amperímetro representado indica 2A.

Sabendo que $R_1 = 7\Omega$, $R_2 = 5\Omega$ e $R_3 = 2\Omega$ determine I_1, I_2 e $\mathcal{E}$



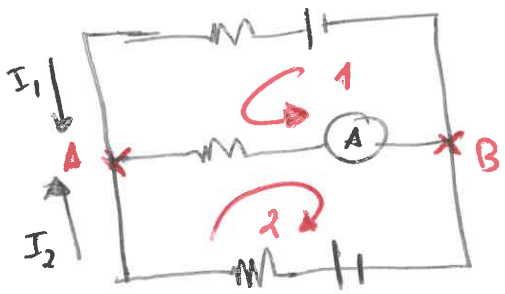
Lei das Kirchoff

Lei dos Nós



Ⓐ: $I_1 + I_2 = I_3$

Lei das Malhas



Amperímetro = 2A = I_3

Começar no Ponto A

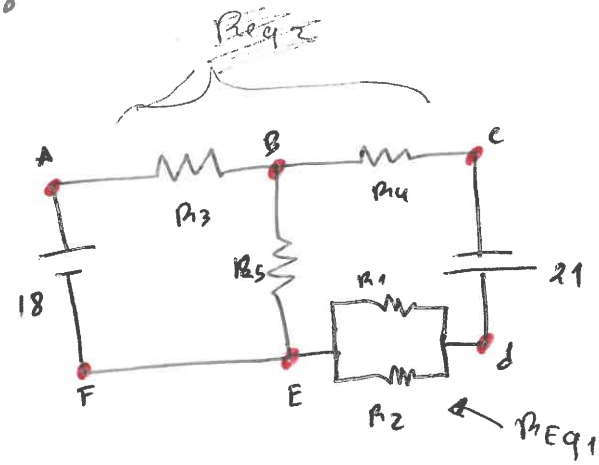
negativo porque houve queda de Tensão

Malha 1: $R_2 I_3 - 15 + R_1 I_1 = 0$

Malha 2: $R_2 I_3 - \mathcal{E} + R_2 I_2 = 0$

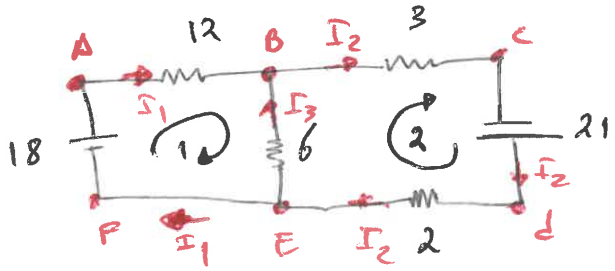
$$\begin{cases} I_1 = 2 - I_2 \\ 5\times 2 - 15 + 7 I_1 = 0 \\ \mathcal{E} = 5\times 2 + 2 I_2 \end{cases} \Leftrightarrow \begin{cases} I_2 = 2 - I_1 \\ I_1 = \frac{5}{7}\,[A] \\ \mathcal{E} = 5\times 2 + 2 I_2 \end{cases} \Leftrightarrow \begin{cases} I_2 = 2 - \frac{5}{7} = 1{,}3\ A \\ I_1 = \frac{5}{7}\,[A] \\ \mathcal{E} = 10 + 2\times 1{,}3 = 13{,}6\,[V] \end{cases}$$

Exercício 8

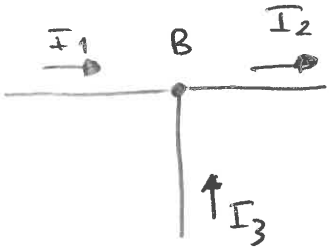


$R_1 = 3.0\ \Omega$
$R_2 = 6.0\ \Omega$
$R_3 = 12\ \Omega$
$R_4 = 3.0\ \Omega$
$R_5 = 6.0\ \Omega$

$$Req_1 = \frac{R_1 R_2}{R_1 + R_2} = 2\,[\Omega]$$



Lei dos Nós



$B = I_1 + I_3 = I_2$

Lei das Malhas

Ponto A

Malha 1: $R_3 I_1 - R_5 I_3 - 18 = 0$

Malha 2: $R_4 I_2 - 21 + R_{eq} I_2 + R_5 I_3 = 0$

Ponto B

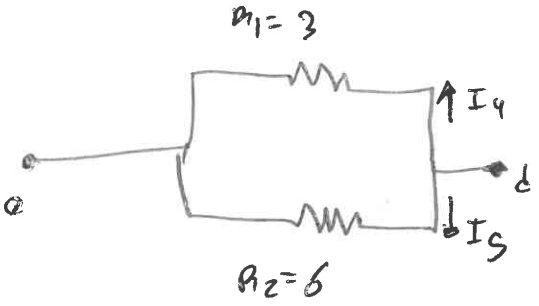
$$\begin{cases} I_1 + I_3 = I_2 \\ R_3 I_1 - R_5 I_3 - 18 = 0 \\ R_4 I_2 - 21 + R_{eq} I_2 + S_5 I_3 = 0 \end{cases} \Leftrightarrow \begin{cases} I_2 = I_1 + I_3 \\ 12 I_1 - 6 I_3 = 18 \\ 3(I_1 + I_3) + 2(I_1 + I_3) + 6 I_3 = 21 \end{cases}$$

$$\begin{cases} 12 I_1 - 6 I_3 = 18 \\ \hline \end{cases} \quad \begin{cases} \hline \\ 5 I_1 - I_3 = 3 \\ 5(I_1 + I_3) + 6 I_3 = 21 \end{cases} \quad \begin{cases} \hline \\ I_3 = 2 I_1 - 3 \\ 5 I_1 + 11 I_3 = 21 \end{cases}$$

$$\begin{cases} \\ \\ 5I_1 + 11(2I_1 - 3) = 21 \end{cases} \quad \begin{cases} \\ \\ 27I_1 = 54 \end{cases} \quad \begin{cases} \\ \\ I_1 = \frac{54}{27} = 2 \end{cases}$$

$$\begin{cases} \\ I_3 = 2\times(2) - 3 = 1 \\ I_1 = 2 \end{cases} \Leftrightarrow \begin{cases} I_2 = 2+1 \\ I_3 = 1 \\ I_1 = 2 \end{cases} \Leftrightarrow \begin{cases} I_2 = 3 \text{ A} \\ I_3 = 1 \text{ A} \\ I_1 = 2 \text{ A} \end{cases}$$

$$V_{de} = R_{eq_1} I_2 = 2\times 3 = 6\text{V}$$



$$V_{de} = R_1 I_4 \Leftrightarrow I_4 = \frac{V_{de}}{R_1} \Leftrightarrow I_4 = \frac{6}{3} = 2\ [A]$$

$$V_{de} = R_2 I_5 \quad I_5 = \frac{V_{de}}{R_2} \quad I_5 = \frac{6}{6} = 1\ [A]$$

8.2: d.dp em ABC

$$V_{ac} = V_{ab} + V_{bc}$$

$$= R_3 I_1 + R_4 I_2$$

$$V_{ac} = 12 \times 2 + 3 \times 3 = 24 + 9 = 33\,V$$

8.3 Resistência dissipada na resistência de 12 Ω

↳ Potência dissipada

$12\,\Omega = R_3$

$$P = VI = (RI) \times I = RI^2$$

$$P(R_3) = 12 \times 2^2 \Rightarrow P(R_3) = 12 \times 2^2 = 48\,[W] \text{ ou } J/s$$