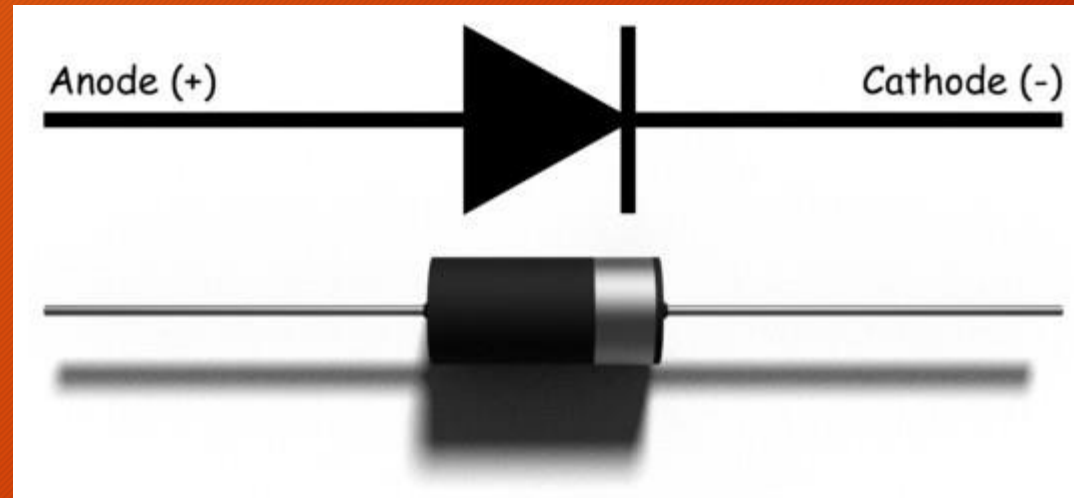


27-Diodes

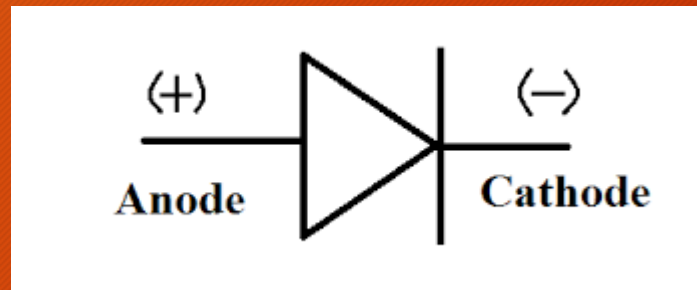
Diodes

- A diode is a semiconductor device with two terminals, typically allowing the flow of current in one direction.



SEMICONDUCTOR DIODES

- These are semiconductor components that are used to control the direction of flow of current in the circuit.
- Its symbol is:

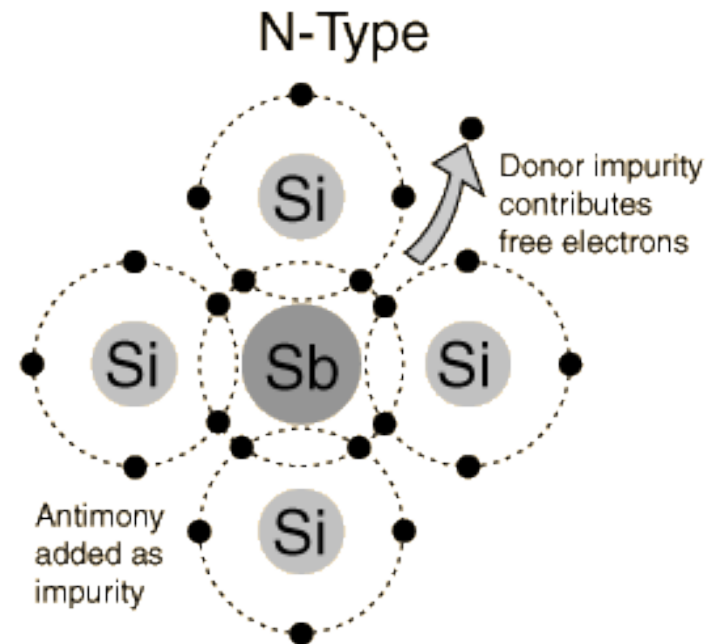
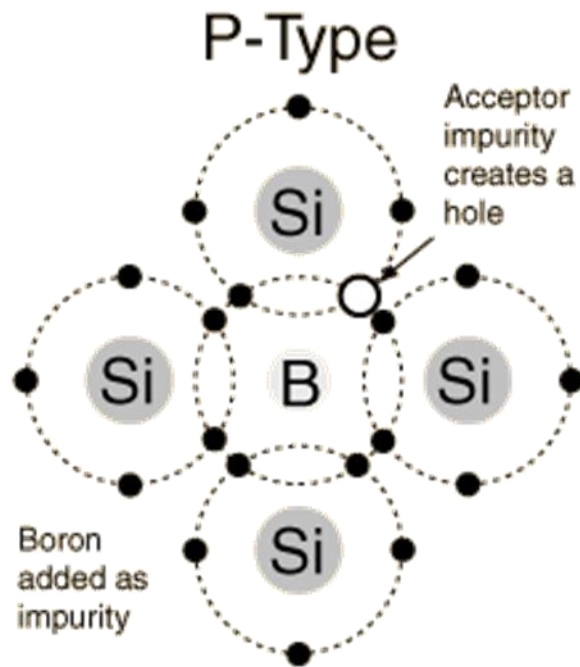


- These are made of Germanium and Silicon.

SEMICONDUCTOR DIODES

- CONSTRUCTION
- IVth group element like Silicon or Germanium are used to make these diodes. Since their valence shells are half filled under normal circumstances they are not very reactive.
- One half of the element is doped with trivalent impurity for electron deficiency and the other is doped with pentavalent impurity because of which electrons are the majority charge carriers in that half.
- When these two halves are allowed to react they form a pn junction semiconductor.

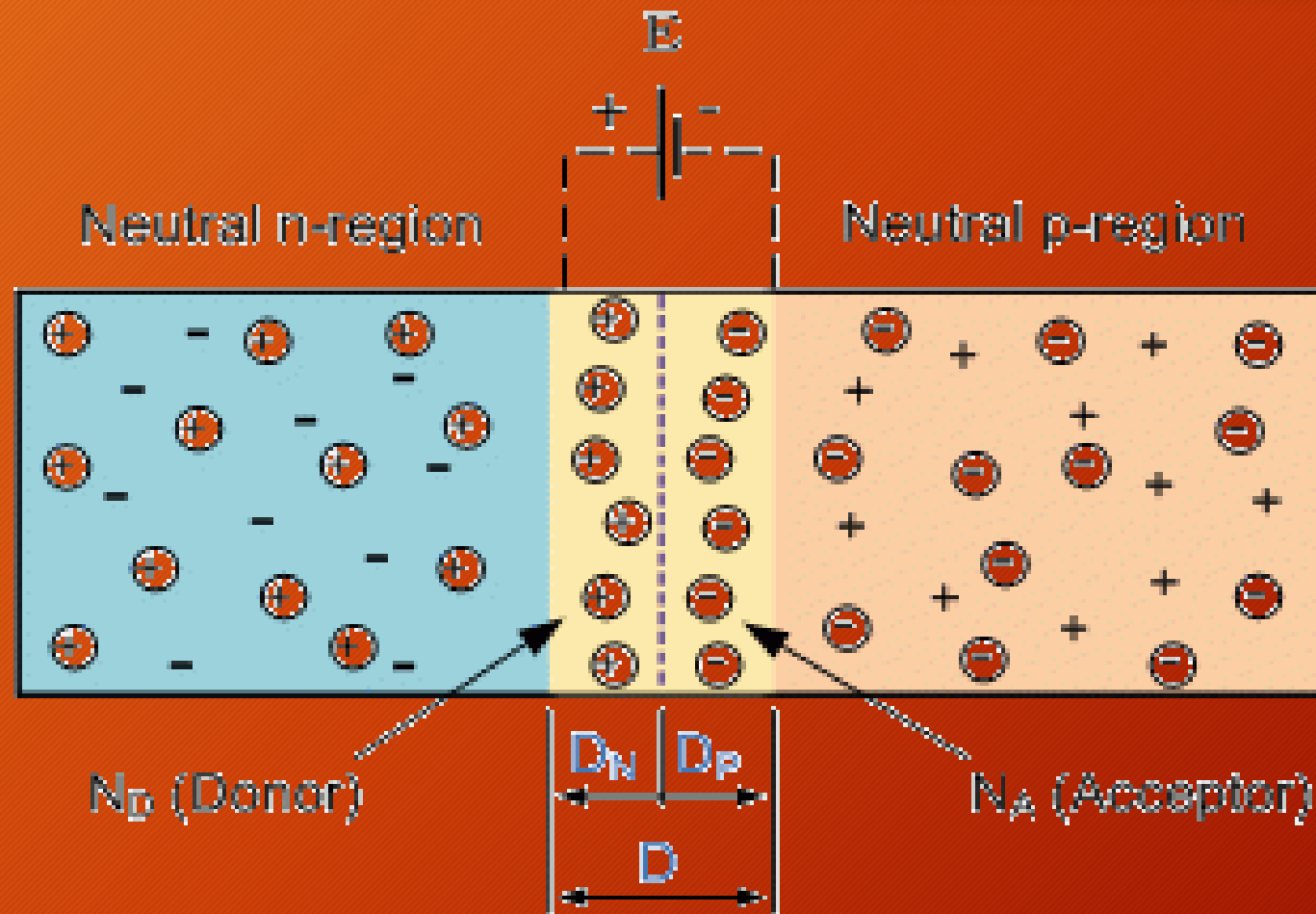
SEMICONDUCTOR DIODES



Semiconductor diode (Working)

- The P side of the PN junction has trivalent impurities and hence has holes as majority charge carriers.
- The N side of the PN junction pentavalent impurity and hence has electrons as majority charge carriers.
- Initially when the two sides interact a region is formed called as the “depletion region”. Where the mobile charge carriers have been diffused.
- It is called depletion region because it is formed from a conducting region by removal all free charge carriers, leaving none to carry a current.

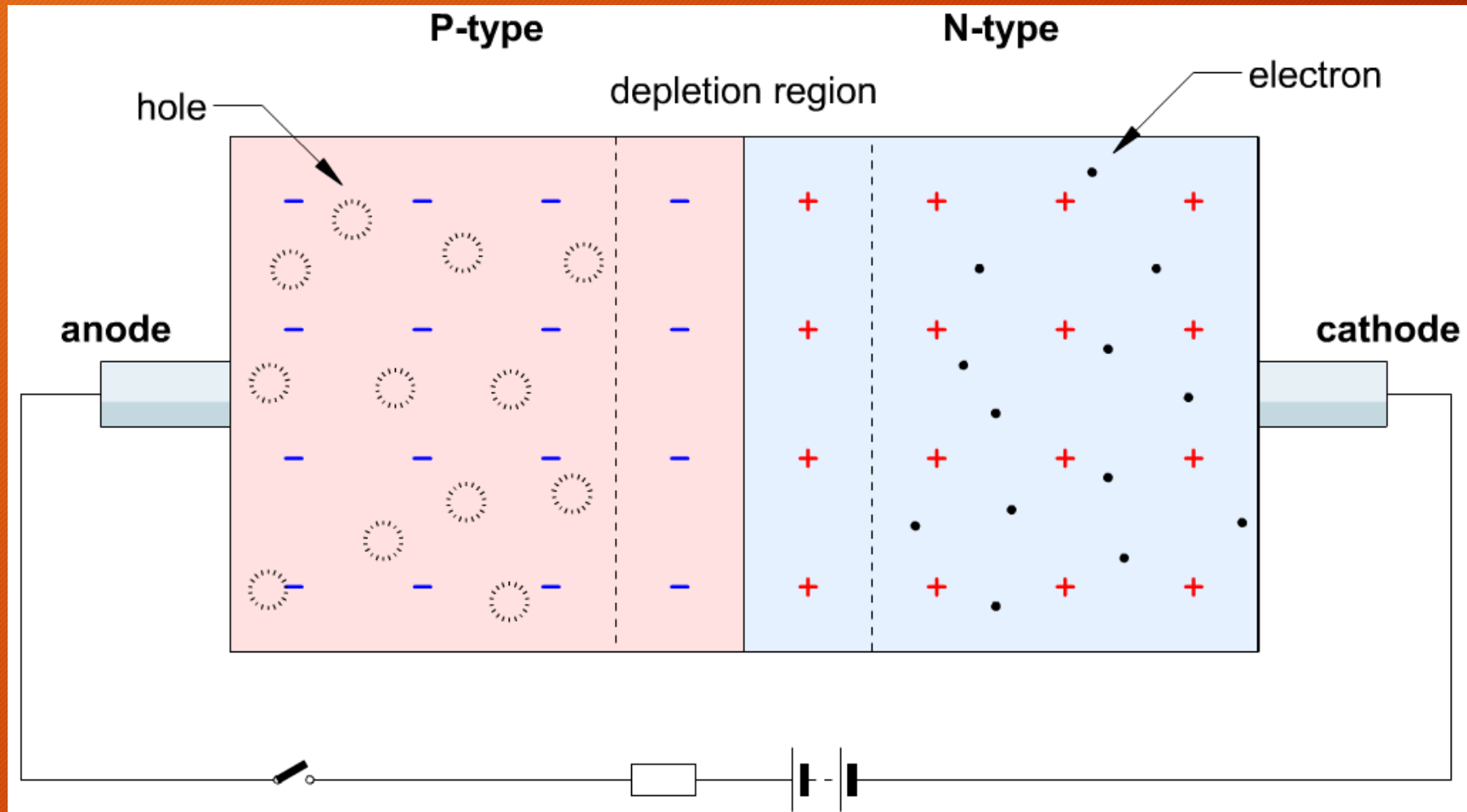
Semiconductor diode (Working)



Forward and Reverse Biased:

- When the anode of diode is connected to the +ve terminal of the battery and cathode to the -ve; the electrons get enough potential to overcome the depletion region and the current starts flowing. This connection is called forward biased connection. On the contrary when the connection is reversed the depletion region widens, blocking all the current passing through it, this is called reverse biased connection.

Forward and Reverse Biased:

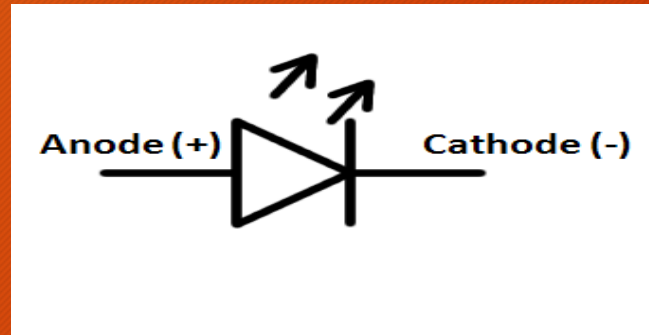


Light Emitting Diodes (LED)



LED (Light Emitting Diodes)

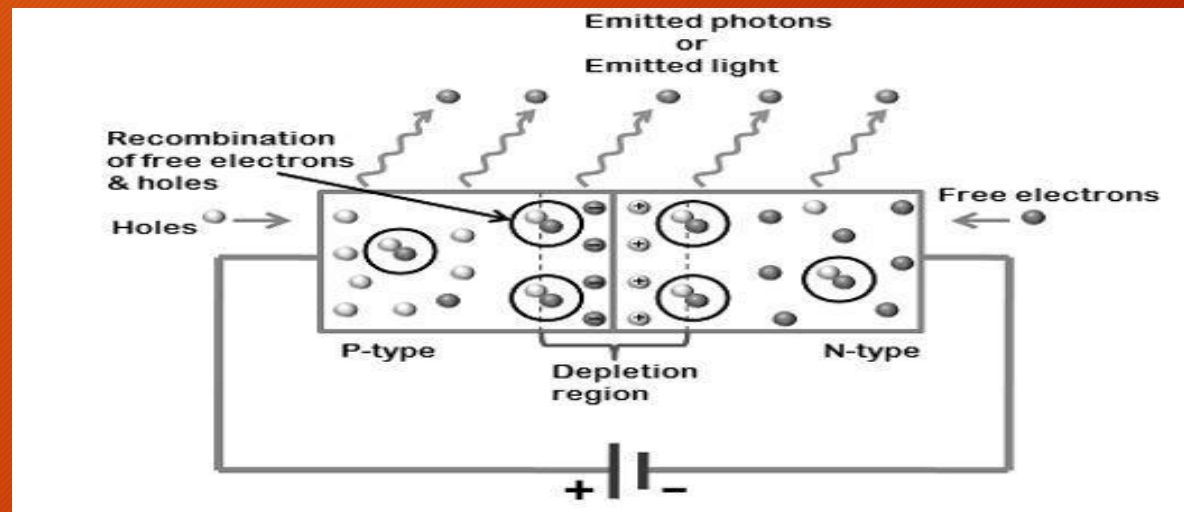
- These type of diodes are used for the production of light and hence named as light emitting diodes.
- Its symbol is:



- These are made of GaAs (Gallium Arsenide) and GaP (Gallium Phosphide).

Light Emitting Diodes (LED)

- Construction:
 - The construction of led is more or less same as a semi conductor diode which it already is.
 - The materials used in led is doped Aluminum Gallium Arsenide.
 - The colour of the light is dependent upon the type of semi conductor used.



Light Emitting Diodes (LED)

- The main semiconductor materials used to manufacture LEDs are :
 - Indium gallium nitride (InGaN): blue, green and ultraviolet high-brightness LEDs
 - Aluminum gallium indium phosphide (AlGaInP): yellow, orange and red high-brightness LEDs
 - Aluminum gallium arsenide (AlGaAs): red and infrared LEDs
 - Gallium phosphide (GaP): yellow and green LEDs

Light Emitting Diodes (LED)

- Working Principle:
- The working principle of leds is based on quantum theory.
- The quantum theory states that when the energy of electrons decreases from the higher level to lower level, it emits energy in the form of photons.

Light Emitting Diodes (LED)

- Working:
- The led diode is at its core is pn junction diode.
- The diode is connected in forward biased and the current starts to flow.
- The flow of current causes the diodes to emit photons which appear to us as light.
- The more the current higher will be the energy and more will be the intensity of light.

Applications

- These are used as rectifiers i.e. converting AC into DC.
- These are used as switches.
- LEDs are utilized throughout our daily lives, like the led bulbs, led light, backlit lights of the LCD displays.
- LEDs are used in the display of digital watches, or the counter displays at banks and hospitals. The 7 led display.