12. (a) We use $U = \frac{1}{2}LI^2 = \frac{1}{2}Q^2/C$ to solve for L:

$$\begin{aligned} L &= \frac{1}{C}\left(\frac{Q}{I}\right)^2 = \frac{1}{C}\left(\frac{CV_{\text{max}}}{I}\right)^2 \\ &= C\left(\frac{V_{\text{max}}}{I}\right)^2 \\ &= (4.00 \times 10^{-6}\,\text{F})\left(\frac{1.50\,\text{V}}{50.0 \times 10^{-3}\,\text{A}}\right)^2 \\ &= 3.60 \times 10^{-3}\ \text{H}\ . \end{aligned}$$

(b) Since $f = \omega/2\pi$, the frequency is

$$f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{(3.60 \times 10^{-3}\,\text{H})(4.00 \times 10^{-6}\,\text{F})}} = 1.33 \times 10^3\ \text{Hz}\ .$$

(c) Referring to Fig. 33-1, we see that the required time is one-fourth of a period (where the period is the reciprocal of the frequency). Consequently,

$$t = \frac{1}{4}T = \frac{1}{4f} = \frac{1}{4(1.33 \times 10^3\,\text{Hz})} = 1.88 \times 10^{-4}\ \text{s}\ .$$