

7. (a) The mass  $m$  corresponds to the inductance, so  $m = 1.25$  kg.  
 (b) The spring constant  $k$  corresponds to the reciprocal of the capacitance. Since the total energy is given by  $U = Q^2/2C$ , where  $Q$  is the maximum charge on the capacitor and  $C$  is the capacitance,

$$C = \frac{Q^2}{2U} = \frac{(175 \times 10^{-6} \text{ C})^2}{2(5.70 \times 10^{-6} \text{ J})} = 2.69 \times 10^{-3} \text{ F}$$

and

$$k = \frac{1}{2.69 \times 10^{-3} \text{ m/N}} = 372 \text{ N/m} .$$

- (c) The maximum displacement corresponds to the maximum charge, so  $x_{\text{max}} = 175 \times 10^{-6}$  m.  
 (d) The maximum speed  $v_{\text{max}}$  corresponds to the maximum current. The maximum current is

$$I = Q\omega = \frac{Q}{\sqrt{LC}} = \frac{175 \times 10^{-6} \text{ C}}{\sqrt{(1.25 \text{ H})(2.69 \times 10^{-3} \text{ F})}} = 3.02 \times 10^{-3} \text{ A} .$$

Consequently,  $v_{\text{max}} = 3.02 \times 10^{-3}$  m/s.