Prob 2.4 $X_L = 5\Omega$ $\omega L = X_L$ $L = \frac{X_L}{\omega} = \frac{5}{2\pi(60)}$

$L = 13.26\,mH$

$C_1 = 60\,\mu F$ $C_2 = 40\,\mu F$; $C_e = 24[\mu F]$

$$Z_o = \sqrt{\frac{L}{C_e}} = \sqrt{\frac{13.26\,mH}{24\,\mu F}} = 23.5[\Omega]$$

$$\omega_o = \frac{1}{\sqrt{LC_e}} = \frac{1}{\sqrt{(13.26m)(24\mu)}} = 1772.5\ [rad/s]$$

ⓐ Instantaneous Current when Switch closes.

$I(0) = 0$, because I can not change instantaneously in an inductor

ⓑ Peak Current

$$I_{peak} = \frac{V_1(0) - V_2(0)}{Z_o} = \frac{16.67\,KV}{23.5\,\Omega} = 709\ [A]$$

ⓒ Energy stored in L after 1ms.

$$I(t) = I_{peak}\sin\omega_o t = 709 \sin 1773\,t\ [A]$$

$$I(1ms) = 709 \sin 1773(1\,ms) = 695\ [A]$$

$$E_L = \frac{1}{2} I^2 L = \frac{1}{2}(695A)^2(13.26\,mH) = 3200\ [J]$$

ⓓ Energy stored in C_1 at the same time.

$$E_{C_1}(0) = \frac{1}{2} C_1 [V_1(0)]^2 = \frac{1}{2}(60\,\mu F)(16.67\,KV)^2 = 8334\ [J]$$

$$E_{C_1}(1ms) = E_{C_1}(0) - E_L(1ms) = 8334[J] - 3200[J]$$

$$= 5134\ [J]$$