

## 9.1 - Electric Conduction in Metals

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- (1999) State Kirchhoffs laws of circuit analysis
- (2000) State Kirchhoffs laws of electric circuits.
- (2000) What do you understand by the term drift velocity as applied to any current carriers in a wire?
- (2000) Determine the drift velocity of electrons in a silver wire of a crosssectional area  $4.5 \times 10^{-6} \text{ m}^2$  when a current of 15 A flows through it. Given: The density of silver =  $1.05 \times 10^4 \text{ kg/m}^3$  . The atomic weight of silver = 108 .
- (2000) An unknown wire of 1 mm diameter is found to carry and passes a total charge of 90 C in 1 hour and 15 min. If the wire has  $5.8 \times 10^{28}$  free electrons per  $\text{m}^3$  , find
  - the current in the wire.
  - the drift velocity of the electrons in  $\text{m s}^{-1}$
- (2000) The current of 12 A is made to pass through an aluminium wire of radius 1.5 mm which is joined in series with a copper wire of radius 0.8 mm. Determine.
  - the current density in an aluminium wire.
  - the drift velocity of the electron tn the copper wire, given that the number of free electrons per unit volume in a copper wire is  $10^{29}$  .
- (2007) Define the internal resistance (r) of a cell and the terminal potential difference.
- (2007) The e.m.f. of a cell is a special terminal potential difference. Comment.
- (2007) State Kirchhoff's laws of electrical network.
- (2007) Discuss two (2) harmful effects of electrolysis.
- (2009) Explain the mechanism of electric conduction in:
  - Gases
  - Electrolytes
- (2010) Define the temperature coefficient of resistance
- (2013) What is meant by power rating" as regards to a resistor?
  - Mention two distinct velocities of an electron in a wire.

- (2013) Explain why it is better to use a small current for a long time to plate a metal with a given thickness of silver than using a larger current for a short time?
- (2013) Give four difference between the passage of electricity through metals and ionized solution.
- (2014) Define the following terms:
  - Current density
  - Conductivity
- (2014) Under what condition is  $\Omega$  s law true?
- (2014) Why does the voltage across the terminals of a cell or battery fall when it is delivering a current?
- (2014) Define temperature coefficient of resistance.
  - A heating coil of Nichrome wire with cross sectional area of  $0.1 \text{ mm}^2$  operates on a  $12 \text{ V}$  supply, and has a power of  $36 \text{ W}$  when immersed in water at  $373 \text{ K}$ . Calculate the length of the wire.
- (2015) What is meant by the following terms:
  - Internal resistance of a cell.
  - Drift velocity.
- (2015) What is a potentiometer.
  - Mention two advantages and two disadvantages of potentiometer.
- (2015) Distinguish between ohmic and non-ohmic conductor. Give one example in each
- (2016) What is the physical significance of Kirchhoff's first law?
- (2016) Why is Kirchhoff's second law sometimes referred to as the voltage law?
- (2016) List down five points to be considered when applying Kirchhoff's second law in formulating analytical problems or equations.
- (2017) What is the advantage of using a greater length of potentiometer wire?
- (2017) Why is Wheatstone bridge not suitable for measuring very high resistance?
- (2017) List two factors on which the resistivity of a material depends.
- (2017) A wire of resistivity,  $\rho$ , is stretched to double its length. What will be its new resistivity? Give reason for your answer.
- (2017) Why a high voltage supply should have high internal resistance?
- (2017) Justify the statement that it is not possible to verify Ohm's law by using a filament lamp.
- (2017) A potential difference of  $4 \text{ V}$  is connected to a uniform resistance wire of length  $3.0 \text{ m}$  and cross-sectional area  $9 \times 10^{-9} \text{ m}^2$ , when a current of  $0.2 \text{ A}$  is flowing in the wire. Find the:

- Resistivity of the wire.
- Conductivity of the wire.

- (2018) Outline three important points which are usually referred as sign convection in solving Kirchhoffs second law problems.
- (2018) How is ohmic conductor differ from non-ohmic conductor? Give one example in each case.
- (2018) State a condition that could be employed to make an insulator conduct some electricity.
- (2018) What is meant by the term Ballistic galvanometer?
- (2018) State two conditions to be fulfilled for a galvanometer to be used as a ballistic galvanometer.
- (2019) A researcher has 2 g of gold and wishes to form it into a wire having a resistance of  $80\Omega$  at  $0^\circ\text{C}$  . How long should the wire be?