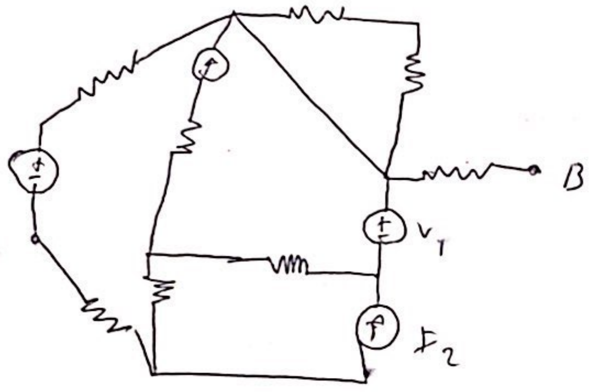
Javier Gómez López



$R = 1\,k\Omega$

$V_1 = 1\,V$

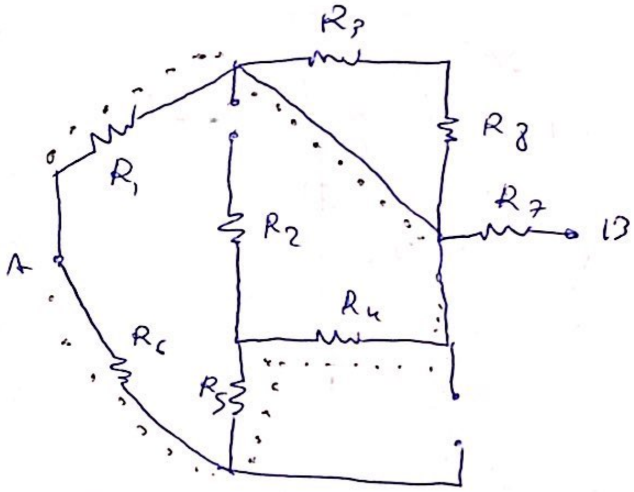
$V_2 = 2\,V$

$I_1 = 1\,mA$

$I_2 = 2\,mA$

a) Calculo R_{th}.

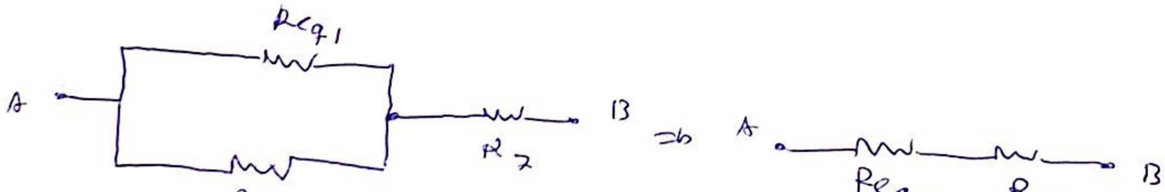
1º Anulamos las fuentes



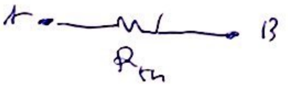
Diferenciamos el camino de arriba y el camino de abajo

Arriba $\to R_1 = 1\,k\Omega = R_{eq_1}$

Abajo $\to R_6 + R_5 + R_4 = 3\,k\Omega = R_{eq_2}$

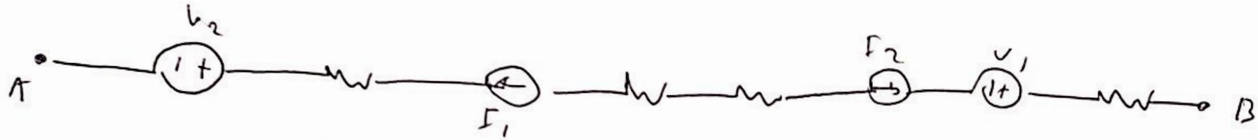


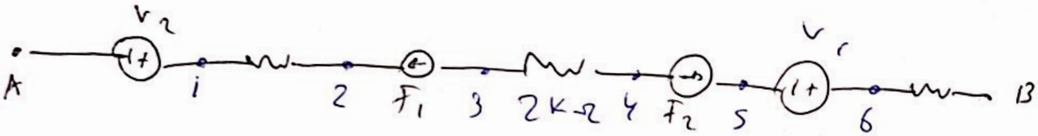
$$\frac{1}{R_{eq_3}} = \frac{1}{R_{eq_1}} + \frac{1}{R_{eq_2}} = \frac{1}{1} + \frac{1}{3} = \frac{4}{3} \Rightarrow R_{eq_3} = 0'75\,k\Omega$$



$$R_{th} = R_{eq_3} + R_7 = \boxed{1'75\,k\Omega}$$

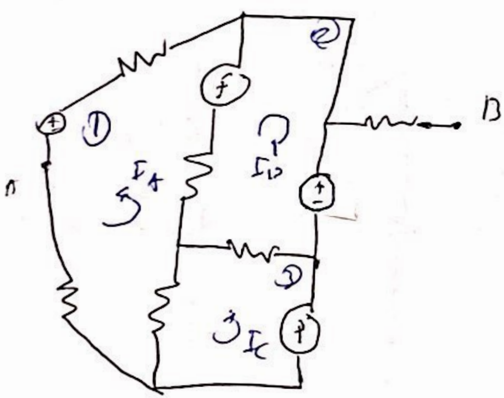
Càlculs V_{th}





$V_A - V_2$

Resolvemos el circuito



Malla 1

$-V_2 + \mathcal{E}_1 = I_A \cdot (R+R+R+R) + I_B \cdot R - I_C \cdot R$

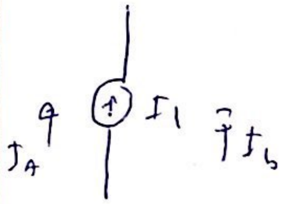
Malla 2

$\mathcal{E}_1 - V_1 = I_B \cdot (R+R) + I_A \cdot (R) + I_3 \cdot R$

Malla 3

$\mathcal{E}_2 = I_C \cdot (R+R) - I_A \cdot R - I_B \cdot R$

Si observamos



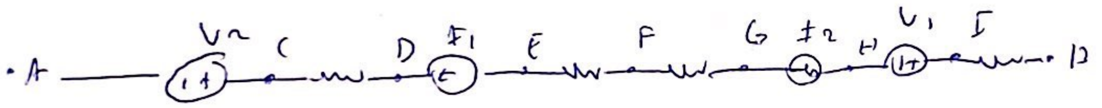
$I_1 = I_A + I_B = 1 \Rightarrow I_A = 1 - I_B$ $\qquad I_C = I_2 = 2mA$

$$\varepsilon_1 = 4I_A - I_C + I_B + 2V$$
$$\varepsilon_1 = 2I_B + I_C + I_A + 1$$
$$\varepsilon_2 = 2I_C - I_A + I_B$$

$$\Downarrow$$

$$\left.\begin{aligned} \varepsilon_1 &= 4 - 3I_B \\ \varepsilon_1 &= 4 + I_B \\ \varepsilon_2 &= 3 + 2I_B \end{aligned}\right\} \quad \begin{aligned} &I_B = 0\,mA \quad I_A = 1\,mA \\ &\varepsilon_2 = 3V \quad \varepsilon_1 = 4V \end{aligned}$$

<u>V_{th}</u>



$V_C - V_A = 2V \qquad V_D - V_C = I_A \cdot R_1 = 1V \qquad V_D - V_E = \varepsilon_1 = 4V$

$V_F - V_E = 4V \qquad V_F - V_G = (I_C - I_A) \cdot R = 1V$

$V_H - V_G = \varepsilon_2 = 3V \qquad V_B - V_H = 1V$

$V_B - V_A = 3V \qquad V_{th} = 3V$

$R_{th} = 1.75\,k\Omega$

$I_N = \dfrac{V_{th}}{R_{th}} = 1.71\,mA$