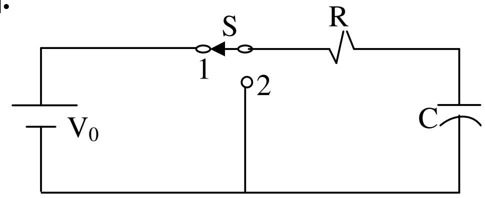
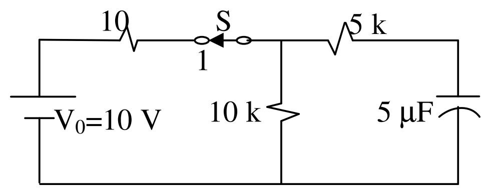
	UNIVERSITY OF GAZIANTEP DEPARTMENT OF ENGINEERING PHYSICS EP 106 General Physics II Second Midterm Exam Questions	2003 TIME 110 min. SUMMER SCHOOL

[1].



(a) Prove that the voltage across a capacitor during a charging phase (position 1) in an RC circuit (in above figure) is given by the relation

$$V_C(t)=V_0\,(1-\exp(-t/RC))$$



(b) Find the mathematical expression of the voltage and current for the capacitor in above figure and then determine V_c and i_c at 100 ms.

[2]. An automobile battery has a potential difference of 12.0 V and sends current through a circuit of total resistance 1.5 Ω that contains a copper wire 1. 0 m long with an 0.3 cm^2 cross-sectional area. Find:

(a) the current through the wire,

(b) the energy lost to heat in the circuit in one hour and

(c) the distance travelled by an electron in the circuit in one hour.

(M_{Cu}=63.5 g/mole, $N_A=6.02\times10^{23}$ $mole^{-1}$, $\rho=8.91\times10^{3}$ kg/m^3)

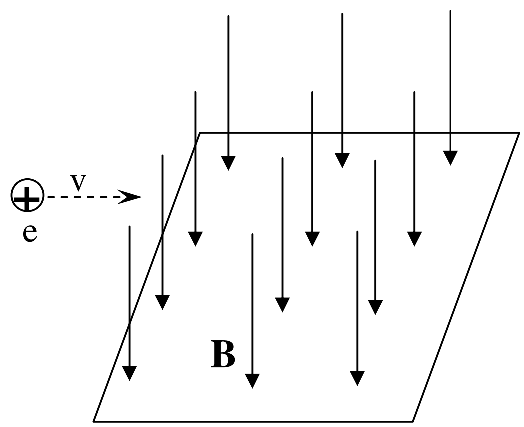
[3]. A proton is moving in a positive x-direction as it enters a region of uniform magnetic field of B= 0.4 Tesla directed vertically down as shown in Figure. The proton starts to follow a circular path of a radius 10 cm in this magnetic field.

(a) Draw path of the proton in this uniform magnetic field.

(b) Determine the momentum and speed of the proton.

(c) If the proton is initially accelerated under the potential difference 12 kV into the same magnetic field, what will be radius of the path of the proton.

($m_p=1.67\times10^{-27}$ kg, $e=1.6\times10^{-19}$ C)



[4]. Two long and thin straight wires carry currents at opposite direction as shown in figure. Find the magnitude of magnetic field and directions at the points P_1 and P_2 using Amper's law.