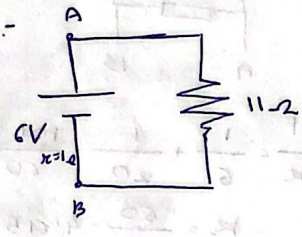
FF

Problemas: Circuitos Corriente Continua

1.-



a) $\mathcal{I} = \frac{V}{R_T} = \frac{6}{11+1} = 0'5\ A$

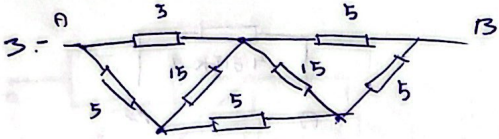
b) $V = \mathcal{I} \cdot R = 0'5 \cdot 1 = 0'5$

$6V - 0'5V = 5'5V = V_{AB}$

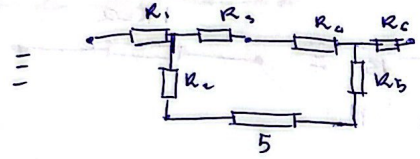
c) $P = \mathcal{I} \cdot V = 0'5 \cdot 6 = 3\ W$

d) $P = \mathcal{I} \cdot V = 0'5 \cdot 5'5 = 2'75\ W$

3.-



Por las transformaciones $\Delta - Y$:



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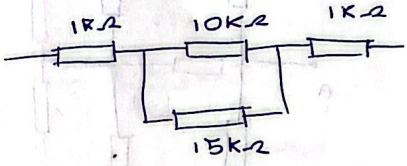

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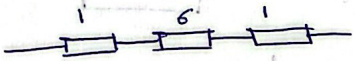
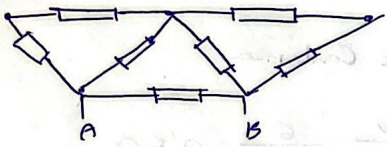


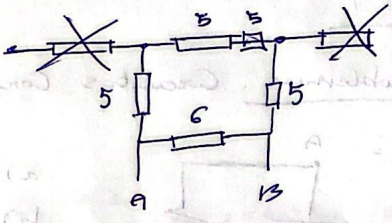
$\equiv$

- $R_1 = \frac{5 \cdot 5}{25} = 1K\Omega$
- $R_2 = \frac{5 \cdot 15}{25} = \frac{125}{25} = 5K\Omega$
- $R_3 = R_2 = 5K\Omega$
- $R_4 = R_2 = 5K\Omega$
- $R_5 = R_2 = 5K\Omega$
- $R_6 = R_1 = 1K\Omega$

- $\frac{1}{R} = \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} \Rightarrow R = 6K\Omega$

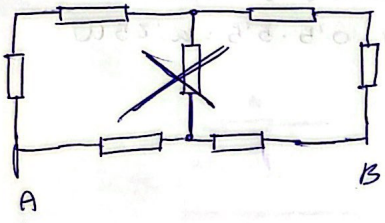
Escaneado con CamScanner

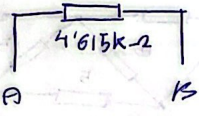


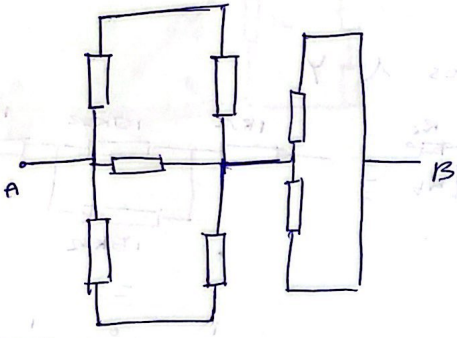


$$\frac{1}{k} = \frac{1}{6} + \frac{1}{20} = \frac{10+3}{60}$$

$$k = \frac{60}{13} = 4'615\,k\Omega$$







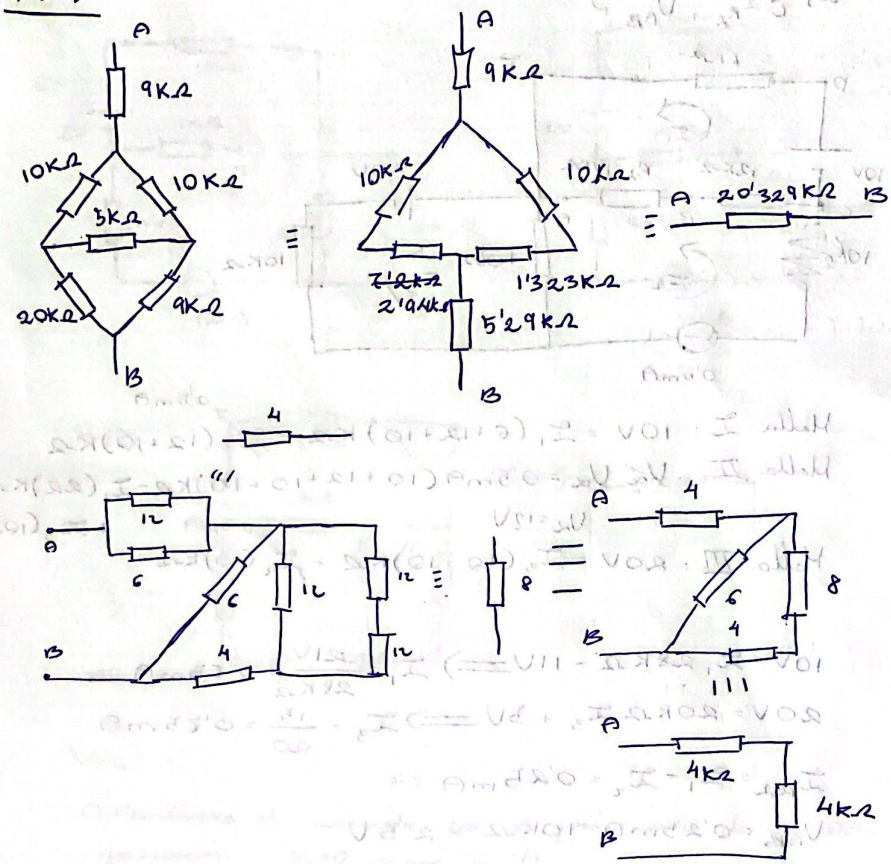
$$\frac{1}{R} = \frac{1}{1} + \frac{1}{0'5} + \frac{1}{1} = 4$$

$$R = 0'25\,k\Omega$$

$$\frac{1}{R} = \frac{1}{0'5} + \frac{1}{1'5} \Rightarrow R = 0'75\,k\Omega$$

Escaneado con CamScanner

FFF



5.- $U_A = 100V = R \cdot I = 10_\Omega \cdot I \Longrightarrow I = 10A$

a) ~~$U_{cs} = I R$~~ $R_{BCD} = 1'428\Omega$

$R_{BCDEF} = 2'92\Sigma\Omega$

$U_{24} = IR = 10 \cdot 2'92\Sigma = 29'2\Sigma V$

$I_\Sigma = \frac{U}{R} = \frac{29'2\Sigma}{3'428} = 8'153A$

$U_{23} = IR = 8'153 \cdot 1'428 = 12'1929$

$I_B = \frac{U_{23}}{R_B} = 2'438A$ // $I_C = 4'064A$ // $I_D = 2'032A$ //

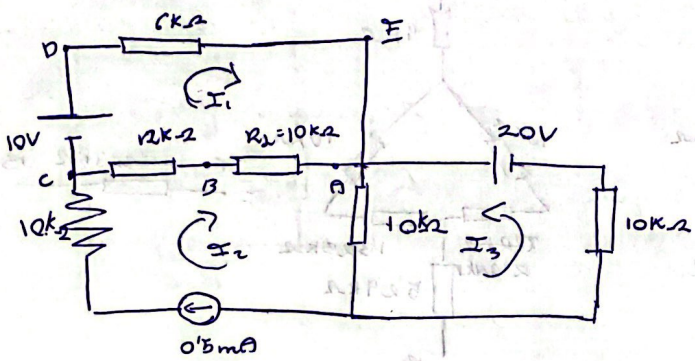
B) $U_B = R \cdot I = 12'19V$

c) $P_F = I \cdot V = \frac{U^2}{R} = 42'83\Sigma W$ //

3

Escaneado con CamScanner

2.- a) ¿I_{R_2} , V_{AB} ?



Malla I: $10V = I_1(6+12+10)K\Omega - I_2(12+10)K\Omega$ (0'5mA)

Malla II: ~~Vα~~ $V_\alpha = 0'5mA(10+12+10+10)K\Omega - I_1(22)K\Omega + I_3(10)K\Omega$

$V_2 = 12V$ (0'5mA)

Malla III: $20V = I_3(10+10)K\Omega + I_2(10)K\Omega$

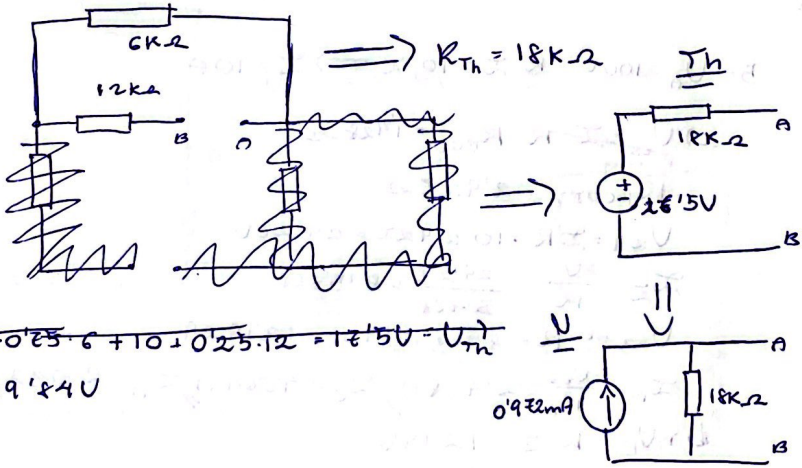
$10V = I_1\,28K\Omega - 11V \Longrightarrow I_1 = \frac{21V}{28K\Omega} = 0'75mA$ 0'82

$20V = 20K\Omega\, I_3 + 5V \Longrightarrow I_3 = \frac{15}{20} = 0'75mA$

$I_{R2} = I_1 - I_2 = 0'25mA$ 0'38

$V_{AB} = 0'25mA \cdot 10K\Omega = 2'5V$

b)

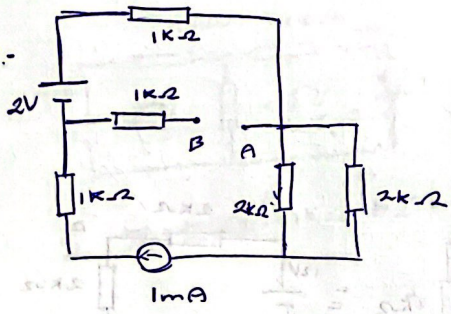


~~$V_{AB} = +0'25 \cdot 6 + 10 + 0'25 \cdot 12 = 12'5V = V_{Th}$~~

$V_{AB} = 19'44V$

Escaneado con CamScanner

8.-



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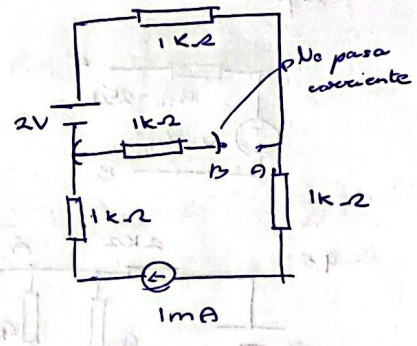
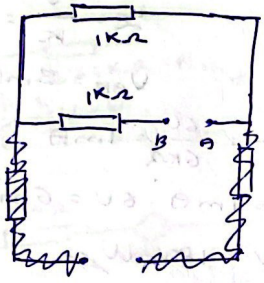


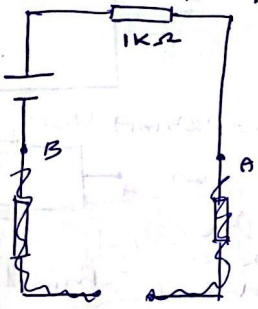
R_{Th} :



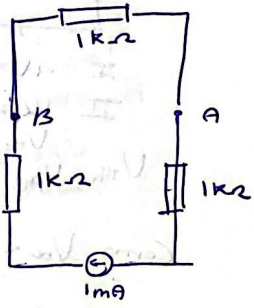
$\Longrightarrow R_{Th} = 2K\Omega$

V_{Th} :

1) Resolveré el circuito con el principio de superposición. $V_R = 0$ ya que $I = 0A$



$V_{AB} = 2V \quad I = 0A$



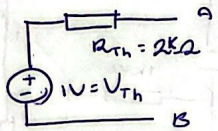
$I = 1mA$

$V_{AB} = -1V$

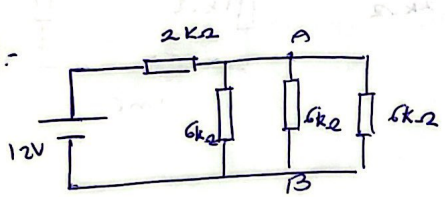
$V_{AB} = 2 - 1 = 1V \quad I = 0 + 1 = 1mA$ //

Escaneado con CamScanner

Equivalente Thevenin:



9.-



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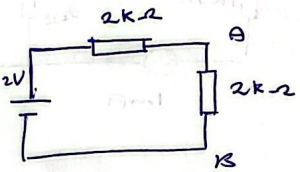


$$I = \frac{V}{R} = \frac{12V}{4K\Omega} = 3mA$$

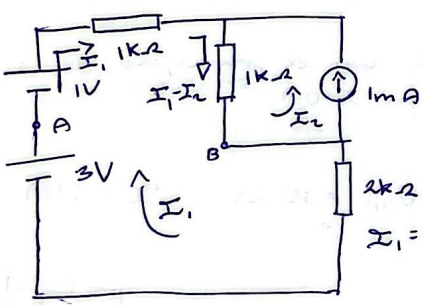
$$V_{AB} = 3mA \cdot 2K\Omega = 6V$$

$$- I_{R_2} = I_{R_3} = I_{R_4} = \frac{V}{R} = \frac{6V}{6K\Omega} = 1mA$$

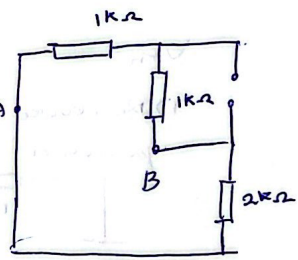
$$- P_{R_2} = P_{R_3} = P_{R_4} = IV = 1mA \cdot 6V = 6mW$$

$$- P_{R_1} = I \cdot V = 3mA \cdot 6V = 18mW //$$

14.-



R_{Th} :



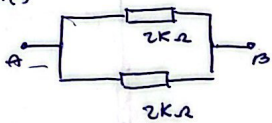
$$I_1 = \frac{5}{4} = 1'25mA$$

I: $4V = I_1(1+1+2)K\Omega - 1K\Omega \cdot I_2$

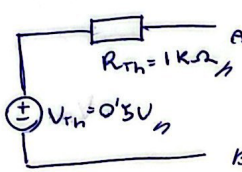
II: $V_\alpha = 1mA(1K\Omega) - I_1 \cdot 1K\Omega$

$V_\alpha = 1 - 1'25 \Longrightarrow V_\alpha = -0'25V$

V_{Th} : $V_{AB} = 1'25 + 0'25 - 1V = 0'5V$ //



$R_{Th} = 1K\Omega$ //



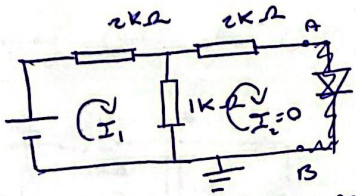
Como $V_\alpha < 0 \Longrightarrow I$ consume energía

$P = IV = -0'25mW$ //

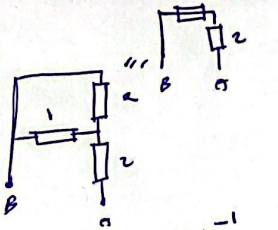
Escaneado con CamScanner

FFJ

16.-



R_{Th} :

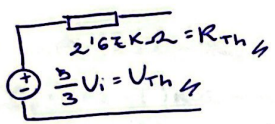


$$R_{Th} = 2 + \left(\frac{1}{1} + \frac{1}{2}\right)^{-1} K\Omega$$

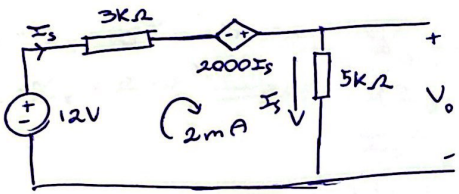
$$R_{Th} = 2'6\Omega\ K\Omega$$

Σ : $V_i = I_1 (2+1)K\Omega \Rightarrow I_1 = \frac{V_i}{3K\Omega}$

V_{Th} : $V_{AB} = V_{Th} = 2K\Omega I_1 + V_i = \frac{2K\Omega}{3K\Omega} V_i + V_i = \frac{5}{3} V_i$



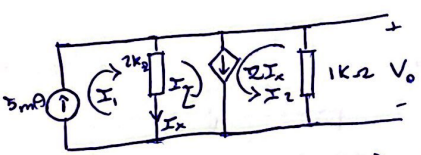
19.-



$$12V + 2000 I_3 = I_3 (3+5)K\Omega$$

$$I_3 = \frac{12}{6.10^3} = 2mA$$

$V_o = 10V$



$$I_x = \cancel{I_1} - \cancel{I_2}$$

$$3I_x = 5mA$$

$$I_x = 1'66\overline{6}\ mA$$

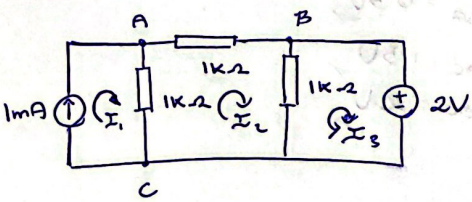
Σ : $V_a = 5mA\,(2K\Omega) - 2I_x (2K\Omega) = 3'332V$

Σ : $V_a' = 2I_x (2K\Omega) - 5mA\,(2K\Omega) = -3'332V$

$V_o = 3'332V$

Escaneado con CamScanner

Ejemplo: Circuito C.C.



$\mathcal{I}_1 = 1mA$

Por mallas:

$\mathcal{I}_1 = 1mA$

I: $V_{AC} = 1mA \cdot 1K\Omega - \mathcal{I}_2(1K\Omega)$

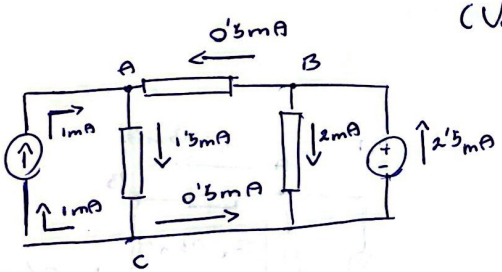
II: $0 = \mathcal{I}_2(1+1+1)K\Omega - 1mA(1K\Omega) + \mathcal{I}_3(1K\Omega)$

III: $2V = \mathcal{I}_3(1K\Omega) + \mathcal{I}_2(1K\Omega)$

$$\begin{cases} 3\mathcal{I}_2 + \mathcal{I}_3 = 10^{-3} \Longrightarrow -3\mathcal{I}_2 - \mathcal{I}_3 = -10^{-3} \\ \mathcal{I}_2 + \mathcal{I}_3 = 2\cdot 10^{-3} \Longrightarrow -2\mathcal{I}_2 = 10^{-3} \end{cases}$$

$\mathcal{I}_2 = -0'5mA \Longrightarrow \mathcal{I}_3 = 2'5mA$

$(V_{AC} = 0'5V)$

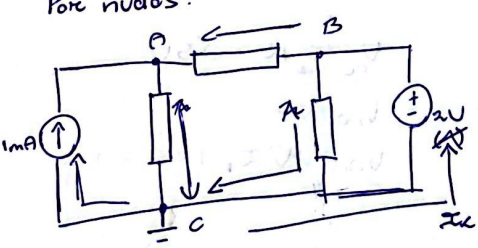


$V_{AC} = 1'5mA \cdot 1K\Omega = 1'5V$

$V_{BA} = 0'5mA \cdot 1K\Omega = 0'5V$

$V_{BC} = 0'5V + 1'5V = 2V$

Por nudos:



$$\mathcal{I}_{AC} = \frac{V_A - \cancel{V_C}^{0}}{1K\Omega} = \frac{V_A}{1K\Omega}$$

$$\mathcal{I}_{BC} = \frac{V_B}{1K\Omega} \qquad (V_B = 2V)$$

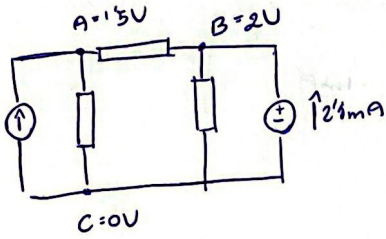
$$\mathcal{I}_{BA} = \frac{V_B - V_A}{1K\Omega}$$

A: $1mA + \frac{\cancel{V_B}^{2V} - V_A}{1K\Omega} = \frac{V_A}{1K\Omega}$

B: $\frac{\cancel{V_B}^{2V} - V_A}{1K\Omega} + \frac{\cancel{V_B}^{2V}}{1K\Omega} = \mathcal{I}_{AC}$

Escaneado con CamScanner

$$\begin{cases} 1 + 2V - V_A = V_A \Longrightarrow V_A = 1'5V \\ 4V - V_A = \mathcal{I}_\alpha \cdot 10^3 \Longrightarrow \mathcal{I}_\alpha = 2'5\,mA \end{cases}$$



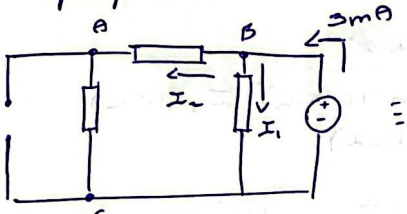
$V_{BA} = 0'5V$

$V_{AC} = 1'5V$

$V_{BC} = 2V$

Por superposición:

①



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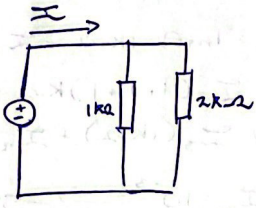


$\mathcal{I}_1 = \frac{V^C}{R} = \frac{2V}{1k\Omega} = 2mA$

$\mathcal{I}_2 = \frac{2V}{2k\Omega} = 1mA$

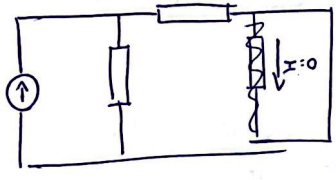
$\mathcal{I} = \frac{V}{R} = \frac{2V}{\left(\frac{1}{1}+\frac{1}{2}\right)^{-1} k\Omega} = 3mA$

$V_{BA} = \mathcal{I}_2 \cdot 1k\Omega = 1V$

$V_{BC} = \mathcal{I}_2 \cdot 2k\Omega = 2V$

$V_{AC} = \mathcal{I}_2\, 1k\Omega = 1V$

②



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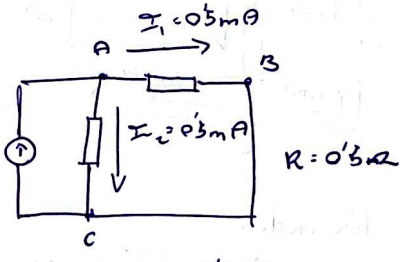

$V_{BC} = \mathcal{I}_2 \cdot R = 0'5V$

$V_{BC} = 0V$

$V_{AB} = V \mathcal{I}_1 \cdot 1k\Omega = 0'5V$

Si sumamos las $\mathcal{I}$ y V consec. quiremos los resultados

Escaneado con CamScanner