

***Physics Department***

***Physics 112***

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**Preliminary Laboratory Questions sheet**

**Experiment 5: Capacitors and Inductors .**

Q1: We can calculate and measure in both RC and RL circuits time constants ***τ*** but we do not do that for the LC circuit. Explain Why?

In reality it is never possible to construct a pure LC circuit . Various sources of resistance cause a continuous loss of power as heat ; consequently , the simple harmonic will sooner or later decay . Moreover, it hasn’t a charging and discharging cases .

Q2: Calculate ***τ*** for RC circuit if R = 1kΩ and C = 0.1 μF?

$$τ=RC=1×10^{3}×0.1×10^{-6}=0.1 ms$$

Q3: Calculate ***τ*** for RL circuit if R = 1kΩ and L = 10 mH?

$$τ=\frac{L}{R}=\frac{10 ×10^{-3}}{1×10^{3}}=10 μs $$

Q4: What do we mean by natural frequency of an object like a bridge or a tuning fork?

$$ω\_{0}=\frac{1}{\sqrt{LC}}$$

When the system is driven at the natural frequency, it is said to be in resonance.

Q5: Calculate the frequency of oscillation an LC circuit with L = 10 mH and C = 0.1 μF ?

$$ω=\frac{1}{\sqrt{10×10^{-3}×0.1×10^{-6}}}=31622.78$$

Q6: What will happen when the driving frequency in LC circuit equals its natural frequency? Explain in detail.

The system will reach its maximum amplitude when the driving frequency [omega] of the applied emf is equal to



This frequency is the natural frequency of the LC circuit.