

“AÑO DE LA UNIDAD LA PAZ Y EL DESARROLLO”
UNIVERSIDAD NACIONAL DE SAN AGUSTÍN DE AREQUIPA
FACULTAD DE INGENIERÍAS DE PROCESOS
ESCUELA PROFESIONAL DE INGENIERÍA METALÚRGICA



CURSO:

FÍSICA II

TEMA:

EJERCICIOS DE KIRCHHOFF

DOCENTE:

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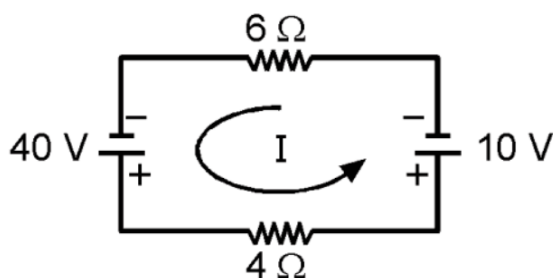
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AREQUIPA – PERÚ

2023

Ejercicios de 1 Malla:

Problema 1: Halle la intensidad de la corriente en un circuito mostrado



RESOLUCIÓN:

$$\sum V = \sum I \cdot R$$

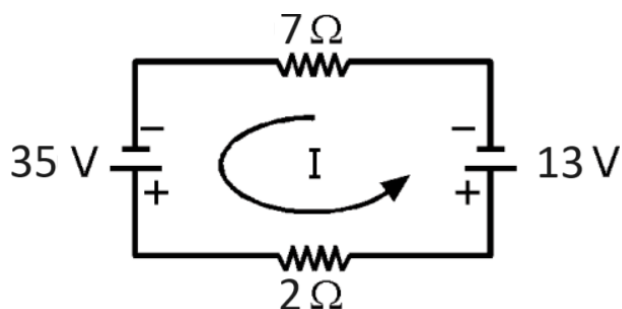
$$40V - 10V = I (6\Omega + 4\Omega)$$

$$30V = I (10\Omega)$$

$$I = 3 \text{ A}$$

BIBLIOGRAFÍA: <https://maticasn.blogspot.com/2022/11/leyes-de-kirchhoff-formulas-ejemplos-problemas-resueltos-de-circuitos-electrodinamica-fisica-de-secundaria-y-preuniversitaria-word-doc-pdf.html>

Problema 2: Halle la intensidad de la corriente en un circuito mostrado



RESOLUCIÓN:

$$\sum V = \sum I \cdot R$$

$$35V - 13V = I (7\Omega + 2\Omega)$$

$$22V = I (9\Omega)$$

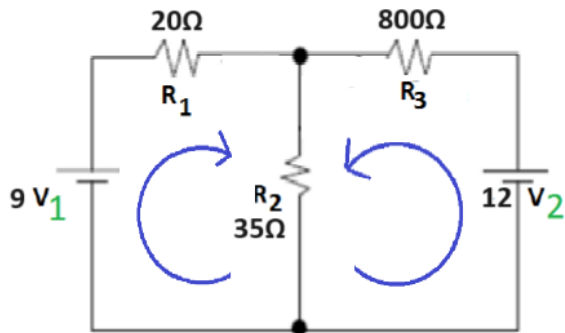
$$I = 2.44 \text{ A}$$

BIBLIOGRAFÍA:

<https://maticasn.blogspot.com/2022/11/leyes-de-kirchhoff-formulas-ejemplos-problemas-resueltos-de-circuitos-electrodinamica-fisica-de-secundaria-y-preuniversitaria-word-doc-pdf.html>

Ejercicios de 2 Mallas:

Problema 1: Halle las tres intensidades del circuito mostrado



$$R_1 = 20 \, \Omega$$

$$R_2 = 35 \, \Omega$$

$$R_3 = 800 \, \Omega$$

$$V_1 = 9 \, V$$

$$V_2 = 27 \, V$$

$$I_3 = I_2 + I_1$$

$$I_3 = 0.03 \, A + 0.15 \, A$$

$$I_3 = 0.18 \, A$$

$$9V = I_2 \times 35\Omega + I_1 \times (20+35)\Omega$$

$$9V = I_1 \times 55\Omega + I_2 \times 35\Omega \quad \times 3$$

$$27V = I_2 \times (800+35)\Omega + I_1 \times 20\Omega$$

$$27V = I_1 \times 20\Omega + I_2 \times 835\Omega$$

$$27V = 5.03I_2 \times 20\Omega + I_2 \times 835\Omega$$

$$27V = 100.6I_2 + 835I_2$$

$$27V = 935.6I_2$$

$$I_2 = 0.03 \, A$$

$$27V = I_1 \times 165\Omega + I_2 \times 105\Omega$$

$$I_1 \times 20\Omega + I_2 \times 835\Omega = I_1 \times 165\Omega + I_2 \times 105\Omega$$

$$I_2 \times 730\Omega = I_1 \times 145\Omega$$

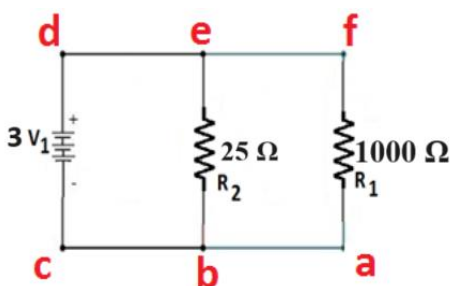
$$I_1 = 5.03I_2$$

$$I_1 = 0.15 \, A$$

$$I_2 = 0.03 \, A$$

$$I_3 = 0.18 \, A$$

Problema 2: Halle las intensidades de las resistencias



$$R_1 = 25 \, \Omega$$

$$R_2 = 1000 \, \Omega$$

$$R_3 = \frac{25 \times 1000}{25 + 1000} \, \Omega = 0.041 \, \Omega$$

$$V_1 = 3 \, V$$

$$V = I \times R$$

$$3V = I_3 \times 0.041 \, \Omega$$

$$I_3 = 73.17 \, A$$

$$I_1 = 0.12 \, A$$

$$I_2 = 0.003 \, A$$

$$I_3 = 73.17 \, A$$

$$V = I_1 \times R$$

$$3V = I_1 \times 25 \, \Omega$$

$$I_1 = 0.12 \, A$$

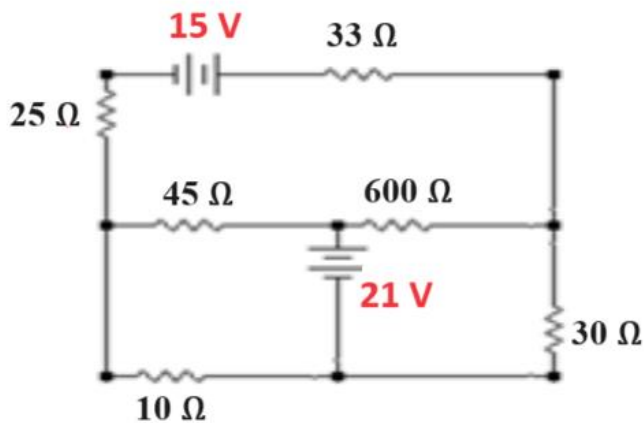
$$V = I_2 \times R$$

$$3V = I_2 \times 1000 \, \Omega$$

$$I_2 = 0.003 \, A$$

Ejercicios de 3 Mallas:

Problema 1: Halle las intensidades de cada una de las resistencias



$$R1 = 33 \Omega$$

$$R2 = 25 \Omega$$

$$R3 = 45 \Omega$$

$$R4 = 600 \Omega$$

$$R5 = 30 \Omega$$

$$R6 = 10 \Omega$$

$$V_1 = 15 V$$

$$V_2 = 21 V$$

$$I_1 = -79.5 A$$

$$I_2 = 126.3 A$$

$$I_3 = -87.3 A$$

$$I_4 = I_1 + I_2 = 46.8 A$$

$$I_5 = I_1 - I_3 = 7.8 A$$

$$I_6 = I_2 + I_3 = 39 A$$

Malla 1

$$\sum V = \sum I \times R$$

$$15V = (33+25+45+600) I_1 + (45) I_2 - (600) I_3$$

$$15V = 703 I_1 + 45 I_2 - 600 I_3$$

Malla 2

$$\sum V = \sum I \times R$$

$$21V = (45+10) I_2 + (45) I_1 + (10+30) I_3$$

$$21V = 45 I_1 + 55 I_2 + 40 I_3$$

Malla 3

$$\sum V = \sum I \times R$$

$$21V = (600+30) I_3 - (600) I_1 + (40) I_2$$

$$21V = -600 I_1 + 40 I_2 + 630 I_3$$

$$15V = 703 I_1 + 45 I_2 - 600 I_3$$

$$21V = 45 I_1 + 55 I_2 + 40 I_3$$

$$21V = -600 I_1 + 40 I_2 + 630 I_3$$

$$D1 = \begin{vmatrix} 15 & 45 & -600 \\ 21 & 55 & 40 \\ 21 & 40 & 630 \end{vmatrix} = 127\,200$$

$$I_1 = \frac{127\,200}{-1\,600} = -79.5 A$$

$$D2 = \begin{vmatrix} 703 & 15 & -600 \\ 45 & 21 & 40 \\ -600 & 21 & 630 \end{vmatrix} = -202\,080$$

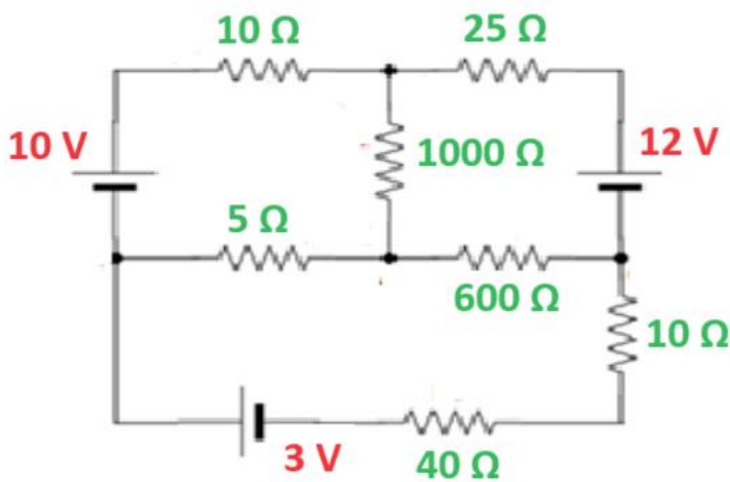
$$I_2 = \frac{-202\,080}{-1\,600} = 126.3 \text{ A}$$

$$D3 = \begin{vmatrix} 703 & 45 & 15 \\ 45 & 55 & 21 \\ -600 & 40 & 21 \end{vmatrix} = 133\,920$$

$$I_3 = \frac{133\,920}{-1\,600} = -83.7 \text{ A}$$

$$D = \begin{vmatrix} 703 & 45 & -600 \\ 45 & 55 & 40 \\ -600 & 40 & 630 \end{vmatrix} = -1\,600$$

Problema 2: Halle las intensidades de cada una de las resistencias



$$R1 = 10 \, \Omega$$

$$R2 = 25 \, \Omega$$

$$R3 = 1000 \, \Omega$$

$$R4 = 5 \, \Omega$$

$$R5 = 600 \, \Omega$$

$$R6 = 10 \, \Omega$$

$$R7 = 40 \, \Omega$$

$$V_1 = 10 \text{ V}$$

$$V_2 = 12 \text{ V}$$

$$V_3 = 3 \text{ V}$$

$$I_1 = 0.0023 \text{ A}$$

$$I_2 = -0.0011 \text{ A}$$

$$I_3 = 0.0015 \text{ A}$$

$$I_4 = I_1 + I_2 = 0.0013 \text{ A}$$

$$I_5 = I_3 + I_2 = -0.0008 \text{ A}$$

$$I_6 = I_3 - I_1 = 0.0005 \text{ A}$$

Malla 1

$$\sum V = \sum I \times R$$

$$10\text{V} = (10+1000+5) I_1 + (1000) I_2 - (5) I_3$$

$$10\text{V} = 1015 I_1 + 1000 I_2 - 5 I_3$$

Malla 2

$$\sum V = \sum I \times R$$

$$12\text{V} = (25+1000+600) I_2 + (1000) I_1 + (600) I_3$$

$$12\text{V} = 1000 I_1 + 1625 I_2 + 600 I_3$$

Malla 3

$$\sum V = \sum I \times R$$

$$3V = (5+600+10+40) I_3 - (5) I_1 + (600) I_2$$

$$3V = -5 I_1 + 600 I_2 + 655 I_3$$

$$10V = 1015 I_1 + 1000 I_2 - 5 I_3$$

$$12V = 1000 I_1 + 1625 I_2 + 600 I_3$$

$$3V = -5 I_1 + 600 I_2 + 655 I_3$$

$$D1 = \begin{vmatrix} 10 & 1000 & -5 \\ 12 & 1625 & 600 \\ 3 & 600 & 655 \end{vmatrix} = 972\,125$$

$$I_1 = \frac{972\,125}{414\,932\,000} = 0.0023 \text{ A}$$

$$D2 = \begin{vmatrix} 1015 & 10 & -5 \\ 1000 & 12 & 600 \\ -5 & 3 & 655 \end{vmatrix} = -444\,400$$

$$I_2 = \frac{-444\,400}{414\,932\,000} = -0.0011 \text{ A}$$

$$D3 = \begin{vmatrix} 1015 & 1000 & 10 \\ 1000 & 1625 & 12 \\ -5 & 600 & 3 \end{vmatrix} = 661\,375$$

$$I_3 = \frac{661\,375}{414\,932\,000} = 0.0015 \text{ A}$$

$$D = \begin{vmatrix} 1015 & 1000 & -5 \\ 1000 & 1625 & 600 \\ -5 & 600 & 655 \end{vmatrix} = 414\,932\,000$$