Phasors 006

Problem has been graded.

Find the steady-state currents $i_1(t)$ and $i_2(t)$.

$i_1(t) = A_1$

$i_2(t) = A_2\cos(1000t + B_2)$ with $-180° < B_2 \leq 180°$

Given Variables:

A0 : 2 A

B0 : 25 degrees

C : 200 uF

L : 3 mH

R1 : 6 ohm

R2 : 3 ohm

Calculate the following:

A1 (A) :

1.5 ✓

A2 (A) :

1.5 ✓

B2 (degrees) :

70 ✓

Hint: Solve the second circuit with phasors.

Find the steady-state currents $i_1(t)$ and $i_2(t)$.

$i_1(t) = A_1$

$i_2(t) = A_2\cos(1000t + B_2)$ with $-180° < B_2 \leq 180°$

A0 : 2 A

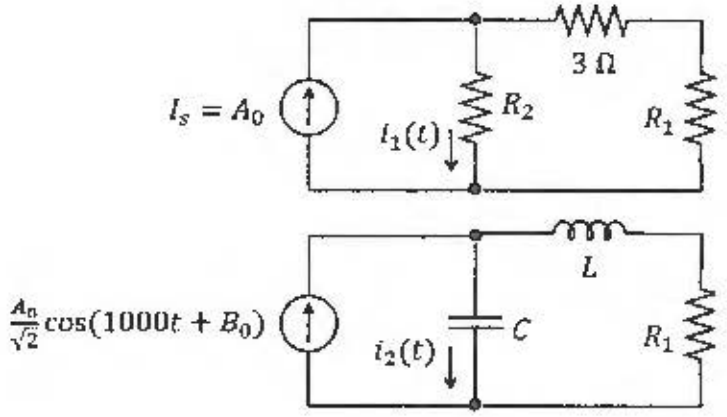
B0 : 20 degrees

C : 250 uF

L : 4 mH

R1 : 4 ohm

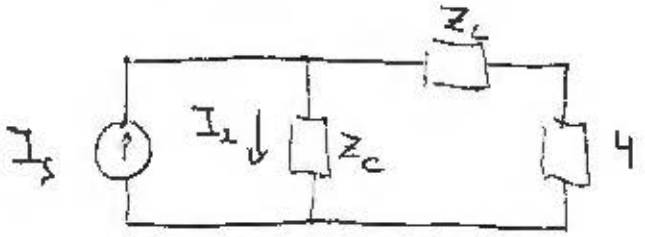
R2 : 3 ohm



① CURRENT DIVIDER. $I_1 = 2 \cdot \frac{3+4}{3+4+3} = \frac{14}{10}$

$A_1 = 1.4\ A$

②



$I_s = \frac{2}{\sqrt{2}} \cdot e^{j20°}$

$Z_L = j\omega L = j\,1000 \cdot 4 \cdot 10^{-3}$

$= 4j$

$Z_C = \frac{1}{j\omega C} = \frac{1}{j\,1000 \cdot 250 \cdot 10^{-6}}$

$= -4j$

$I_1 = I_s \cdot \frac{4j+4}{4j+4-4j} = I_s \cdot \frac{4(1+j)}{4} = \frac{2}{\sqrt{2}} e^{j20°} \sqrt{2}\, e^{j45°}$

$I_1 = 2\, e^{j65°}$

$i_1(t) = 2\cos(1000t + 65°)$

$A_1 = 2\ A$

$B_1 = 65°$