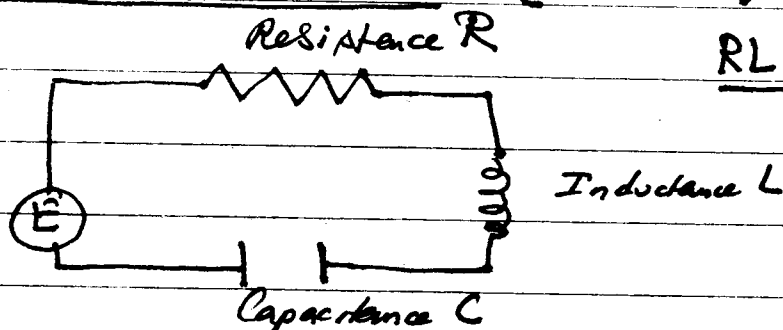


HW : 3, 5, 11, 13

(1)

5.6 Electrical Circuits (Also 3.5)

RLC - Circuit



Kirchhoff's Laws:

Current Law (1) Sum of current flowing into any junction point is zero.

Voltage Law (2) Sum of ~~potential~~ voltage drops

around any closed loop is zero. Let $I = I(t)$ be the current through any point at time t

Ohm's Law: Voltage drop across resistor $E_R = RI$. (Resistor (Ohm))

Voltage drop across inductor $E_L = L \frac{dI}{dt}$ (L Henry (H))

Voltage drop across a capacitor (charge q coulombs)

$$E_C = \frac{1}{C} q$$

where $q = q(t)$ is the charge on the capacitor & C is the capacitance. (farad (F))

Here $I = \frac{dq}{dt}$

By Kirchhoff's voltage Law

$$E_L + E_R + E_C = E(t)$$

voltage applied to the circuit at time t (volts V)

So

$$L \frac{dI}{dt} + RI + \frac{1}{C} q = E(t).$$

$$L \frac{d^2 I}{dt^2} + R \frac{dI}{dt} + \frac{1}{C} I = E'(t)$$