An oscillating LC circuit consisting of a 1.8 nF capacitor and a 2.4 mH coil has a maximum voltage of 6.1 V.
(a) What is the maximum charge on the capacitor?
(b) What is the maximum current through the circuit?
(c) What is the maximum energy stored in the magnetic field of the coil?

Solution

(a) $Q_{max} = CU_{max} = 1.8 * 10^{-9} * 6.1 = 1.1 * 10^{-8} = 11$ nC

(b) $E = \frac{LI_{max}{}^2}{2} \gg I_{max} = \sqrt{\frac{2E}{L}} = \sqrt{\frac{2*33.5*10^{-9}}{2.4*10^{-3}}} = 5.3 * 10^{-3} A = 5.3\ mA$

(c) $\max E_{coil} = \max E_{\text{capacitor}} = \text{E} = \frac{CU_{max}^2}{2} = 1.8 * \frac{10^{-9}}{2} * 6.1^2 = 33.5 * 10^{-9}\text{J} = 33.5$ nJ