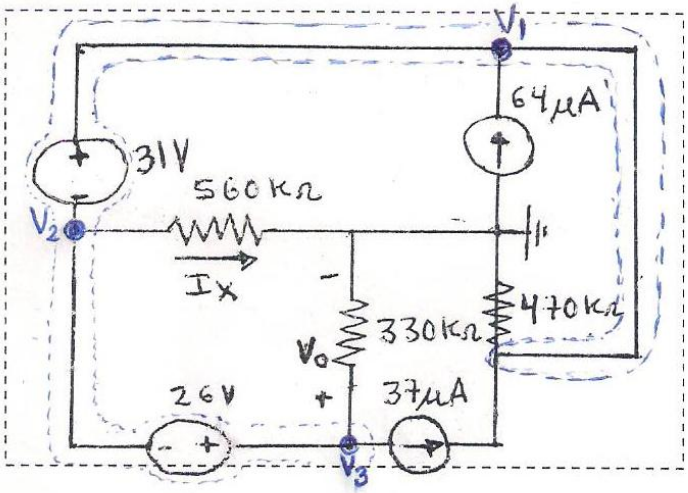
Primer Examen Parcial
Circuitos Eléctricos I
13/10/2014

1. (4 Ptos) Encuentre I_x y V_o utilizando el método de analisis de voltaje de nodos.



$V_1 - V_2 = 31\,V$ (I)

$V_3 - V_2 = 26\,V$ (II)

$\frac{V_1}{470K\Omega} + \frac{V_2}{560K\Omega} + \frac{V_3}{330K\Omega} = 64\mu A + 37\mu A - 37\mu A$ (III)

Resolviendo:

$V_1 = 19{,}37\,V$

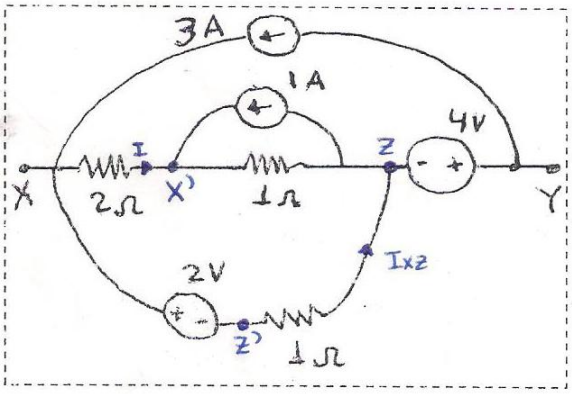
$V_2 = -11{,}63\,V$

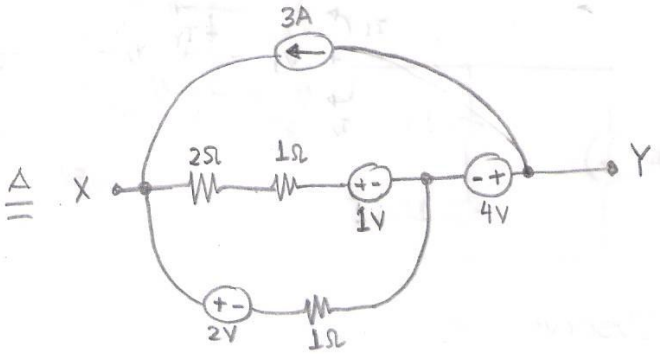
$V_3 = 14{,}37\,V$

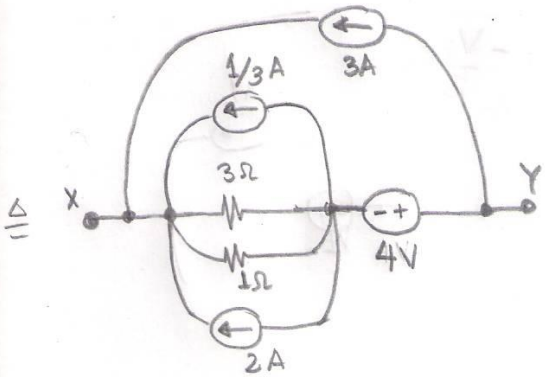
$I_x = \frac{V_2}{560K\Omega} = -20{,}76\mu A$

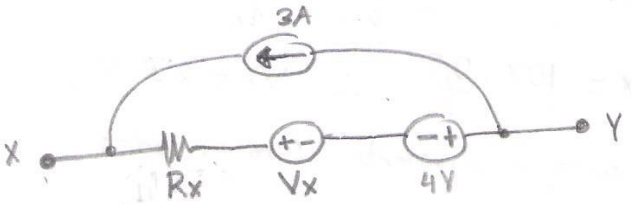
$V_o = V_3 = 14{,}37\,V$

2. (4 Pts) Para el circuito de la Fig. sin aplicar método de análisis de nodos ni de mallas, determine:
   a. Vxy
   b. Balance energético del circuito original









$R_x = 1\Omega \,//\, 3\Omega = 0{,}75\Omega$

$V_x = \left(\frac{1}{3} + 2\right) \cdot (1\Omega \,//\, 3\Omega) = 1{,}75\,V$

$\therefore V_{XY} = R_x\left(3A + \frac{V_x - 4}{R_x}\right)$

$\therefore V_{XY} = 0{,}75 \cdot 3 + 1{,}75 - 4 = 0\,V$

$I_{xz} = \frac{2}{1} = 2A$ $\quad V_{x'z} = 2\,V$

$V_{xx'} = 2 \cdot I$

$V_{xx'} = 2\,V$

Balance Energético.

P_{FUENTE}

$P_{3A} = 3\,V_{XY} = 0\ W$

$P_{2V} = 2(-I_{XZ}) = -4\ W$

$P_{1A} = 1\,V_{XZ} = 2\ W$

$P_{4V} = 4 \cdot 3 = 12\ W$

$P_F = 10\ W$

$P_{RESISTENCIA}$

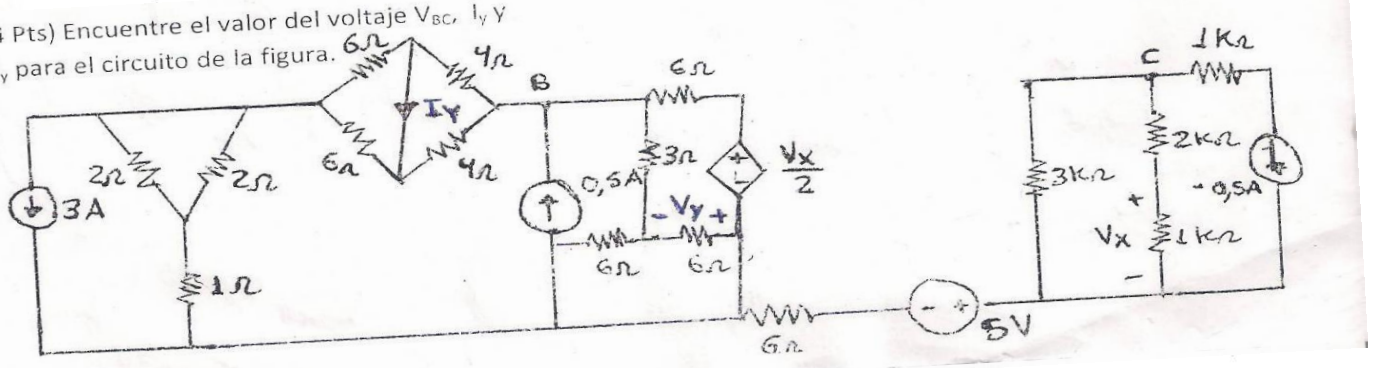
$P_{1\Omega} = \frac{V_{ZY}^2}{1} = 4\ W$

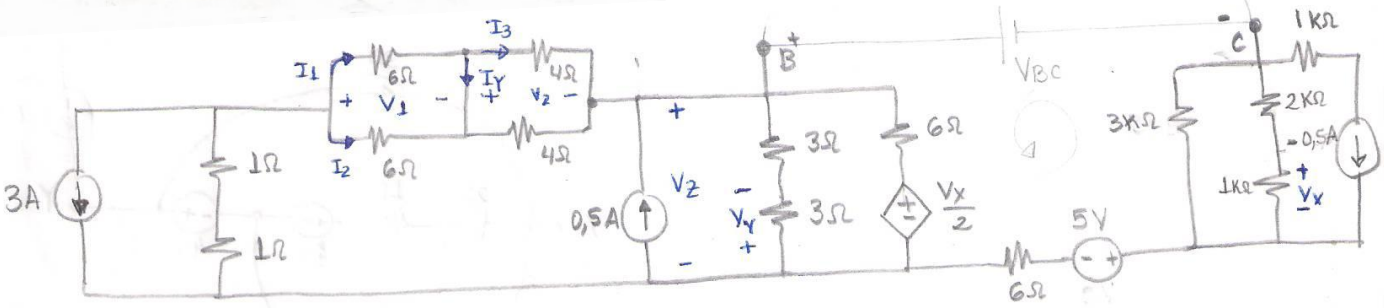
$P_{2\Omega} = 2\,I^2 = 2\ W$

$P_{1\Omega} = \frac{V_{XZ}^2}{1} = 4\ W$

$P_R = 10\ W$

3. (4 Pts) Encuentre el valor del voltaje V_{BC}, I_Y y V_Y para el circuito de la figura.





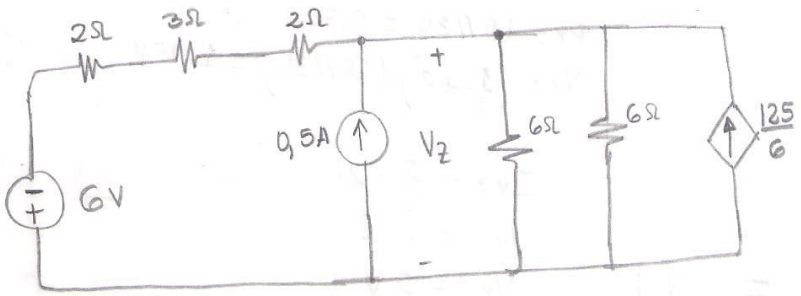
Observe que:

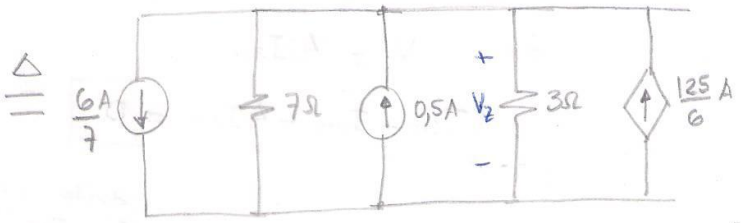
$I_Y = I_1 - I_3 = \frac{V_1}{6\Omega} - \frac{V_2}{4\Omega} = \frac{(6//6)\,I}{6} - \frac{(4//4)\,I}{4} = 0 \quad \therefore \quad I_Y = 0A$

$V_X = 1000 \cdot \frac{0,5}{2} \quad \therefore \quad V_X = 250\,V$

$V_Y = -\frac{V_Z}{2}$

Circuito Equivalente Simplificado:





$$\therefore V_z = (7//3)\left(0,5 + \frac{125}{6} - \frac{6}{7}\right)$$

$$V_z = 2,1 \cdot 20,47$$

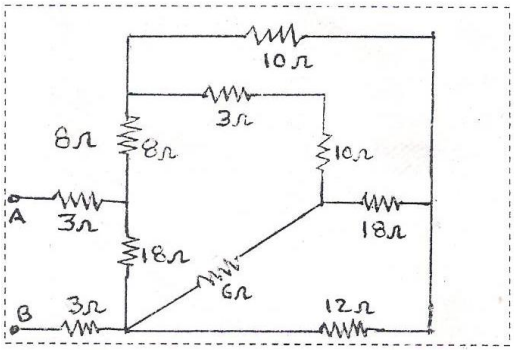
$$V_z = 43\ V$$

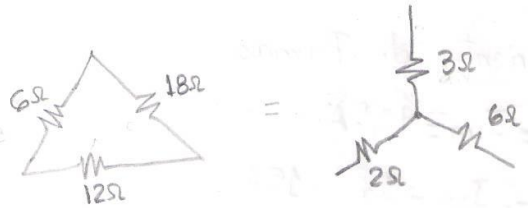
$$\therefore V_Y = \frac{-V_z}{2} = 21,5\ V \qquad V_Y = 21,5\ V$$

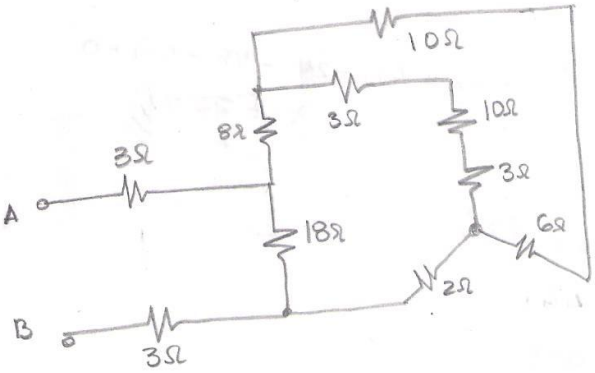
$$-V_{BC} + V_z - 5 - 3000 \cdot 0,25 = 0$$

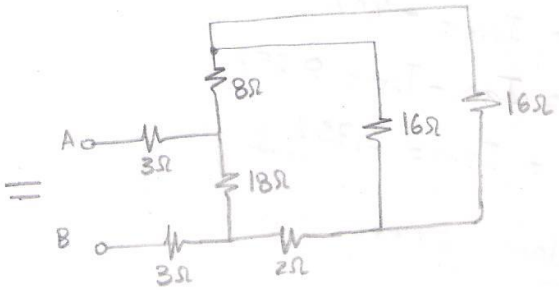
$$V_{BC} = -712\ V$$

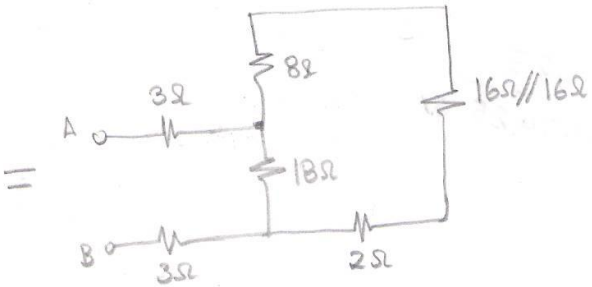
4. (5 Pts) Determine la resistencia vista desde los terminales A y B

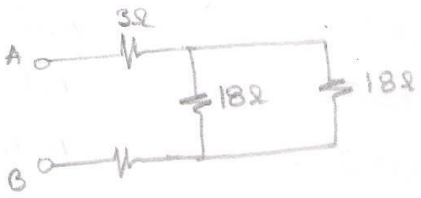


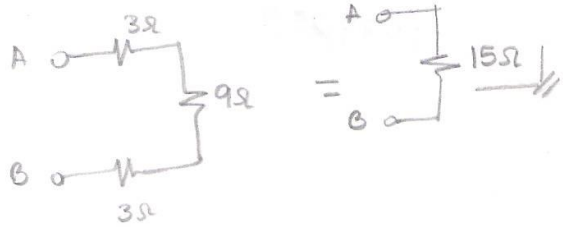




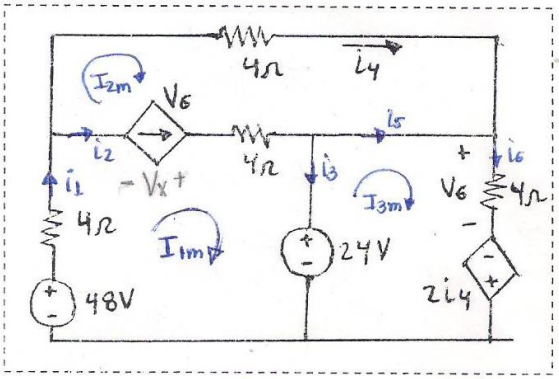








5. (4 Pts) Para el circuito de la figura encuentre el valor corrientes y voltajes en cada rama y demuestre el balance energético



$I_{1m} - I_{2m} = V_6$

donde $V_6 = 4.I_{3m}$

$\therefore \boxed{I_{1m} - I_{2m} - 4I_{3m} = 0}$ (I)

$-24 + 4I_{3m} - 2i_4 = 0$ donde $i_4 = I_{2m}$

$\boxed{0I_{1m} - 2I_{2m} + 4I_{3m} = 24}$ (II)

$-48 + 4I_{1m} + 4I_{2m} + 24 = 0$

$\boxed{4I_{1m} + 4I_{2m} = 24}$ (III)

Resolviendo:

$I_{1m} = 10,5A$

$I_{2m} = -4,5A$

$I_{3m} = 3,75A$

Corrientes de Ramas

$i_1 = I_{1m} = 10,5A$

$i_2 = I_{1m} - I_{2m} = 15A$

$i_3 = I_{1m} - I_{3m} = 6,75A$

$i_4 = I_{2m} = -4,5A$

$i_5 = I_{3m} - I_{2m} = 8,25A$

$i_6 = I_{3m} = 3,75A$ //

$-V_x + 4i_2 + 24 - 48 + 4.i_1 = 0$

$V_x = 78V$ //

Balance Energético

Pactiva (W)	
$48.i_1$ =	504
$24.-i_3$ =	-162
$2.i_4.i_6$ =	-33,75
$V_6.V_x$ =	1170
	1478,25 W

Pasiva (W)	
$4.i_1^2$ =	441
$4.i_2^2$ =	900
$4.i_4^2$ =	81
$4.i_6^2$ =	56,25
	1478,25 W