❖ **Light Emitting Diode (LED):** LED is a PN junction semiconductor device which can convert electrical energy into light energy. The working of LED depends on the quantum theory. It states that when an electron moves from higher energy level to lower energy level, it emits energy in the form of photon. The energy of the photons is equal to the gap between the higher and lower levels. The LED works in forward bias configuration as shown in the figure. In forward bias the positive charge on the p side pushes the holes towards the junction and the negative charge of the n-side pushes the electrons towards the junction. The depletion layer gets smaller.

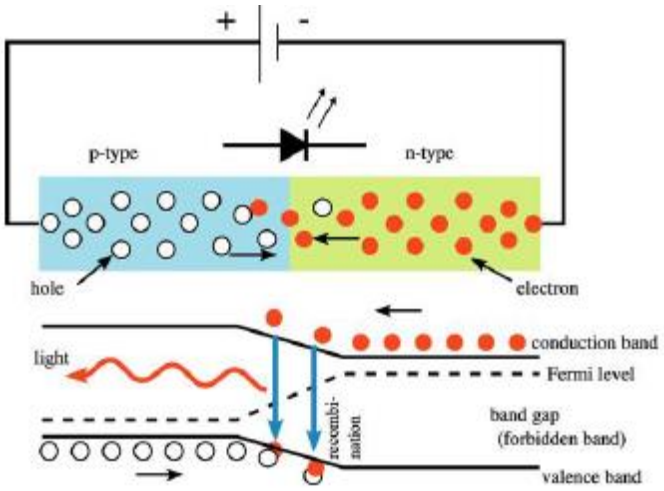

Fig. : LED with PN junction

As the junction is formed by p- and n-types, there are holes in the valence band on the p side and electrons in the conduction band on the n-side. The forward bias will push the electrons and the holes to the depletion region. Therefore the electrons will recombine close to the depletion region with the holes. If the electrons recombine they release energy in the form of light. Hence it is called as light emitting diode.

Wavelength pf the emitted light is expressed as

$$\lambda = \frac{hc}{E_g}$$

Where E_g is the energy band gap