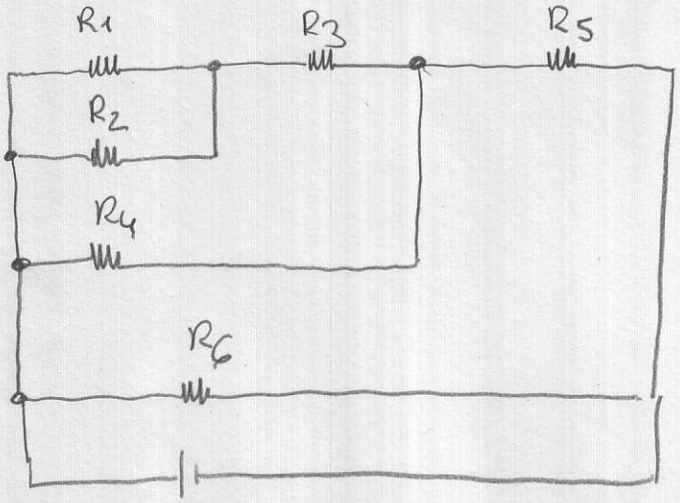
Ejercicio 39 (b).



Datos: $V_T = 200V$

$R_1 = 10\,\Omega$

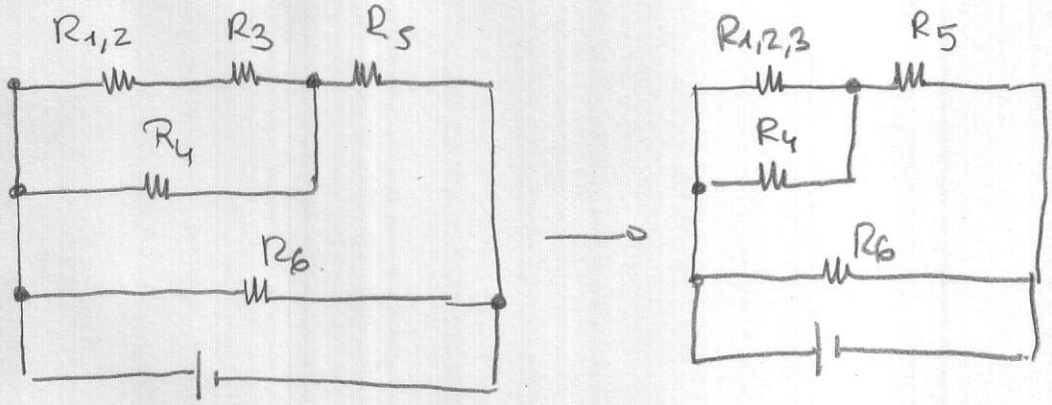
$R_2 = 40\,\Omega$

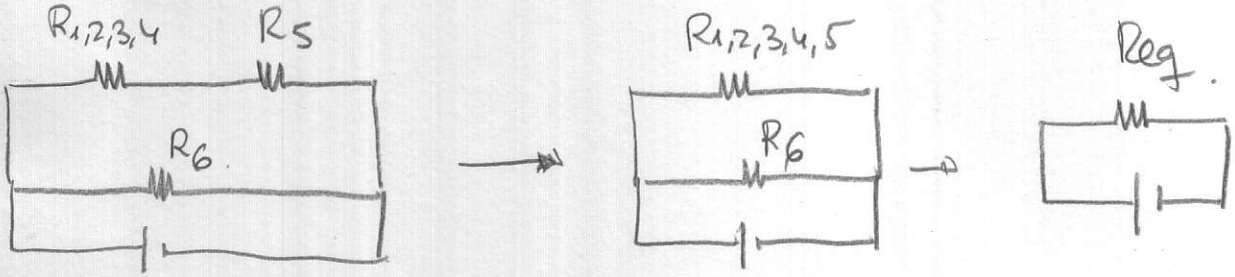
$R_3 = 20\,\Omega$

$R_4 = 50\,\Omega$

$R_5 = 30\,\Omega$

$R_6 = 60\,\Omega$





$$\frac{1}{R_{1,2}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{10} + \frac{1}{40} = \frac{40+10}{400} = \frac{50}{400} \Rightarrow R_{1,2} = \frac{400}{50} = 8\,\Omega$$

$$R_{1,2,3} = R_{1,2} + R_3 = 8 + 20 = 28\,\Omega.$$

$$\frac{1}{R_{1,2,3,4}} = \frac{1}{R_{1,2,3}} + \frac{1}{R_4} = \frac{1}{28} + \frac{1}{50} = \frac{50+28}{28 \cdot 50} = \frac{78}{1400} \Rightarrow R_{1,2,3,4} = \frac{1400}{78} = 17'94\,\Omega$$

$$R_{1,2,3,4,5} = R_{1,2,3,4} + R_5 = 17'94 + 30 = 47'94\,\Omega.$$

$$\frac{1}{R_{eq}} = \frac{1}{R_{1,2,3,4,5}} + \frac{1}{R_6} = \frac{1}{47'94} + \frac{1}{60} = \frac{60+47'94}{47'94 \cdot 60} = \frac{107'94}{2876'4} \Rightarrow R_{eq} = 26'64\,\Omega$$

$$I_T = \frac{V_T}{R_{eq}} = \frac{200}{26'64} = 7'5\,A$$

Como R_6 y $R_{1,2,3,4,5}$ están en paralelo $\Rightarrow V_T = V_{1,2,3,4,5} = V_6 = 200\,V$.

luego $\Rightarrow I_{1,2,3,4,5} = \frac{V_{1,2,3,4,5}}{R_{1,2,3,4,5}} = \frac{200}{47'94} = 4'17\,A$.

$$I_6 = \frac{V_6}{R_6} = \frac{200}{60} = 3'33\,A$$

Como $R_{1,2,3,4}$ y R_5 están en serie $\Rightarrow I_{1,2,3,4} = I_5 = I_{1,2,3,4,5} = 4'17\,A$

luego $\Rightarrow V_{1,2,3,4} = I_{1,2,3,4} \cdot R_{1,2,3,4} = 4'17 \cdot 17'94 = 74'84\,V$.

$$V_5 = I_5 \cdot R_5 = 4'17 \cdot 30 = 125'1\,V$$

Como $R_{1,2,3}$ y R_4 están en paralelo $\Rightarrow V_{1,2,3} = V_4 = V_{1,2,3,4} = 74'84\,V$

luego $\Rightarrow I_{1,2,3} = \frac{V_{1,2,3}}{R_{1,2,3}} = \frac{74'84}{28} = 2'67\,A$.

$$I_4 = \frac{V_4}{R_4} = \frac{74'84}{50} = 1'4968\,A.$$

Como $R_{1,2}$ y R_3 están en serie $\Rightarrow I_{1,2} = I_3 = I_{1,2,3} = 2'67\,A$

luego $\Rightarrow V_{1,2} = I_{1,2} \cdot R_{1,2} = 2'67 \cdot 8 = 21'36\,V$

$$V_3 = I_3 \cdot R_3 = 2'67 \cdot 20 = 53'4\,V$$

Como R_1 y R_2 están en paralelo $\Rightarrow V_1 = V_2 = V_{1,2} = 21'36\,V$.

luego $I_1 = \frac{V_1}{R_1} = \frac{21'36}{10} = 2'136\,A$ # $I_2 = \frac{V_2}{R_2} = \frac{21'36}{40} = 0'534\,A$

las potencias: $P_T = V_T \cdot I_T = 200 \cdot 7'5 = 1500\,W$.

$P_1 = V_1 \cdot I_1 = 21'36 \cdot 2'136 = 45'62\,W$

$P_2 = V_2 \cdot I_2 = 21'36 \cdot 0'534 = 11'40\,W$

$P_3 = V_3 \cdot I_3 = 53'4 \cdot 2'67 = 142'57\,W$

$P_4 = V_4 \cdot I_4 = 74'84 \cdot 1'4968 = 112'02\,W$

$P_5 = V_5 \cdot I_5 = 125'1 \cdot 4'17 = 521'66\,W$.

$P_6 = V_6 \cdot I_6 = 200 \cdot 3'33 = 666\,W$.