

ELECTROTECNIA SEPTIEMBRE 2014

OPCION A

Cuestión 1.

Solución:

a)

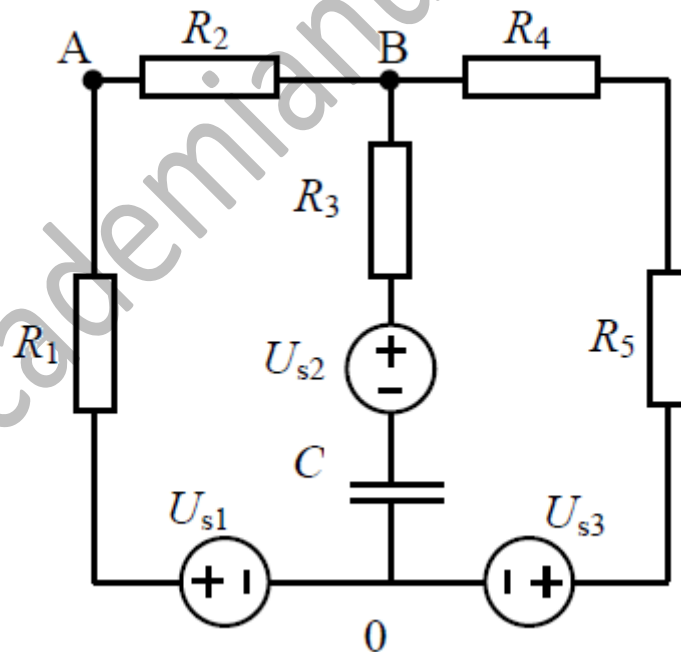
$$L = \frac{N^2 \mu S}{l} = 4,0212 \text{ H}$$

b)

$$i = 10 \text{ A} \rightarrow W_L = \frac{1}{2} Li^2 = 201,06 \text{ J}$$

Cuestión 2.

Solución:



a)

$$-20 + 5I + 10 = 0 \rightarrow I = 2 \text{ A}$$

$$U_A = 20 - 2 \cdot 1 = 18 \text{ V}$$

$$U_B = 20 - 2 \cdot 1 - 2 \cdot 2 = 14 \text{ V}$$

b)

$$W_C = \frac{1}{2} CU^2 = 98 \mu J$$

c)

$$P_{us1} = 20 \cdot 2 = 40 W$$

$$P_{us2} = -20 W$$

d)

$$P_1 = 4 W$$

$$P_2 = 8 W$$

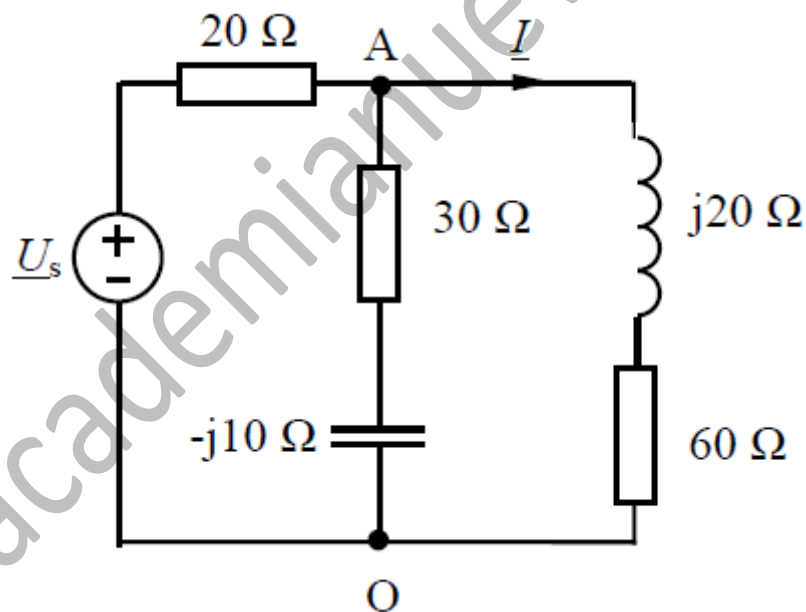
$$P_3 = 0 W$$

$$P_4 = 4 W$$

$$P_5 = 4 W$$

Cuestión 3.

Solución:



a)

$$U_{A0} = 2 \cdot 60 + 2 \cdot j20 = 126,5 \angle 18,43 V$$

b)

$$i_2 = \frac{U_{A0}}{Z} = 4 \angle 36,87 A$$

$$i_{total} = i_1 + i_2 = 5,727 \angle 24,77 A$$



$$U_s = 126,5 \pm 18,43 + 20 \cdot 5,727 \pm 24,77 = 240,7 \pm 21,44 \text{ V}$$

c)

$$Q_{bobina} = i^2 j20 = 60 \text{ VAR}$$

d)

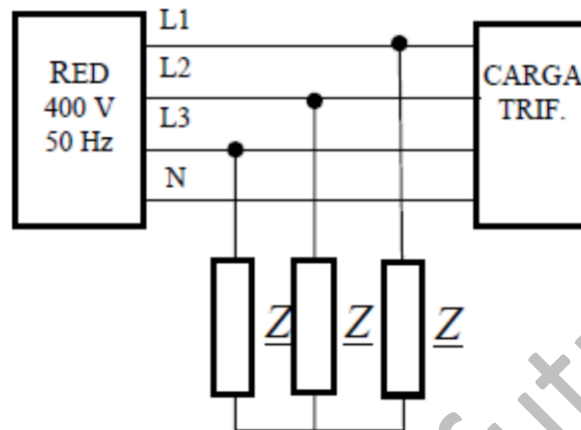
$$P_{20\Omega} = 5,727^2 \cdot 20 = 655,97 \text{ W}$$

e)

$$S_{us1} = (240,7 \pm 21,44)(5,727 \pm 24,77) = 1376 - j80 \text{ VA}$$

Cuestión 4.

Solución:



a)

$$i_1 = 54,126 \angle -36,87^\circ \text{ A}$$

$$i_2 = 28,01 \angle -14,04^\circ \text{ A}$$

b)

$$i_{total} = i_1 + i_2 = 80,67 \angle -29,12^\circ \text{ A}$$

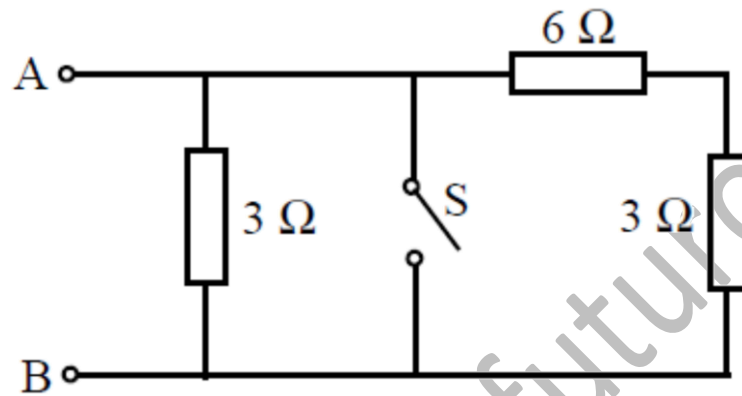
c)

$$\cos \varphi = 0,87 \text{ (inductivo).}$$

OPCION B

Cuestión 1.

Solución:



a)

S abierto:

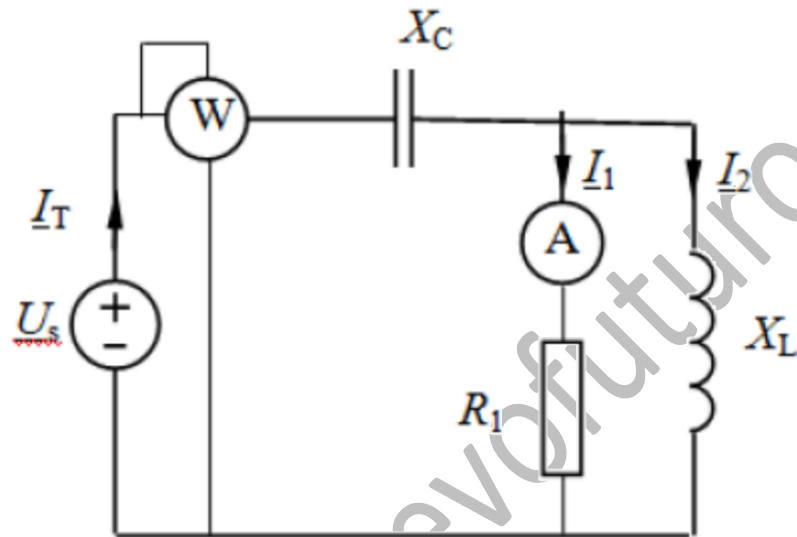
$$R_{equivalente} = (6 + 3) \cdot \frac{3}{6 + 3 + 3} = 2,25 \Omega$$

b)

S cerrado → Cortocircuito, resistencia equivalente nula.

Cuestión 3.

Solución:



a)

$$i_2 = \frac{50}{j10} = 5\sqrt{2} - 90^\circ \text{ A}$$

$$i_{total} = 7,07\sqrt{2} - 45^\circ \text{ A}$$

b)

$$U_s - iZ = 50 \rightarrow U_s = 50\sqrt{2} - 90^\circ \text{ V}$$

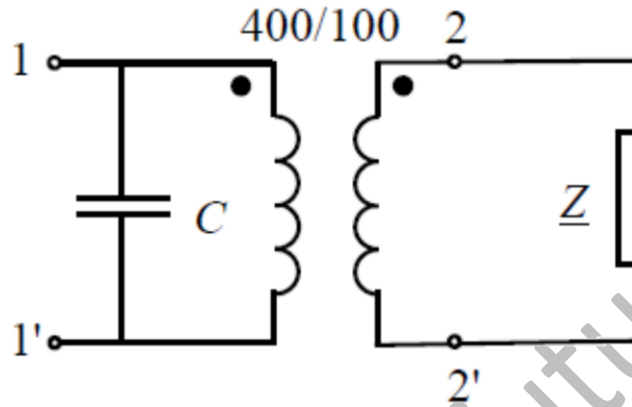
$$P = UI^* \cos\varphi = 50 \cdot 7,07 \cdot \cos 45 = 249,96 \text{ W}$$

c)

$$S = 249,96 - j249,96 \text{ VA}$$

Cuestión 4.

Solución:



a)

$$i_2 = \frac{100}{32 + j24} = 2,5 \angle -36,869^\circ \text{ A}$$

$$S_1 = S_2 \rightarrow 200 + j150 = 400i_1^*$$

$$i_1 = 0,625 \angle -36,869^\circ \text{ A}$$

b)

$$S_{carga} = UI^* = 200 + j150 \text{ VA} = P + jQ$$

c)

$$\cos \varphi = 0,97$$