

Name: KEY

PHYSICS 2220 - QUIZ #8 - SPRING 2009

1. Consider an RLC circuit with  $\mathcal{E}_m = 12 \text{ V}$ ,  $R = 24 \Omega$ ,  $L = 400 \text{ mH}$ , and  $C = 6.4 \mu\text{F}$ .

- a. Find the angular resonance frequency and the impedance at resonance.

$$\omega_0 = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{(0.4 \text{ H})(6.4 \times 10^{-6} \text{ F})}} = \boxed{625 \frac{\text{rad}}{\text{sec}}}$$

At resonance,  $X_L = X_C$  so

$$Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{R^2} = \boxed{R = 24 \Omega}$$

- b. Find the amplitude of the voltage across the capacitor at resonance.

$$V_C = I_m X_C = \frac{\mathcal{E}_m}{Z} \frac{1}{\omega_0 C}$$
$$S_o \quad V_C = \frac{12 \text{ V}}{24 \Omega} \frac{1}{(625 \frac{\text{rad}}{\text{sec}})(6.4 \times 10^{-6} \text{ F})}$$
$$= \boxed{125 \text{ V}}$$