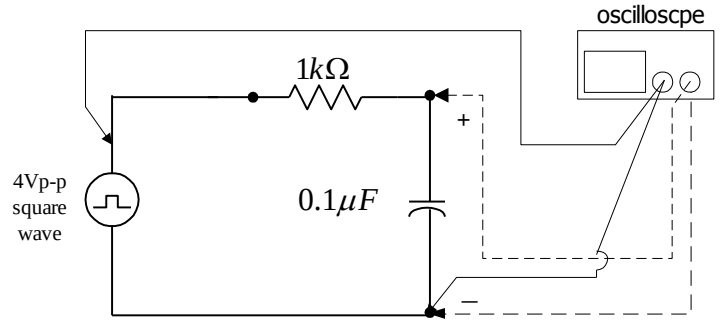
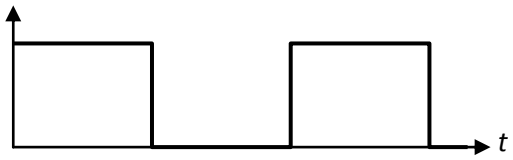
School of Information, Computer and Communication Technology
Sirindhorn International Institute of Technology
Thammasat University

ECS204 Quiz 5 Sample

In this lab, we will investigate the discharging of a capacitor. The circuit is connected as shown in the figure below.



1) The plot below shows the voltage across the generator. On the same plot, sketch the voltage across the capacitor.



2) Which of the following equations describes the capacitor voltage when it is discharging?

a) $V(t) = V_{in}(1 - e^{\frac{-t}{\tau}})$ b) $V(t) = V_0 e^{\frac{-t}{\tau}}$

3) What is the value of τ for the circuit above?

4) What is the relationship between τ and t_{half} ?

Hint: The quantity t_{half} is defined in the lab manual as the time elapse that the voltage across the capacitor drops to half of the maximum voltage.

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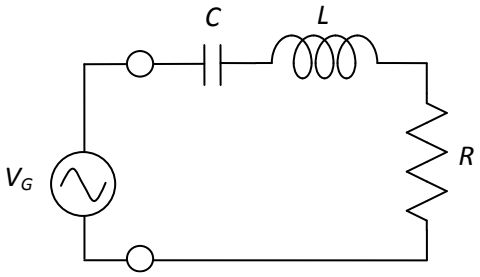
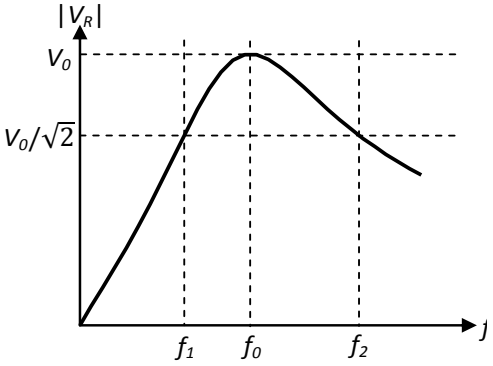
Consider a series RLC circuit with a sinusoidal function generator whose peak voltage V_G = 8V and angular frequency is ω rad/s.



The voltage across the resistor in this circuit is given by

$$V_R = R\frac{V_G}{R + j\omega L + \dfrac{1}{j\omega C}}.$$

The plot of the magnitude of V_R as a function of the frequency f (in Hz) is shown below.



Note that, as usual, $f = \dfrac{\omega}{2\pi}$.

We will also assume $\dfrac{1}{2\pi} \approx 0.1592$.

Suppose

$$L = \frac{1}{200\pi}\ \text{H and } f_0 = 10\ \text{kHz}.$$

1. What is the value of C ?

2. What is the value of V_0 ?

3. Suppose $f_2 - f_1 = 10$ kHz. What is the value of R?

Hint: $BW = \dfrac{R}{L}$ and the unit of BW is in rad/s.

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What is the value in nF of the capacitor that is labeled with numerical code 103K ?

What is the value in nF of the capacitor that is labeled with numerical code 222K ?

What is the numerical code of the capacitor that has the value $84nF$?

What is the numerical code of the capacitor that has the value 47 nF ?

What is the numerical code of the capacitor that has the value 680 nF ?