

Electronics

Electronics : Electronics is the branch of physics and technology concerned with the behaviour and movement of electrons.

Diode Valve : Designed by J. A. Fleming in 1904, diode valve consists of two electrodes placed inside an evacuated glass envelope. One electrode is called cathode which is made up of tungsten on which there is a thin layer of barium oxide. When heated, cathode emits electrons. These electrons flow towards the other electrode called anode or plate, which is at positive potential. As a result an electric current is established in the circuit.

---> The electrons emitted from the cathode are collected in the evacuated space around it. This collection of electrons is called space charge which is obviously negative.

---> Diode valve acts as a rectifier. Rectifier is a device which converts alternating voltage (current) into direct voltage (current).

Triode Valve : Designed by Lee de Forest in 1907, triode valve is a modified form of usual diode. It consists of a usual anode - cathode pair and one more electrode called control grid.

---> Triode valve can be used as amplifier, oscillator, transmitter and detector.

Semi-conductor : Semi-conductors are those materials whose electrical conductivity, at room temperature, lies in between that of insulator and conductor. Germanium and Silicon are two important semiconductors. In a crystal lattice of semi-conductor, some of the electrons become free from bond formation. At the sites of these electrons a deficiency of electron exists which acts as a virtual positive charge. These virtual positive charges are called holes. Semi-conductors are used in electronics industry.

Semi-conductors are of two types :

(i) Intrinsic Semi-Conductor : A semi-conductor in an extremely pure form is known as intrinsic semi-conductor.

(ii) Extrinsic Semi-Conductor : If a measured and small amount of chemical impurity is added to intrinsic semi-conductor, it is called extrinsic semi-conductor or doped semi-conductor. As a result of doping, there is a large increase in its conductivity.

---> **Extrinsic semi conductor are of two types :**

(a) N type semi conductor : An extrinsic semi conductor in which electrons are majority charge carrier is called N type semi conductor. Such a semi conductor is made by doping a pure semi conductor with pentavalent impurity like Arsenic, Antimony & Phosphorus.

(b) P type semi conductor : An extrinsic semi conductor in which holes are the majority charge carrier is called a P type semi conductor. Such a semi conductor is made by doping a pure semi conductor with trivalent impurity like Gallium, Indium, Boron and Aluminium.

Doping : Adding of chemical impurity to a pure semi conductor is called doping. The amount and type of impurity is closely controlled.

Donor : Pentavalent impurities are called donor.

Acceptor : Trivalent impurities are called acceptor.

---> The electrical conductivity of a semi conductor increases with the increase in temperature.