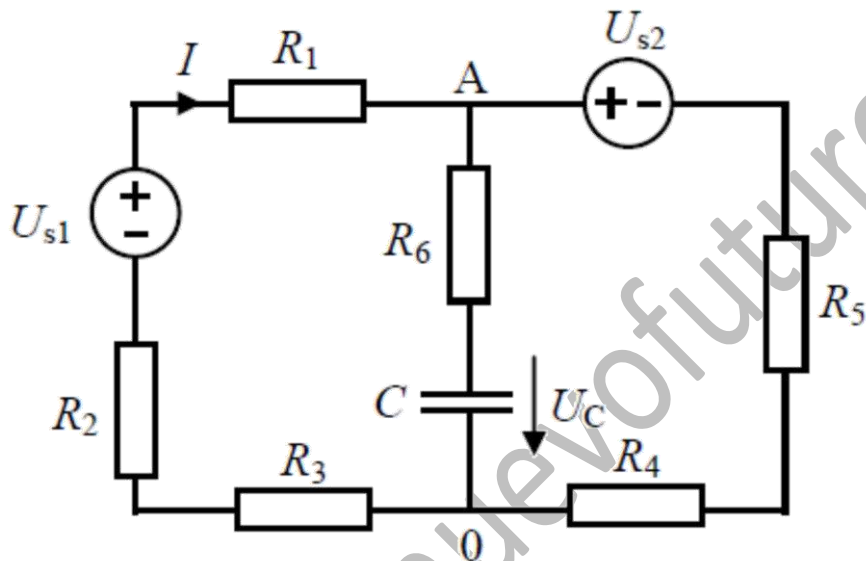


ELECTROTECNIA SEPTIEMBRE 2013

OPCION A

Cuestión 1.

Solución:



$$I = \frac{40}{10} = 4 \text{ A}$$

a)

$$V_A = -8 - 4 + 50 - 12 = 26 \text{ V}$$

b)

$$W_C = 6,76 \text{ mJ}$$

c)

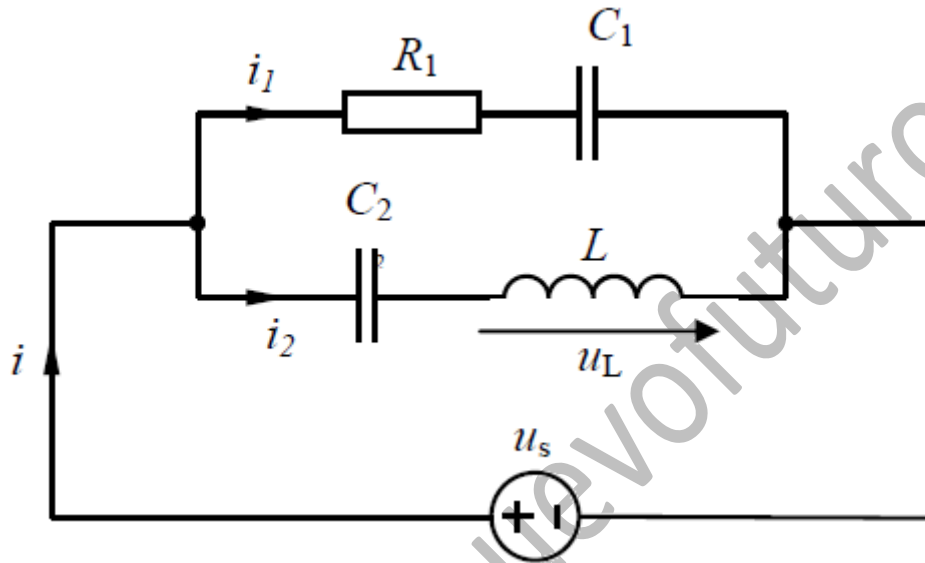
$$S_{us1} = 200 \text{ W}$$

d)

$$P = 0 \text{ W}$$

Cuestión 2.

Solución:



a)

$$i_2(t) = 3,535 \cos\left(\omega t + \frac{\pi}{2}\right) A$$

b)

$$U_L = 30 \cos\left(\omega t + \frac{\pi}{4}\right) V$$

c)

$$i(t) = 3,535 \cos(\omega t) A$$

d)

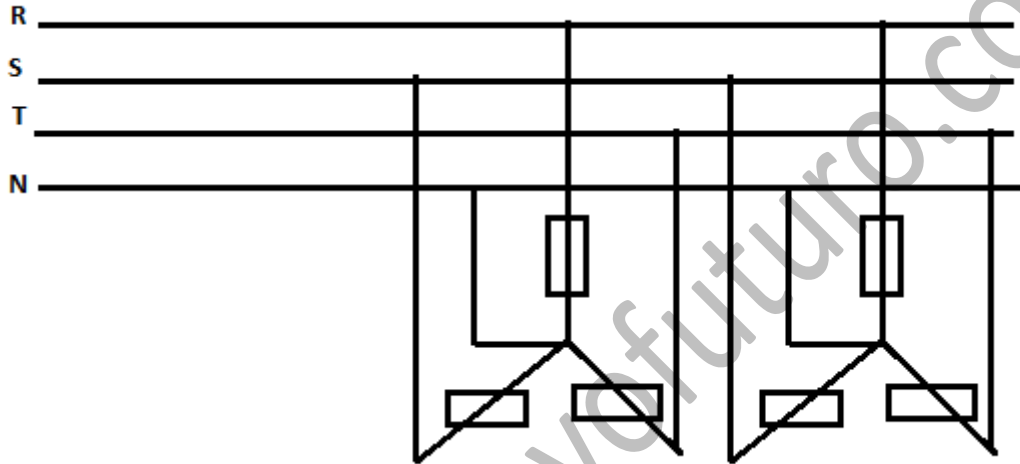
$$P_R = 50 W$$

Cuestión 3.

Solución:

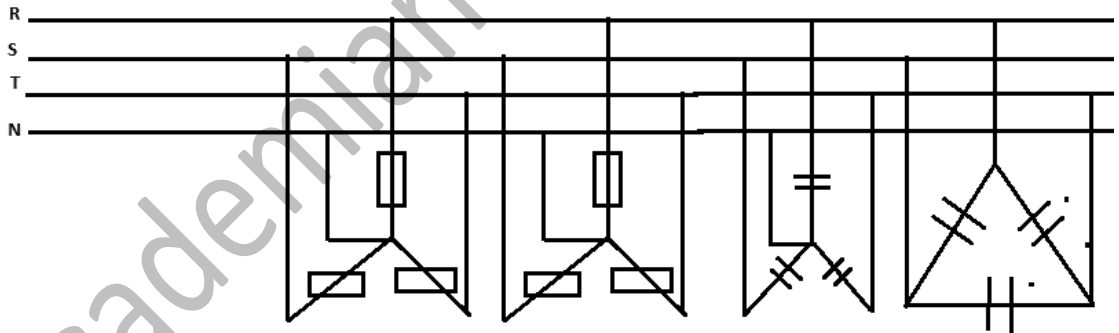
a)

Esquema instalación



b)

Esquema condensadores

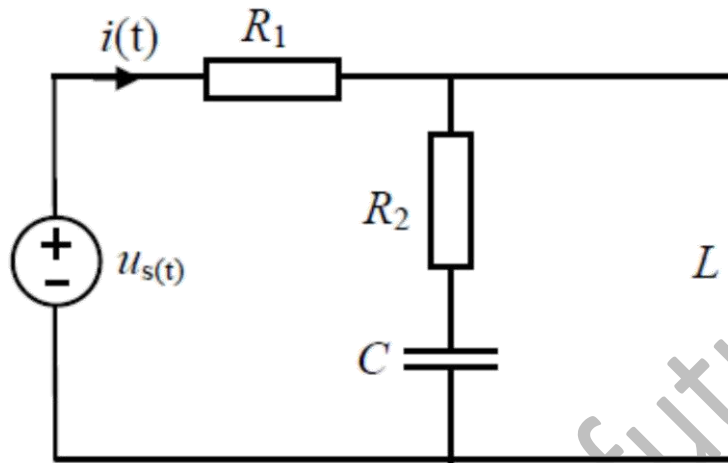


c)

$$C = 39,9 \mu F$$

Cuestión 4.

Solución:



a)

$$22,54 \cos(3t - 37,012)$$

b)

$$\text{Factor de potencia} = \cos\varphi = \cos(37,012) = 0,798$$

c)

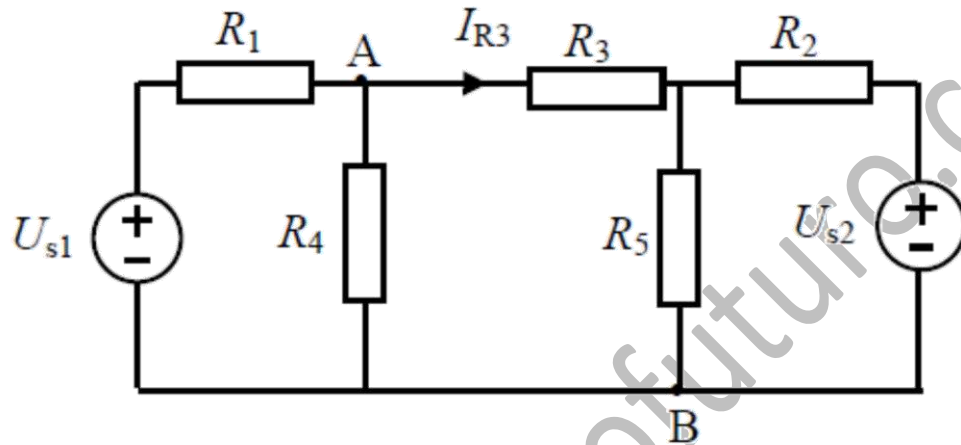
$$C = 0,28 \text{ F}$$

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OPCION B

Cuestión 1.

Solución:



a)

Resolviendo por mallas, llegamos a la siguiente solución:

$$I_3 = 3 \text{ A (antihorario)}$$

$$I_1 = 4,5 \text{ A}$$

$$U_{s1} = 40,5 \text{ V}$$

b)

$$P_{us1} = 40,5 \cdot 4,5 = 182,25 \text{ W}$$

$$U_{us2} = 90 \text{ W}$$

c)

$$U_A = 40,5 - 5 \cdot 4,5 = 18 \text{ V}$$

$$U_B = 0 \text{ V}$$

$$U_{AB} = 18 \text{ V}$$

d)

$$P_1 = 101,25 \text{ W}$$

$$P_2 = 45 \text{ W}$$

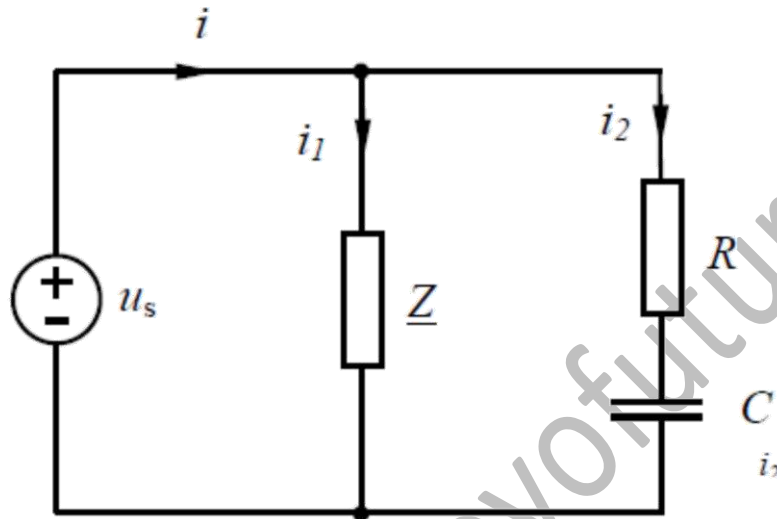
$$P_3 = 0 \text{ W}$$

$$P_4 = 81 \text{ W}$$

$$P_5 = 54 \text{ W}$$

Cuestión 2.

Solución:



a)

$$i_2 = \frac{20\sqrt{2}}{2 - j2} = 10 \angle 45^\circ \text{ A}$$

b)

$$i_1 = i_T - i_2 = 19,99 \angle -44,9^\circ \text{ A}$$

c)

$$Z = \frac{u}{i} = 1,416 \angle 44,9^\circ \Omega$$

Cuestión 3.

Solución:

a)

$$U_{fase} = \frac{380}{\sqrt{3}} = 220 \text{ V}$$

$$I_L = \frac{U_{fase}}{Z} = 44 \angle -36,86^\circ \text{ A}$$

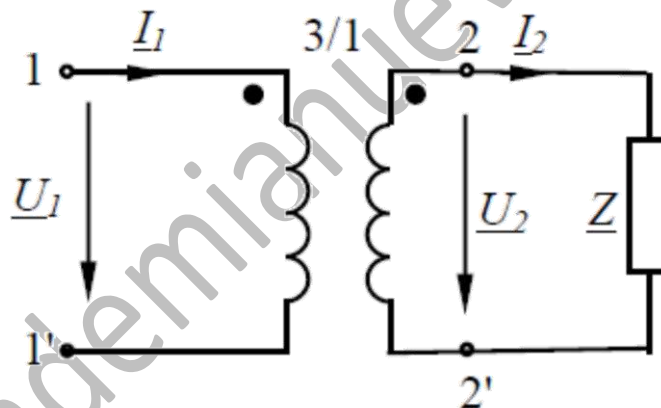
b)

$$S_{carga} = UI^* = 7745 + j5806,7 \text{ VA} = P + jQ$$

$$S = 5806,7 \text{ VA}$$

Cuestión 4.

Solución:



a)

$$u_2 = \frac{u_1}{3} = 230 \text{ V}$$

$$Q_1 = UI^* \sin \varphi = 727,5 \rightarrow \varphi = 42,18^\circ$$

$$S_2 = S_1 \rightarrow U_2 I_2^* = U_1 I_1^*$$

$$I_2 = 4,71 \angle -42,187^\circ \text{ A}$$

b)

Impedancia:

$$Z = \frac{U_2}{I_2} = 48,83 \angle 42,187^\circ \Omega$$



c)

$$S_{carga} = UI^* = 802,678 + j727,49 \text{ VA} \rightarrow P = 802,678 \text{ W}$$

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