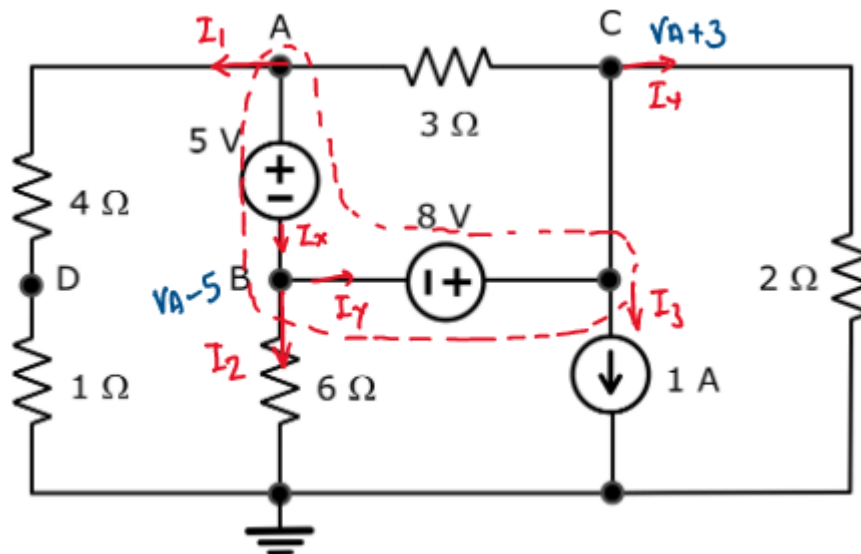


Examen 26 enero 2021- Continua.



Ecuaciones de nodo:

(1)

$$\frac{V_A}{5} + \frac{V_A - V_C}{3} + I_x = 0 ; \quad V_B = V_A - 5$$

(2)

$$-I_x + I_y + \frac{V_B}{6} = 0 ; \quad V_C = V_A + 3$$

(3)

$$\frac{V_C - V_A}{3} - I_y + 1 + \frac{V_C}{2} = 0$$

Sumando (1) + (2) + (3) eliminamos las corrientes.

$$\frac{V_A}{5} + \cancel{\frac{V_A - (V_A + 3)}{3}} + \frac{V_A - 5}{6} + \cancel{\frac{V_A + 3 - V_A}{3}} + 1 + \frac{V_A + 3}{2} = 0$$

$$\frac{V_A}{5} \left(\frac{1}{5} + \frac{1}{6} + \frac{1}{2} \right) = -1 - \frac{3}{2} + \frac{5}{6} ; \quad V_A = -1,92 \text{ V}$$

Entonces:

$$V_A = -1,92 \text{ V} ; V_B = -6,92 \text{ V} ; V_C = 1,077 \text{ V}$$

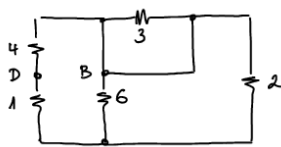
Utilizando un supernodo:

$$I_1 + I_2 + I_3 + I_4 = 0$$

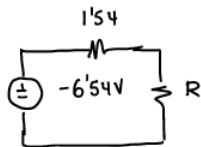
$$\frac{V_A}{5} + \frac{V_A - 5}{6} + 1 + \frac{V_A + 3}{2} = 0$$

$$\text{Equivalente de Thévenin: } V_{th} = V_{BD} = -6,92 - \left(-\frac{1,92}{5}\right) = -6,54 \text{ V}$$

Resistencia de Thévenin



$$R_{th} = (6//2 + 1)//4 = 2,54//4 = 1,54\Omega$$



$$P_R = \left(-\frac{6,54}{1,54+R}\right)^2 \cdot R = 6 \quad R^2 - 4,05R + 2,37 = 0 \quad R = 3,34\Omega ; \\ R = 0,71\Omega$$

$$P_{m\acute{a}x} = \frac{V_{th}^2}{4R_{th}} \rightarrow P_{m\acute{a}x} = \left(\frac{-6,54}{1,54+R}\right)^2 = 6,94 \text{ W luego no pueden transferir 10 W}$$

Potencia de las fuentes:

Corriente:

$$P_{1A} = -1,077 \cdot 1 = -1,077 \text{ W} \quad \text{de (1) } I_x = -\frac{1,92}{5} + 1 = 1,38 \text{ A}$$

Tensión:

$$P_{5V} = -5 \cdot I_x = -6,92 \text{ W} \quad \text{de (2) } I_y = I_x + \frac{6,92}{6} = 1,38 + 1,15 = 2,53 \text{ A}$$

$$P_{8V} = 2,53 \cdot 8 = 20,2 \text{ W}$$

