Physics 2220
Spring 2002
George A. Williams

FINAL EXAM

3.

Name:_____

Discussion Instructor (circle): Andrade El-Gendy Mimoto Owen

Discussion Section # _____ Student ID #:_____ 3

SHOW ALL WORK!!!!!
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

An LC circuit includes a 30.0 μF capacitor and has a period of 2.50 ms. The peak value of the current is 13.0 mA.

(a) Calculate the inductance in the circuit.
(b) Calculate the peak value of the charge on the capacitor.

a) $\omega = 2\pi f = \frac{2\pi}{T} = \frac{1}{\sqrt{LC}} = \frac{2\pi}{2.5\times10^{-3}} = 2513\ s^{-1}$

$\therefore \frac{4\pi^2}{T^2} = \frac{1}{LC} \Rightarrow L = \left(\frac{T^2}{4\pi^2}\right)\frac{1}{C} = \frac{(2.5\times10^{-3})^2}{4\pi^2}\frac{1}{30\times10^{-6}}$

$= 5.28\ mH$

b) $I = \frac{dq}{dt} \Rightarrow I_p = \omega q_p$

$\Rightarrow q_p = I_p/(2513) = 13\times10^{-3}/2513 = 5.18\ \mu C$