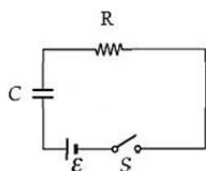


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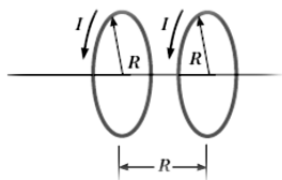
Chapter 28-31, Serway; ANY TYPES OF CHEATING WILL MAKE YOU FAIL!

Please write down the answers on the blank space or on the back of this paper. Answer should be in English. [] indicates the question points.

Q1. (a) Draw the charging and discharging diagram for the given RC circuit as a function of time. Suppose you are working in a camera production company as a circuit designer. To develop an efficient flush (light) device you need to design a RC circuit of short time constant. If you set voltage $\mathcal{E} = 5\text{V}$ to charge the capacitor C as shown in figure below, (b) what resistance do you need to add to reach flush time 1ms. (c) How much current will be generated in the resistor during 1ms after the switch is closed. Let the capacitor stored charge $25 \times 10^{-6}\text{C}$ and Flush time can be considered as time constant of the circuit. [5+10+15 = 30]



Q2. In general physics laboratory suppose you need to set up Helmholtz coils to produce a uniform magnetic field, where the separation distance between the coils is equal to the radius of the coils. If each coil carries current 10A, (a) determine the magnitude of the magnetic field at a point on the common axis of the coils and halfway between them. Let each coil has $N = 100$ turns and radius $R = 500\text{cm}$. (b) Now if an electron is accelerated through 2400V from rest and let it enters into this uniform magnetic field, calculate the maximum and minimum values of magnetic force experienced by the electron? Here mass of electron, $m = 9.11 \times 10^{-31}\text{kg}$, charge, $e = 1.6 \times 10^{-19}\text{C}$, $\mu_0 = 4\pi \times 10^{-7}\text{T} \cdot \text{m/A}$. [20+20=40]



Q3. (a) What is solenoid? If you make a solenoid with 2000 turns per meter and radius 2 cm and then supply an oscillating current $I = 5 \sin 100\pi t$ through it, (b) Find out the electric field induced at a radius $r = 1\text{cm}$ from the axis of the solenoid? (c) What will be the direction of this electric field when the current is increasing counterclockwise in the solenoid? [5+15+10=30]