# PHYCS 102
# Test (II)

**Time: 11:00 – 11:50 am**

**Date: 22$^{nd}$ May 2001**

Name:--------------------------------------------------ID#----------------------------Sec:-------------

| Qts | Marks | |
|-----|-------|------|
| 1 | | |
| 2 | | |
| 3 | | ___ |
| 4 | | 100 |
| Total | 100 | |

**Important data:**

$e^{-} = e^{+} = 1.6 \times 10^{-19} C$ $\qquad$ $m_e = 9.1 \times 10^{-31} kg$

$m_p = 1.67 \times 10^{-27} kg$ $\qquad$ $k = \dfrac{1}{4\pi \varepsilon_o} = 9 \times 10^9 \quad \dfrac{Nm^2}{C^2}$

$g = 10 \text{ m/s}^2$

1. A tungsten wire of length 3m and cross section area of $2 \times 10^{-2} cm^2$ is connected with a source of emf $= 20V$, and internal resistance of $0.5\Omega$, find:
   a. The resistance of the wire assuming ($\rho = 5.6 \mu \Omega . cm$)
   b. The current density in the tungsten wire.
   c. The electric field in the wire.
   d. The electron drift velocity. The concentration of electrons in the tungsten wire is
      $n = 6.32 \times 10^{22}/cm^3$.



$$3m$$

$$A = 2 \times 10^{-2} cm^2$$

$$0.5\Omega$$

$$\varepsilon = 20V$$
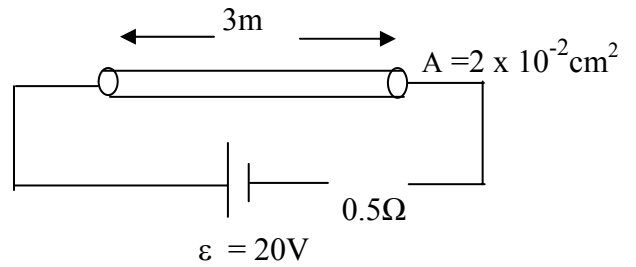
**Q2.** The ammeter reads 2A, find the following:
   **a.** $I_1$, $I_2$ and R.
   **b.** The power dissipated in the 10Ω resistor.
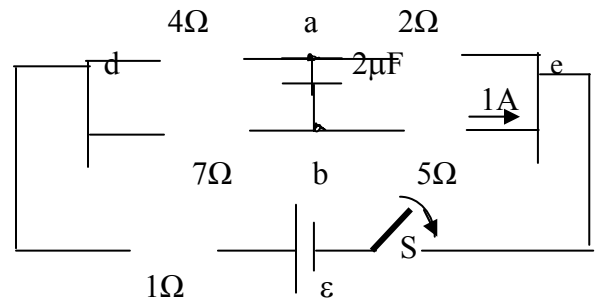   **c.** The potential difference $V_{ab}$.
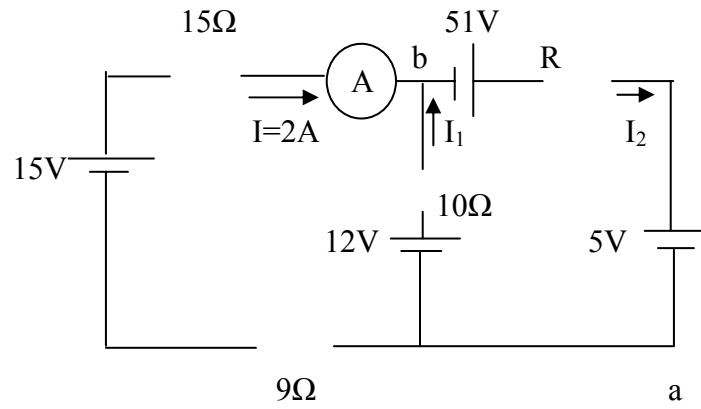
**Q3.** Consider the circuit shown below. Calculate, after a long time of connection, the
  a. Voltage $V_{ab}$
  b. Charge of the capacitor.

  c. If the switch (s) is opened, how long does it take for the capacitor to discharge to $\left(\dfrac{1}{5}\right)$ of its initial charge?

**4.** The accelerating voltage that is applied to an electron beam is 5000V. The beam enters a region of uniform magnetic field of 50 mT perpendicular to the page as shown. Determine:

    **a.** The velocity of electrons in the beam.

    **b.** The radius of the electron trajectory.

    **c.** Draw the path of the electron in the region of the external magnetic field.



B = 50 mT

+ 5000V