17. (a) The total energy U is the sum of the energies in the inductor and capacitor:

$$\begin{aligned} U &= U_E + U_B = \frac{q^2}{2C} + \frac{i^2 L}{2} \\ &= \frac{(3.80 \times 10^{-6}\,\mathrm{C})^2}{2(7.80 \times 10^{-6}\,\mathrm{F})} + \frac{(9.20 \times 10^{-3}\,\mathrm{A})^2 (25.0 \times 10^{-3}\,\mathrm{H})}{2} = 1.98 \times 10^{-6}\ \mathrm{J}\ . \end{aligned}$$

(b) We solve $U = Q^2/2C$ for the maximum charge:

$$Q = \sqrt{2CU} = \sqrt{2(7.80 \times 10^{-6}\,\mathrm{F})(1.98 \times 10^{-6}\,\mathrm{J})} = 5.56 \times 10^{-6}\ \mathrm{C}\ .$$

(c) From $U = I^2 L/2$, we find the maximum current:

$$I = \sqrt{\frac{2U}{L}} = \sqrt{\frac{2(1.98 \times 10^{-6}\,\mathrm{J})}{25.0 \times 10^{-3}\,\mathrm{H}}} = 1.26 \times 10^{-2}\ \mathrm{A}\ .$$

(d) If q_0 is the charge on the capacitor at time $t = 0$, then $q_0 = Q\cos\phi$ and

$$\phi = \cos^{-1}\left(\frac{q}{Q}\right) = \cos^{-1}\left(\frac{3.80 \times 10^{-6}\,\mathrm{C}}{5.56 \times 10^{-6}\,\mathrm{C}}\right) = \pm 46.9^\circ\ .$$

For $\phi = +46.9^\circ$ the charge on the capacitor is decreasing, for $\phi = -46.9^\circ$ it is increasing. To check this, we calculate the derivative of q with respect to time, evaluated for $t = 0$. We obtain $-\omega Q \sin\phi$, which we wish to be positive. Since $\sin(+46.9^\circ)$ is positive and $\sin(-46.9^\circ)$ is negative, the correct value for increasing charge is $\phi = -46.9^\circ$.

(e) Now we want the derivative to be negative and $\sin\phi$ to be positive. Thus, we take $\phi = +46.9^\circ$.