Ch. 15 Prob. 20

$f = 1000\,Hz$

$L = 5.0\,mH$

$\omega = 2\pi \cdot f$

$= 2\pi(1000\,Hz)$

$= 6283\,\frac{rad}{s}$

$X_C = X_L$

Find the capacitor value.

since $X_C = \frac{1}{\omega C}$ & $X_L = \omega L$

Then $\frac{1}{\omega C} = \omega L$

with algebra

$$C = \frac{1}{\omega^2 L} = \frac{1}{\left(6283\,\frac{rad}{s}\right)^2 (5.0\times10^{-3}\,H)}$$

$$= 5.07\times10^{-6}\,F$$

$$\boxed{C = 5.07\,\mu F}$$