EASTERN UNIVERSITY, SRI LANKA

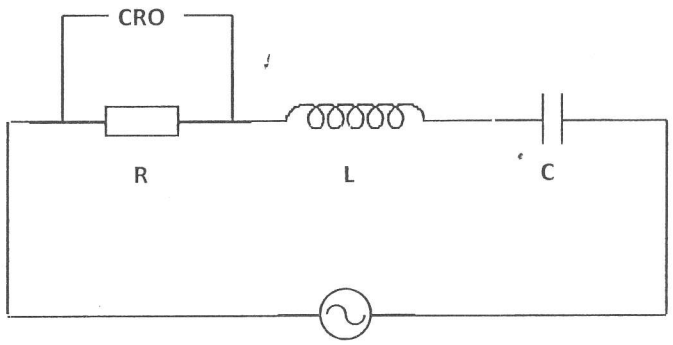
SECOND YEAR FIRST SEMESTER EXAMINATION IN SCIENCE - 2021/2022

(March/April - 2024)

PH2051 GENERAL PHYSICS LABORATORY-I

Time Allowed: $1\frac{1}{2}$ hours

Answer ALL Questions



When an input signal $V_{in} = V_o e^{i\omega t}$ is given to the circuit above, the current through the above circuit is given by $I = \dfrac{V_o}{\sqrt{R^2 + \left(\omega L - \dfrac{1}{\omega C}\right)^2}} e^{j(\omega t - \phi)} = I_o e^{j(\omega t - \phi)}$,

where $\tan\phi = \dfrac{\omega L - \dfrac{1}{\omega C}}{R}$.

(a) Show that resonance occur when $f_r = \dfrac{1}{2\pi\sqrt{LC}}$.

(b) Connect the circuit as shown in the above figure.

(c) Use a suitable frequency range on the signal generator and obtain the output wave pattern across the resistance R (as shown in figure) for suitable capacitance (C) and resistance (R) values.

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(d) Vary the frequency from the signal generator for 10 different values and note the value of $\left|\frac{V_R}{V_o}\right|$.

(e) Plot the graph of $\left|\frac{V_R}{V_o}\right|$ vs the frequency (f) and determine the value of resonance frequency f_r

(f) Hence obtain the value of the inductance L of the coil using the equation $f_r = \frac{1}{2\pi\sqrt{LC}}$.

(g) Measure the value of ϕ at resonance frequency and calculate R, and compare with the value you have set in the circuit.