

1. Indica el tipus de connexió de les resistències dels circuits 1 i 2.

Circuit 1: connexió en sèrie

Circuit 2: connexió en paral·lel

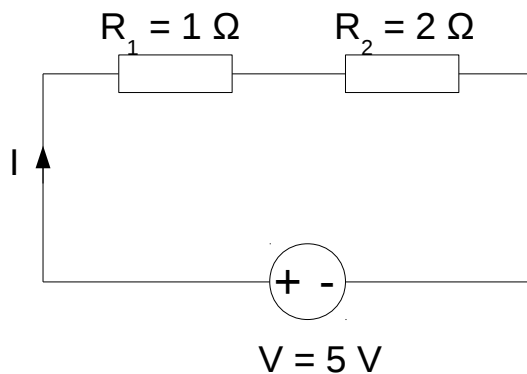
2. En quin dels circuits es consumeix la major potència?

En el circuit 2 la potència és de 37,5 W, en el circuit 1 de 8,35 W.

3. Dels circuits 1 i 2, quina és la resistència que consumeix la major potència?

En el circuit 2, la resistència 1 consumeix una potència de 25 W.

Circuit 1



Calcula

$I, V_1, V_2, P_1, P_2, R_{eq}, P_{eq}$

$$I = \frac{V}{R} = 5 \frac{\text{V}}{3 \Omega} = 1,67 \text{ A}$$

$$R_{eq} = \frac{V}{I} = \frac{5 \text{ V}}{1,67 \text{ A}} = 2,99 \Omega$$

$$V_1 = I \cdot R_1 = 1,67 \text{ A} \cdot 1 \Omega = 1,67 \text{ V}$$

$$\text{Prova: } R_{eq} = R_1 + R_2 = 1 \Omega + 2 \Omega = 3 \Omega$$

$$V_2 = I \cdot R_2 = 1,67 \text{ A} \cdot 2 \Omega = 3,33 \text{ V}$$

$$\text{Prova: } P_{eq} = V \cdot I = 5 \text{ V} \cdot 1,67 \text{ A} = 8,35 \text{ W}$$

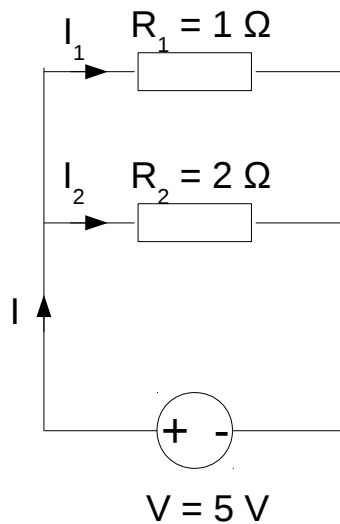
$$\text{Prova: } V = V_1 + V_2 = 1,67 \text{ V} + 3,33 \text{ V} = 5,0 \text{ V}$$

$$P_1 = I \cdot V_1 = 1,67 \text{ A} \cdot 1,67 \text{ V} = 2,79 \text{ W}$$

$$P_2 = I \cdot V_2 = 1,67 \text{ A} \cdot 3,33 \text{ V} = 5,56 \text{ W}$$

$$P_{eq} = P_1 + P_2 = 2,79 \text{ W} + 5,56 \text{ W} = 8,35 \text{ W}$$

Circuit 2



Calcula

 $I, I_1, I_2, P_1, P_2, R_{eq}, P_{eq}$

$$I_1 = \frac{V}{R_1} = \frac{5V}{1\Omega} = 5A$$

$$I_2 = \frac{V}{R_2} = \frac{5V}{2\Omega} = 2,5A$$

$$I = I_1 + I_2 = 5A + 2,5A = 7,5A$$

$$P_1 = I \cdot V_1 = 5A \cdot 5V = 25W$$

$$P_2 = I \cdot V_2 = 2,5A \cdot 5V = 12,5W$$

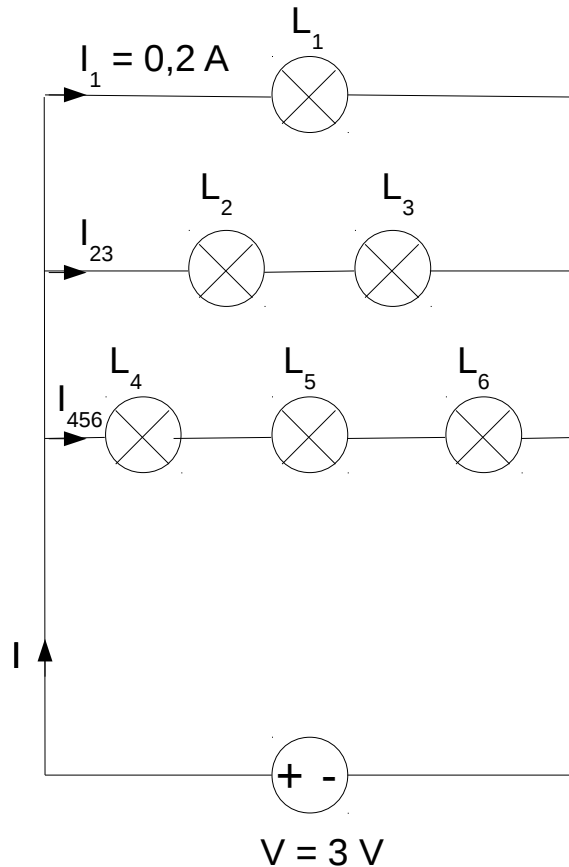
$$P_{eq} = P_1 + P_2 = 25W + 12,5W = 37,5W$$

Prova: $P_{er} = V \cdot I = 5V \cdot 7,5A = 37,5W$

$$R_{eq} = \frac{V}{I} = \frac{5V}{7,5A} = 0,667\Omega$$

Prova: $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{R_1 + R_2}{R_1 \cdot R_2} = \frac{1\Omega + 2\Omega}{1\Omega \cdot 2\Omega} = \frac{3\Omega}{2\Omega^2} = 1,5 \frac{1}{\Omega} \rightarrow R_{eq} = \frac{1}{1,5 \frac{1}{\Omega}} = 0,667\Omega$

4. Totes els llums són iguals (tenen la mateixa resistència). Calcula I_{23} , I_{456} i les tensions en cada un dels llums.



$$R_{L1} = \frac{V}{I} = \frac{3\text{ V}}{0,2\text{ A}} = 15\Omega \rightarrow V_1 = R_1 \cdot I_1 = 15\Omega \cdot 0,2\text{ A} = 3\text{ V}$$

$$R_{L1} + R_{L2} = 2 \cdot 15\Omega = 30\Omega \rightarrow I_{23} = \frac{V}{R_{23}} = \frac{3\text{ V}}{30\Omega} = 0,1\text{ A}$$

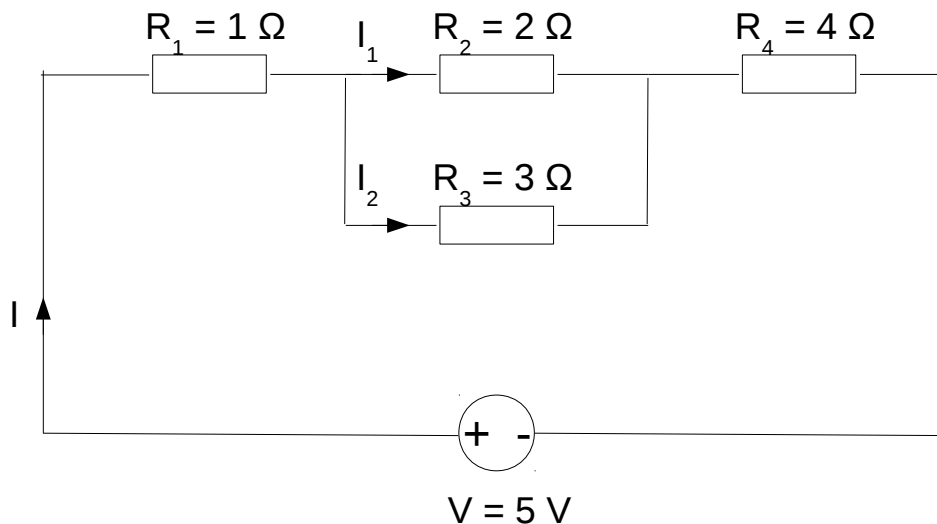
$$\rightarrow V_2 = V_3 = R_{L2} \cdot I_{23} = 15\Omega \cdot 0,1\text{ A} = 1,5\text{ V}$$

$$R_{L1} + R_{L2} + R_{L3} = 3 \cdot 15\Omega = 45\Omega \rightarrow I_{456} = \frac{V}{R_{456}} = \frac{3\text{ V}}{45\Omega} = 0,067\text{ A}$$

$$\rightarrow V_4 = V_5 = V_6 = R_{L4} \cdot I_{456} = 15\Omega \cdot 0,067\text{ A} = 1\text{ V}$$

5. Per al circuit 3, calcula: I , V_1 , V_2 , V_3 , V_4 , P_1 , P_2 , P_3 , P_4 , R_{eq} , P_{eq}

Circuit 3



$$\frac{1}{R_{23}} = \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{2\Omega} + \frac{1}{3\Omega} = 0,8\bar{3} \frac{1}{\Omega} \rightarrow R_{23} = 1,2\Omega$$

$$R_{eq} = R_1 + R_{23} + R_4 = 1\Omega + 1,2\Omega + 4\Omega = 6,2\Omega$$

$$I = \frac{V}{R_{eq}} = \frac{5\text{ V}}{6,2\Omega} = 0,81\text{ A}$$

$$V_1 = I \cdot R_1 = 0,81\text{ A} \cdot 1\Omega = 0,81\text{ V}$$

$$V_{23} = I \cdot R_{23} = 0,81\text{ A} \cdot 1,2\Omega = 0,97\text{ V} \rightarrow I_1 = \frac{V_{23}}{R_2} = \frac{0,97\text{ V}}{2\Omega} = 0,49\text{ A}$$

$$V_4 = I \cdot R_4 = 0,81\text{ A} \cdot 4\Omega = 3,24\text{ V} \quad I_2 = \frac{V_{23}}{R_3} = \frac{0,97\text{ V}}{3\Omega} = 0,32\text{ A}$$

$$P_1 = V_1 \cdot I = 0,81\text{ V} \cdot 0,81\text{ A} = 0,66\text{ W}$$

$$P_2 = V_2 \cdot I_1 = 0,97\text{ V} \cdot 0,49\text{ A} = 0,48\text{ W}$$

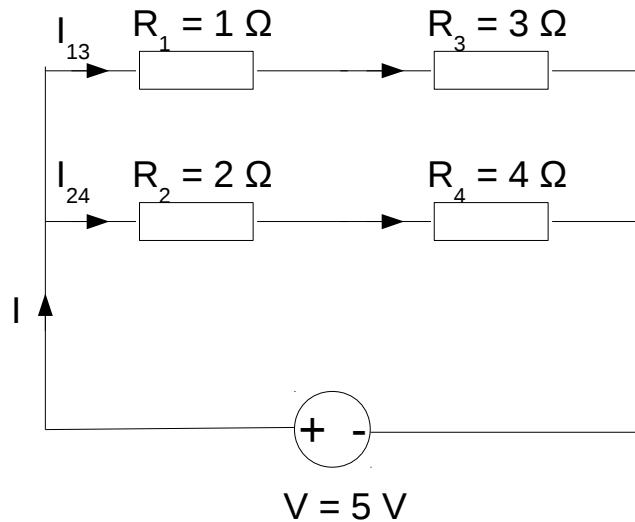
$$P_3 = V_3 \cdot I_2 = 0,97\text{ V} \cdot 0,32\text{ A} = 0,31\text{ W}$$

$$P_4 = V_4 \cdot I = 3,24\text{ V} \cdot 0,81\text{ A} = 2,6\text{ W}$$

$$P_{eq} = V \cdot I = 5\text{ V} \cdot 0,81\text{ A} = 4,05\text{ W}$$

6. Per al circuit 4, calcula: I , I_{13} , I_{24} , P_1 , P_2 , P_3 , P_4 , R_{eq} , P_{eq}

Circuit 4



$$R_{13} = R_1 + R_3 = 4 \, \Omega$$

$$I_{13} = \frac{V}{R_{13}} = \frac{5 \, V}{4 \, \Omega} = 1,25 \, A$$

$$R_{24} = R_2 + R_4 = 6 \, \Omega$$

$$I_{24} = \frac{V}{R_{24}} = \frac{5 \, V}{6 \, \Omega} = 0,83 \, A$$

$$I = I_{13} + I_{24} = 1,25 \, A + 0,83 \, A = 2,08 \, A$$

$$V_1 = R_1 \cdot I_{13} = 1 \, \Omega \cdot 1,25 \, A = 1,25 \, V \quad \rightarrow \quad P_1 = V_1 \cdot I_{13} = 1,25 \, V \cdot 1,25 \, A = 1,56 \, W$$

$$V_3 = R_3 \cdot I_{13} = 3 \, \Omega \cdot 1,25 \, A = 3,75 \, V \quad \rightarrow \quad P_3 = V_3 \cdot I_{13} = 3,75 \, V \cdot 1,25 \, A = 4,7 \, W$$

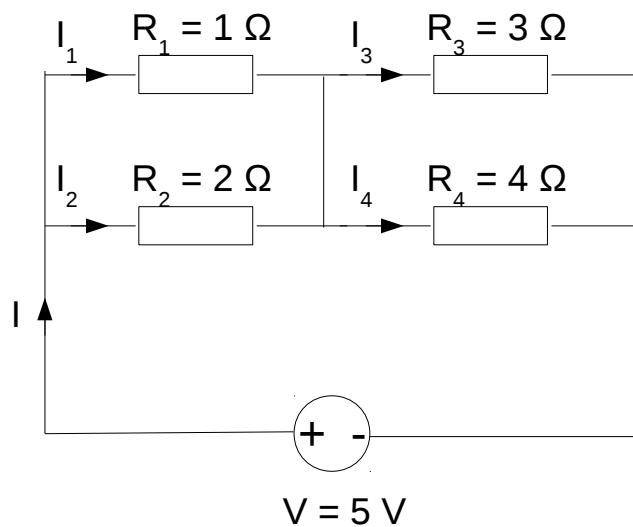
$$V_2 = R_2 \cdot I_{24} = 2 \, \Omega \cdot 0,83 \, A = 1,66 \, V \quad \rightarrow \quad P_2 = V_2 \cdot I_{24} = 1,66 \, V \cdot 0,83 \, A = 1,38 \, W$$

$$V_4 = R_4 \cdot I_{24} = 4 \, \Omega \cdot 0,83 \, A = 3,32 \, V \quad \rightarrow \quad P_4 = V_4 \cdot I_{24} = 3,32 \, V \cdot 0,83 \, A = 2,76 \, W$$

$$V_4 = R_4 \cdot I_{24} = 4 \, \Omega \cdot 0,83 \, A = 3,32 \, V \quad R_{eq} = \frac{V}{I} = 5 \frac{V}{2,08 \, A} = 2,4 \, \Omega$$

7. Per al circuit 5, calcula: I , I_1 , I_2 , I_3 , I_4 , V_{12} , V_{34} , P_1 , P_2 , P_3 , P_4 , R_{eq} , P_{eq}

Circuit 5



$$\begin{aligned}
 R_{12} &= \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} = \frac{1}{\frac{1}{1\Omega} + \frac{1}{2\Omega}} = \frac{1}{1.5} \Omega = 0.67 \Omega \\
 R_{34} &= \frac{1}{\frac{1}{R_3} + \frac{1}{R_4}} = \frac{1}{\frac{1}{3\Omega} + \frac{1}{4\Omega}} = \frac{1}{0.75} \Omega = 1.33 \Omega \\
 R_{eq} &= R_{12} + R_{34} = 2 \Omega \\
 I &= \frac{V}{R_{eq}} = \frac{5V}{2\Omega} = 2.5 A \rightarrow V_{12} = R_{12} \cdot I = 0.67 \Omega \cdot 2.5 A = 1.67 V \\
 & \quad V_{34} = R_{34} \cdot I = 1.33 \Omega \cdot 2.5 A = 3.33 V \\
 I_1 &= \frac{V_{12}}{R_1} = \frac{1.67 V}{1\Omega} = 1.67 A \\
 I_2 &= \frac{V_{12}}{R_2} = \frac{1.67 V}{2\Omega} = 0.83 A \\
 I_3 &= \frac{V_{34}}{R_3} = \frac{3.33 V}{3\Omega} = 1.11 A \\
 I_4 &= \frac{V_{34}}{R_4} = \frac{3.33 V}{4\Omega} = 0.83 A \\
 P_1 &= V_1 \cdot I_1 = 1.67 W \\
 P_2 &= V_2 \cdot I_2 = 1.67 V \cdot 0.83 A = 1.39 W \\
 P_3 &= V_3 \cdot I_3 = 3.33 V \cdot 1.11 A = 3.70 W \\
 P_4 &= V_4 \cdot I_4 = 3.33 V \cdot 0.83 A = 2.76 W \\
 P_{eq} &= V \cdot I = 5V \cdot 2.5 A = 12.5 W \\
 & \quad \Sigma 10.48 W
 \end{aligned}$$

solució**exercici 28/04/20**

Aquestes exercicis s'han de copiar al quadern i enviar foto dels exercicis solucionats a pposada@iessonpacs.cat o per WhatsApp al número 633 485 188.

Les solucions d'aquests exercicis s'han d'entregar abans del 05/05/20.