Cálculos

Primero calculamos el voltaje y corriente de R5 en el circuito original

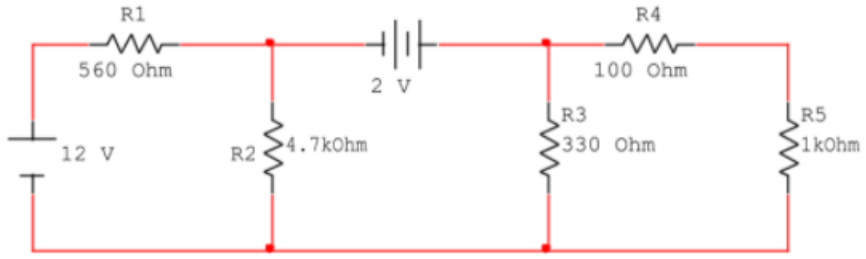


Figura 5.1. Circuito para comprobar el Teorema de Thévenin.

Malla 1

$12 - 0{,}5I1 - 4{,}7(I1 - I2) = 0$

$(-1) \quad -5{,}26I1 + 4{,}7I2 = -12$

$5{,}26I1 - 4{,}7I2 = 12$

Malla 2

$2 - 0{,}33(I2 - I3) - 4{,}7(I2 - I1) = 0$

$4{,}7I1 - 5{,}03I2 + 0{,}33I3 = -2$

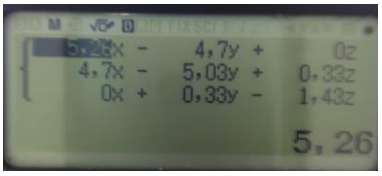
Malla 3

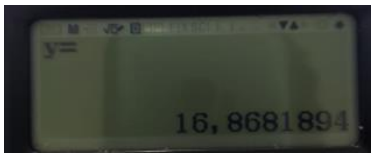
$-0{,}33I(I3 - I2) - 0{,}1I3 - I3 = 0$

$0{,}33I2 - 1{,}43I3 = 0$

Armamos el sistema de ecuaciones

$$\begin{pmatrix} 5{,}26 & -4{,}7 & 0 \\ 4{,}7 & -5{,}03 & 0{,}33 \\ 0 & 0{,}33 & -1{,}43 \end{pmatrix} \begin{pmatrix} I1 \\ I2 \\ I3 \end{pmatrix} = \begin{pmatrix} 12 \\ -2 \\ 0 \end{pmatrix}$$





$$\begin{pmatrix} I1 = 17{,}3537 \\ I2 = 16{,}8681 \\ I3 = 3{,}8926 \end{pmatrix}$$

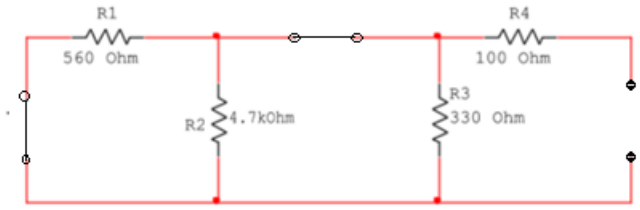
I_{R3}=3,8926

$V_{R3}=I_{R3}*R_3$

$V_{R3}=3{,}8926*1$

V_{R3}=3,8926V

Circuito equivalente de Thevenin

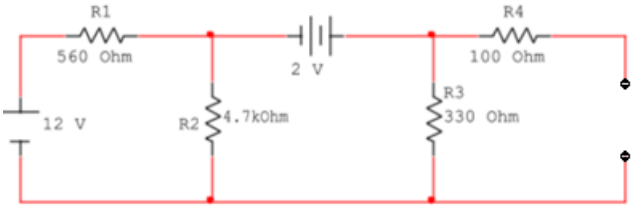


Resistencia de thevenin

$$\boldsymbol{R_1||R_2 = \frac{(0,56)(4,7)}{0,56+4,47} = 0,5k\Omega}$$

$$\boldsymbol{R_{TH} = R_4 + (R_1||R_2)||R_3 = 0,1 + \frac{(0,5)(0,33)}{0,5+0,33} = 0,299k\Omega}$$

Voltaje de Thevenin



Malla 1

$12 - 0,5I1 - 4,7(I1 - I2) = 0$

$(-1) \quad -5,26I1 + 4,7I2 = -12$

$5,26I1 - 4,7I2 = 12$

Armamos el sistema de ecuaciones

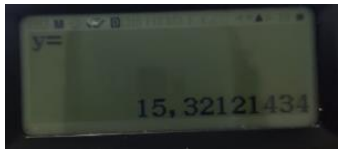
$$\begin{pmatrix} 5,26 & -4,7 \\ 4,7 & -5,03 \end{pmatrix}\begin{pmatrix} I1 \\ I2 \end{pmatrix} = \begin{pmatrix} 12 \\ -2 \end{pmatrix}$$

$$\begin{pmatrix} I1 = 15,9714 \\ I2 = 15,3212 \end{pmatrix}$$

Malla 2

$2 - 0,33I2 - 4,7(I2 - I1) = 0$

$4,7I1 - 5,03I2 = -2$

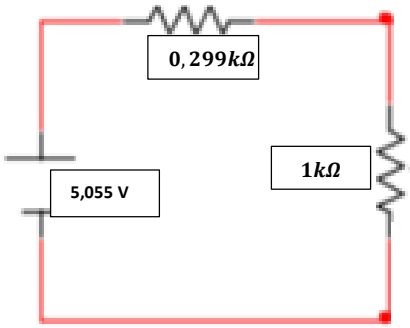


$V_{TH}=I_2*R_3$

$V_{TH}=15,3212*0,33$

$V_{TH}=5,055$ V

Ahora armamos el circuito equivalente ya con la resistencia antes retirada



R_{eq}=0,2987+1

R_{eq}=1,2989$k\Omega$

$$I = \frac{5,055}{1,2987} = 3,8923mA$$

V_{R5}=I*R

V_{R5}=3,8923*1

V_{R5}=3,8923 V