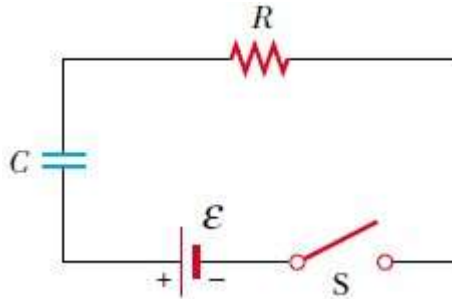


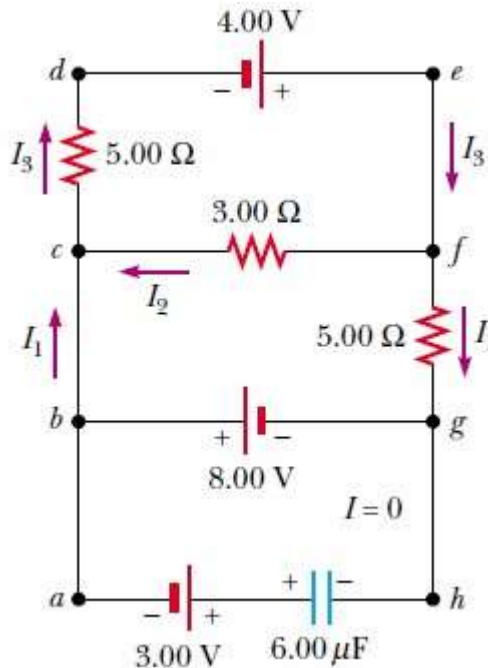
ASSIGNMENT #2 PHY5122 Y1GSE /20marks

In your respective groups attempt the following questions

1. An uncharged capacitor and a resistor are connected in series to a battery, as shown in Figure below. If $\mathcal{E} = 12 \text{ V}$, $C = 5 \mu\text{F}$, and $R = 8 \times 10^5 \Omega$, find the time constant of the circuit, the maximum charge on the capacitor, the maximum current in the circuit, and the charge and current as functions of time.



2. Under steady-state conditions, find the unknown currents I_1 , I_2 , and I_3 in the multiloop circuit shown in Figure below. What is the charge on the capacitor?



3. A solenoid is 40cm long, has cross-sectional area 8cm^2 , and is wound with 300turns of wire that carry a current of 1.2A. The relative permeability of its iron core is 600. Compute
 - (i) The magnetic field for the interior point and
 - (ii) The flux through the solenoid.
4. A 50-loop circular coil has a radius of 3cm. It is oriented so that the field lines of a magnetic field are normal to the area of the coil. Suppose that the magnetic field is varied so that B increase from 0.1T to 0.35T in time of 2milleseconds. Find the average induced emf in the coil.

5. Calculate the inductance of an air-core solenoid containing 300 turns if the length of the solenoid is 25.0 cm and its cross-sectional area is 4.00 cm². Calculate the self-induced emf in the solenoid if the current it carries is decreasing at the rate of 50.0 A/s.
6. In Figure below, the capacitor is initially charged when switch S1 is open and S2 is closed. Switch S2 is then opened, removing the battery from the circuit, and the capacitor remains charged. Switch S1 is then closed, so that the capacitor is connected directly across the inductor.
- Find the frequency of oscillation of the circuit.
 - What are the maximum values of charge on the capacitor and current in the circuit?
 - Determine the charge and current as functions of time.

