UNIVERSIDAD AUTÓNOMA DE BAJA CALIFORNIA

CIRCUITOS APLICADOS

TAREA 3ª UNIDAD

Circuitos Acoplados Magnéticamente

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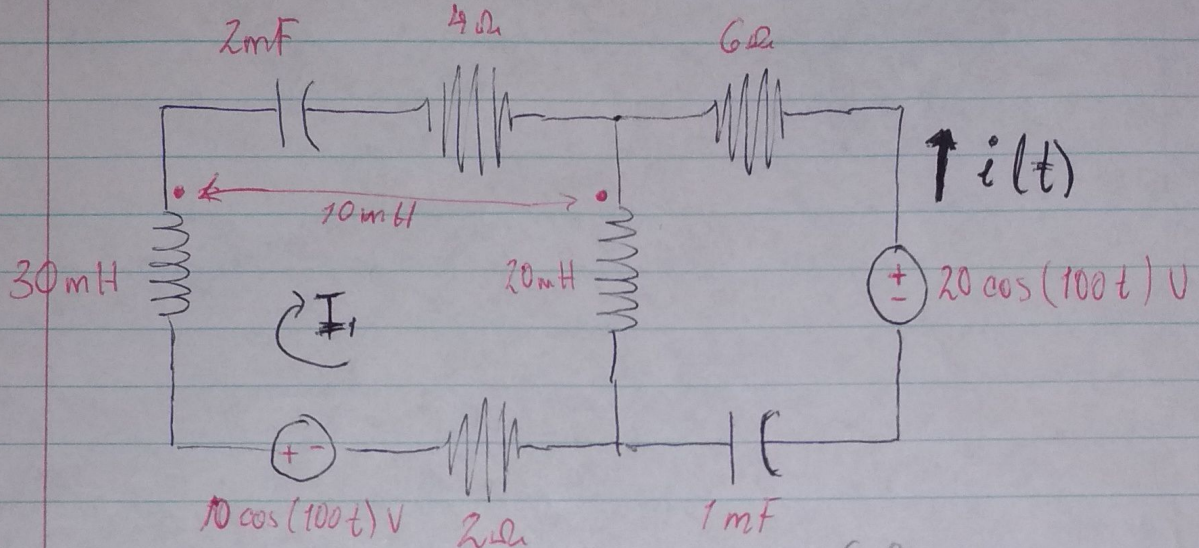
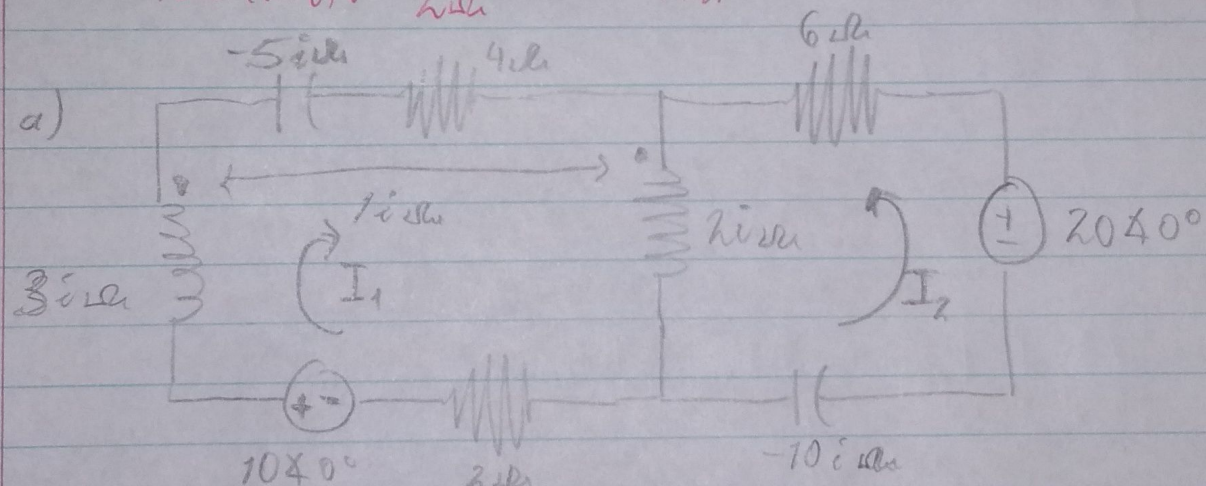
→ Dado el circuito:

a) $i(t)$
b) P_{real}
c) Q
d) S aparente de la fuente de 20 V.





→ Malla 1: $10\angle 0° = 3iI_1 - 5iI_1 + 4I_1 + 2i(I_1+I_2) + 2I_1 - 2(1i)I + 2iI_2$

→ $10\angle 0° = (3i - 5i + 4 + 2i + 2 - 2i)I_1 + (2i+2i)I_2$ ①

→ Malla 2:

$20\angle 0° = 6I_2 + 2i(I_2+I_1) - 10iI_2 - 2i(I_1)$

→ $20\angle 0° = (-2i+2i)I_1 + (6+2i-10i)I_2$ ②

$I_1 = \frac{27}{10} + \frac{1}{10}i$ A

$I_2 = 6/5 + 8/5\,i$ A $\Rightarrow I_2 = 2\angle 53.1301°$ A

$\Rightarrow i_2(t) = \boxed{i(t) = 2\cos(100t + 53.1301°)\ A}$

Lunes 7, Oct. 2019.

b) $P_{real} = Re(S) = S\cos(\theta_v - \theta_i)$

$S_T = V_{RMS} I_{RMS}^* \Rightarrow S_T = \left(\frac{10\angle 0°}{\sqrt{2}}\right)\left(\frac{27/10 + 1/10\, i}{\sqrt{2}}\right)^* + \left(\frac{20\angle 0°}{\sqrt{2}}\right)\left(\frac{6/5 + 8/5\, i}{\sqrt{2}}\right)^*$

$S_T = \frac{27}{2} - \frac{1}{2} i + 12 - 16 i \ VA$

$S_T = \frac{51}{2} - \frac{33}{2} i \ VA$

$P_{real} = Re(S) \Rightarrow P_{real} = \frac{51}{2} W$

$= 25.5 W$

c) $Q = Im(S) \Rightarrow Q = -\frac{33}{2} VAR$

$= -16.5 VAR$

d) $|S|_{20V} = |I_{RMS}|\,|V_{RMS}|_{(20V)}$

$= \left|\frac{6/5 + 8/5\, i}{\sqrt{2}}\right|\left|\frac{20\angle 0°}{\sqrt{2}}\right|$

$|S|_{20V} = 20 \ VAR$