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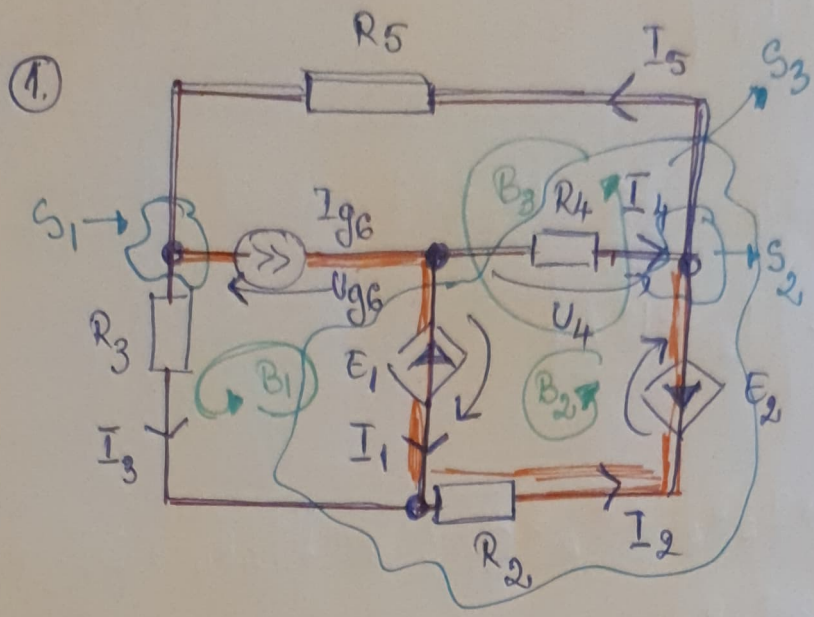
① 

$E_1 = 3I_3$

$R_2 = 5\Omega$, $R_3 = 8\Omega$

$R_4 = 2\Omega$, $R_5 = 3\Omega$

a) Rezolvați circuitul aplicând Kirchhoff.

b) Bilanțul puterilor.

a) $N = 4$, $L = 6$

I Kirchhoff: $N-1 = 3$ noduri (arbore)

II Kirchhoff: $L-N+1 = 6-4+1 = 3$ laturi (coarbore)

(S_1): $-I_5 + I_{g6} + I_3 = 0 \Rightarrow I_3 - I_5 = -6 \Rightarrow \boxed{I_3 = -6 + I_5}$

(S_2): $I_5 - I_2 - I_4 = 0$

(S_3): $-I_4 - I_1 + I_5 = 0$ $\Rightarrow I_1 - I_2 = 0 \Rightarrow \boxed{I_1 = I_2}$

(B_1): $U_{g6} + I_3R_3 - E_1 = 0 \Rightarrow U_{g6} = 8I_3 - 3I_3 = 5I_3 \Rightarrow$

$\Rightarrow \boxed{U_{g6} = 5I_3}$

(B_2): ~~U_4~~ $- I_4R_4 + E_1 + I_2R_2 + E_2 = 0$

(B_3): $I_5R_5 - U_{g6} + E_1 + R_2I_2 + E_2 = 0$ $(-)$

$-I_4R_4 + I_5R_5 + U_{g6} = 0 \Rightarrow -2I_4 - 3I_5 + 5I_3 = 0$

$-2I_4 - 3I_5 + 30 + 5I_5 = 0$

$-2I_4 = -30 - 2I_5 \Rightarrow$

$\Rightarrow \boxed{I_4 = +15 + I_5}$

$I_1 = I_5 - I_4 = I_5 - 15 - I_5 = -15 \Rightarrow \boxed{I_1 = -15A}$

$I_1 = I_2 \Rightarrow \boxed{I_2 = -15A}$

$-I_4R_4 + \mathcal{E}_1 + I_2R_2 + \mathcal{E}_2 = 0 \Rightarrow 2I_4R_4 + 3I_3 + 5I_2 = 0 \Rightarrow$

$\mathcal{E}_2 = 3U_4 = 3I_4R_4$

$\Rightarrow 4I_4 + 3I_3 = 75 \Rightarrow 4(15 + I_5) + 3(-6 + I_5) = 75 \Rightarrow$

$\Rightarrow 60 + 4I_5 + 18 + 3I_5 = 75 \Rightarrow 7I_5 = 75 \Rightarrow$

~~$\Rightarrow 7I_5 = -3 \Rightarrow I_5 = -\frac{3}{7} A$~~ $\boxed{I_5 = 33A}$

$I_4 = 15 + I_5 = 15 - \frac{3}{7} = \frac{105 - 3}{7} = \frac{102}{7} A \Rightarrow$

$\Rightarrow I_4 = \frac{102}{7} A \quad \boxed{I_4 = 48A}$

$I_3 = 6 + I_5 = 6 - \frac{3}{7} = \frac{39}{7} A \Rightarrow I_3 = \frac{39}{7} A$

$U_{g6} = 5I_3 = 5 \cdot \frac{39}{7} = \frac{194}{7} V \quad \mathcal{E}_2 = 3I_4R_4 = 6 \cdot \frac{102}{7} A =$

$\mathcal{E}_1 = 3I_3 = 3 \cdot \frac{39}{7} = \frac{117}{7} V \quad = \frac{612}{7} A.$

b) $P_g = \mathcal{E}_2 I_2 + U_{gG} I_{gG} + \mathcal{E}_1 I_1$

$P_c = R_2 I_2^2 + R_3 I_3^2 + R_4 I_4^2 + R_5 I_5^2$

$P_g = \frac{612}{7} \cdot (-15) + \frac{194}{7} \cdot 6 + \frac{117}{7} \cdot (-15) =$

$= (-15)\left(\frac{612}{7} + \frac{117}{7}\right) + \frac{1164}{7} = \frac{729}{7} \cdot (-15) + \frac{1164}{7} =$

$= \frac{-10935}{7} + \frac{1164}{7} =$

a) $I_3 = -6 + I_5 = -6 + 33 = 27\,A \Rightarrow \boxed{I_3 = 27\,A}$

$U_{gG} = 5 I_3 = 5 \cdot 27 = 135\,V \Rightarrow \boxed{U_{gG} = 135\,V}$

$\mathcal{E}_1 = 3 I_3 = 3 \cdot 27 = 81\,V \Rightarrow \boxed{\mathcal{E}_1 = 81\,V}$

$\mathcal{E}_2 = 3 U_4 = 3 I_4 R_4 = 3 \cdot 2 \cdot 48 = 6 \cdot 48 \Rightarrow \boxed{\mathcal{E}_2 = 288\,V}$.

729 · 15 / 3645 / 729 / 10935