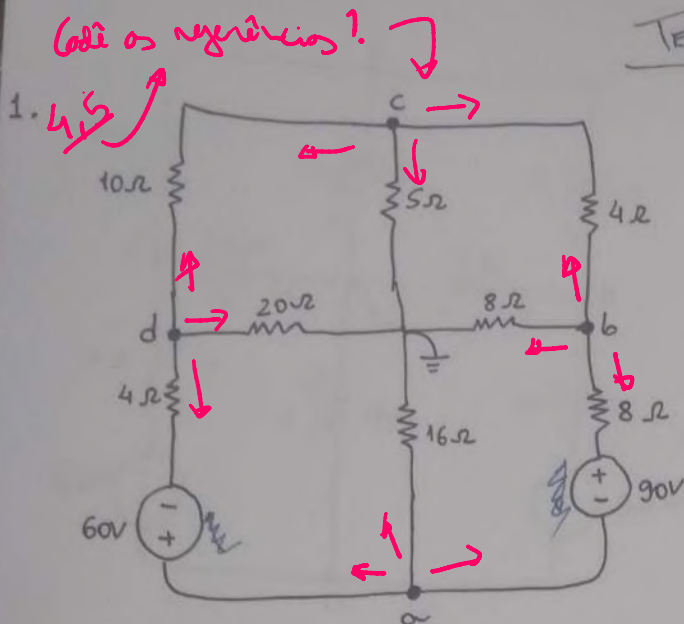


-Vanessa Carvalho do Nascimento



TENSÕES DE NÓ

*9,5*

• Nó 'a':

$$\frac{V_a - (V_d + 60)}{4} + \frac{V_a}{16} + \frac{V_a - (V_b - 90)}{8} = 0$$

$$4V_a - 4V_d - 240 + V_a + 2V_a - 2V_b + 180 = 0$$

$$\boxed{7V_a - 2V_b - 4V_d = 60}$$

• Nó 'b':

$$\frac{V_b}{8} + \frac{V_b - (V_a + 90)}{8} + \frac{V_b - V_c}{4} = 0 \Rightarrow \frac{V_b}{8} + \frac{V_b - V_a - 90}{8} + \frac{2V_b - 2V_c}{4} = 0$$

$$\Rightarrow \boxed{-V_a + 4V_b - 2V_c = 90}$$

• Nó 'c':

$$\frac{V_c}{5} + \frac{V_c - V_b}{4} + \frac{V_c - V_d}{10} = 0 \Rightarrow 4V_c + 5V_c - 5V_b + 2V_c - 2V_d = 0$$

$$\Rightarrow \boxed{-5V_b + 11V_c - 2V_d = 0}$$

• Nó 'd':

$$\frac{V_d}{20} + \frac{V_d - V_c}{10} + \frac{V_d - (V_a - 60)}{4} = 0 \Rightarrow \frac{V_d}{20} + \frac{V_d - V_c}{10} + \frac{V_d - V_a + 60}{4} = 0$$

$$\Rightarrow \boxed{-5V_a - 2V_c + 8V_d = -300}$$

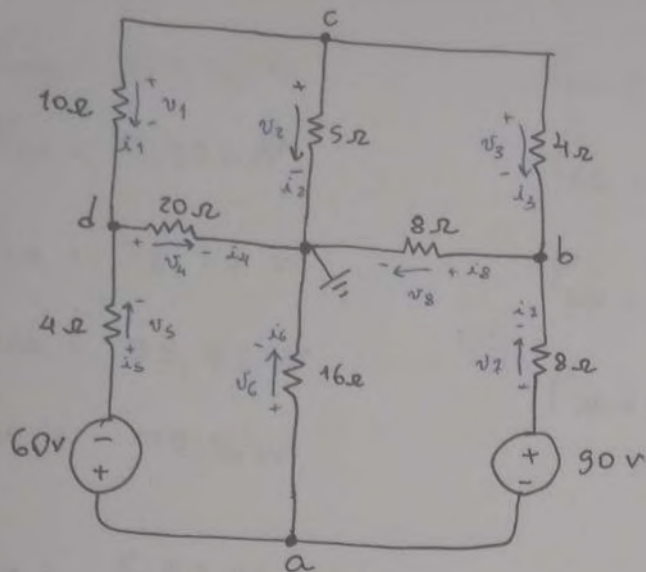
• Solução:

$$V_a \approx -10,56 \text{ V}$$

$$V_c \approx 1,39 \text{ V}$$

$$V_b \approx 20,56 \text{ V}$$

$$V_d \approx -43,75 \text{ V}$$



$$\cdot \underline{v_1} = \overset{V_c - V_d}{45,14 \text{ V}} \Rightarrow \underline{i_1} = 4,51 \text{ A}$$

$$\cdot \underline{v_2} = \overset{V_c - 0}{1,39 \text{ V}} \Rightarrow \underline{i_2} = 0,28 \text{ A}$$

$$\cdot \underline{v_3} = V_c - V_b = -19,17 \Rightarrow \underline{i_3} = -4,79 \text{ A}$$

$$\cdot \underline{v_4} = V_d - 0 = -43,75 \text{ V} \Rightarrow \underline{i_4} = -2,19 \text{ A}$$

$$\cdot \underline{v_5} = \underline{V_a - 60 - \frac{d}{d}} = -26,81 \text{ V} \Rightarrow \underline{i_5} = -6,70 \text{ A}$$

$$\cdot \underline{v_6} = V_a - 0 = -10,56 \text{ V} \Rightarrow \underline{i_6} = -0,66 \text{ A}$$

$$\cdot \underline{v_7} = V_a + 90 - V_b = 58,88 \text{ V} \Rightarrow \underline{i_7} = 7,36 \text{ A}$$

$$\cdot \underline{v_8} = V_b - 0 = 20,56 \text{ V} \Rightarrow \underline{i_8} = 2,57 \text{ A}$$

• TESTE DAS POTÊNCIAS

$$P = Ri^2$$

$$P = Vi$$

$$P_{10\Omega} = 203,40 \text{ W} \checkmark$$

$$P_{5\Omega} = 0,392 \text{ W} \checkmark$$

$$P_{4\Omega} = 91,78 \text{ W} \checkmark$$

$$P_{20\Omega} = 95,92 \text{ W} \checkmark$$

$$P'_{4\Omega} = 179,56 \text{ W} \checkmark$$

$$P_{16\Omega} = 6,97 \text{ W} \checkmark$$

$$P_{8\Omega} = 433,36 \text{ W} \checkmark$$

$$P'_{8\Omega} = 52,84 \text{ W} \checkmark$$

$$P_{60V} = +60 \cdot i_5 = -402 \text{ W (FOR)}$$

$$P_{90V} = -90 \cdot i_7 = -662,4 \text{ W (FOR)}$$

$$\sum P_{\text{ABS}} = 1064,22 \text{ W}$$

$$\sum P_{\text{FOR}} = -1064,22 \text{ W}$$

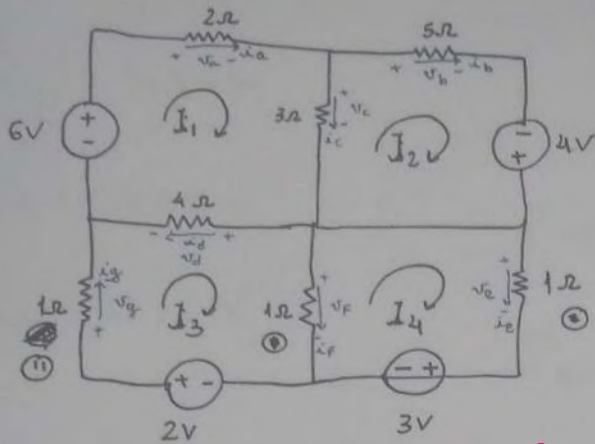
$$\boxed{\sum P_{\text{ABS}} + \sum P_{\text{FOR}} \approx 0}$$

CONFERE!

A que se deve a pequena  $\neq$ ?



2. 5.0



Algoritmo interessante, pela  
sua dimensão da LKT.

• TÉCNICA DE CORRENTES DE MALHA :

$$I_1(2+3+4) + I_2(-3) + I_3(-4) = 6 \Rightarrow 9I_1 - 3I_2 - 4I_3 = 6$$

$$I_3(-3) + I_2(3+5) = 4 \Rightarrow -3I_1 + 8I_2 = 4$$

$$I_1(-4) + I_3(4+1+1) + I_4(-1) = 2 \Rightarrow -4I_1 + 6I_3 - I_4 = 2$$

$$I_3(-1) + I_4(1+1) = -3 \Rightarrow -I_3 + 2I_4 = -3$$

• Solução:

$$I_1 = \frac{692}{437} \approx 1,58A \quad I_2 = \frac{478}{437} \approx 1,09A \quad I_3 = \frac{543}{437} \approx 1,24A \quad I_4 = \frac{-384}{437} \approx -0,88A$$

$$\underline{i_a} = I_1 = 1,58A \Rightarrow \underline{v_a} = 3,16V$$

$$\underline{i_b} = I_2 = 1,09A \Rightarrow \underline{v_b} = 5,45V$$

$$\underline{i_c} = I_1 - I_2 = 0,49A \Rightarrow \underline{v_c} = 1,47V$$

$$\underline{i_d} = I_1 - I_3 = 0,34A \Rightarrow \underline{v_d} = 1,36V$$

$$\underline{i_e} = I_4 = -0,88A \Rightarrow \underline{v_e} = -0,88V$$

$$\underline{i_f} = I_3 - I_4 = 2,12A \Rightarrow \underline{v_f} = 2,12V$$

$$\underline{i_g} = I_3 = 1,24A \Rightarrow \underline{v_g} = 1,24V$$

$$P_{2a} = 4,99 \text{ W} \quad \checkmark$$

$$P_{5a} = 5,94 \text{ W} \quad \checkmark$$

$$P_{3a} = 0,72 \text{ W} \quad \checkmark$$

$$P_{4a} = 0,46 \text{ W} \quad \checkmark$$

$$P_{1a} = 0,77 \text{ W} \quad \checkmark$$

$$P_{12a} = 4,49 \text{ W} \quad \checkmark$$

$$P_{12b} = 1,54 \text{ W} \quad \checkmark$$

$$P_{6v} = -6I_1 = -9,48 \text{ W (FOR)} \quad \checkmark$$

$$P_{4v} = -4I_2 = -4,36 \text{ W (FOR)} \quad \checkmark$$

$$P_{3v} = 3I_4 = -2,64 \text{ W (FOR)} \quad \checkmark$$

$$P_{2v} = -2I_3 = -2,48 \text{ W (FOR)} \quad \checkmark$$

$$\sum P_{\text{ABS}} \approx 18,91 \text{ W} \quad \checkmark$$

$$\sum P_{\text{FOR}} \approx -18,96 \text{ W} \quad \checkmark$$

$$\boxed{\sum P_{\text{abs}} + \sum P_{\text{FOR}} \approx 0}$$

motives?

CONFERE!