Chapter 10, Solution 45.

Use superposition to find i(t) in the circuit of Fig. 10.90.

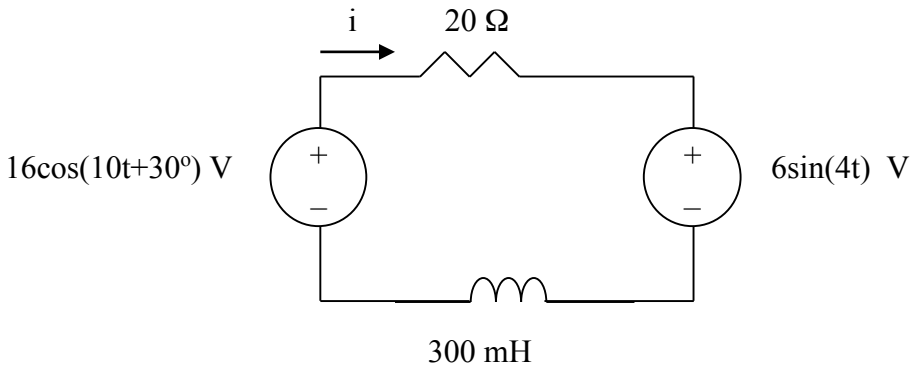
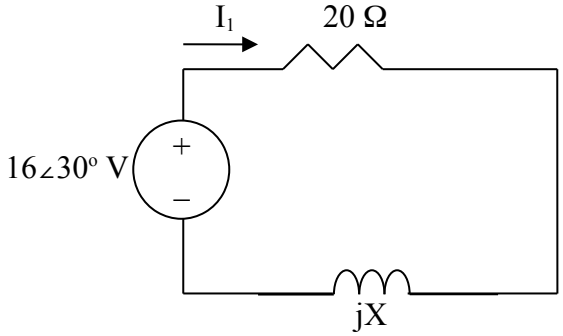


Figure 10.90
For Prob. 10.45.

Solution

Let $i = i_1 + i_2$, where i_1 and i_2 are due to 16cos(10t +30°) and 6sin4t sources respectively. To find i_1, consider the circuit below.



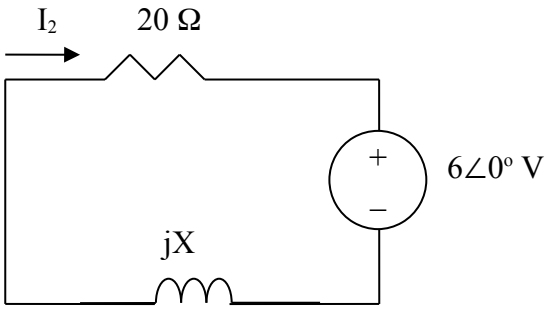
$$X = \omega L = 10x300x10^{-3} = 3$$

Type equation here.

$$I_1 = \frac{16\angle 30°}{20 + j3} = \frac{16\angle 30°}{20.22\angle 8.53°} = 0.7913\angle 21.47°$$

$i_1(t) = 791.1\cos(10t+21.47°)$ mA.

To find $i_2(t)$, consider the circuit below,



$$X = \omega L = 4x300x10^{-3} = 1.2$$

$$I_2 = \frac{-6 \angle 0°}{20 + j\,1.2} = \frac{6 \angle 180°}{20.036 \angle 3.43°} = 0.2995 \angle 176.57° \text{ or}$$

$i_2(t) = 299.5\sin(4t+176.57°)$ mA.

Thus,

$i(t) = i1(t) + i2(t) =$ **[791.1cos(10t+21.47°) + 299.5sin(4t+176.57°)] mA**.