

Q6. Discuss

- a) N - type semiconductor
  - b) P - type semiconductor
- Compare the two.

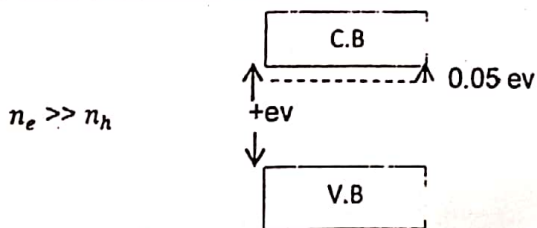
Ans: N - type semiconductor:

It doped with a controlled amount of pentavalent atoms. Impurity atoms which donate free electrons for conduction are called Donor Atoms.

The resulting semiconductor is called N - type semiconductor. The extra electrons of the donor atom orbits around the donor nucleus, in a hydrogen like manner.

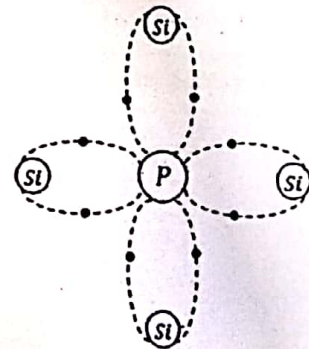
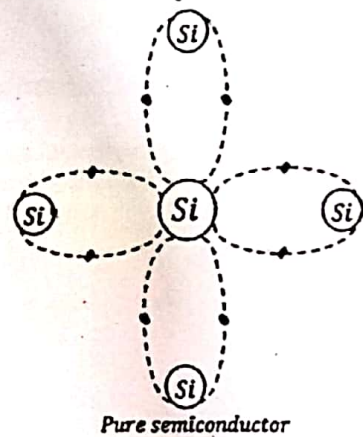
It has been found that 0.05 eV energy in Si is required to remove this electron from the impurity atom and makes it a free electron. The total number of holes in N - type semiconductor is relatively low, hence in N - type semiconductor, Electrons are majority carriers and holes are minority carriers.

These electrons occupy discrete energy levels (called donor energy levels) between the valence and conduction band and the lowest donor electron energy level lies at 0.05 eV below the bottom of the conduction band.



+2 / Unit 9A / Q6 Types of Semiconductor

		Pentavalent Atoms ↓
B	C	N
Al	Si	P
Ga	Ge	As



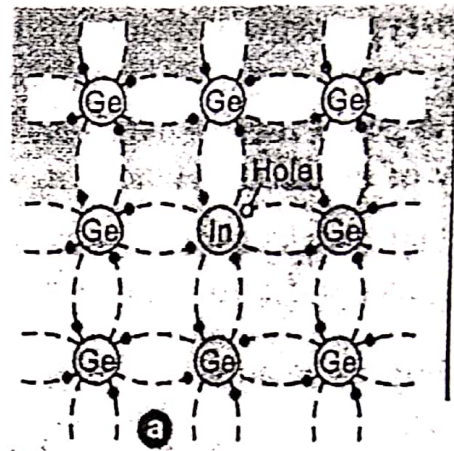
P – type semiconductor:

The trivalent atoms are called acceptor atoms and the conduction of electricity occurs due to motion of holes i.e positive charges or P- type carriers. That is why the resulting semiconductor is called acceptor type or P- type semiconductor.

Hence in P – type semiconductor electrons are minority carriers & holes are majority carriers.

When an external field is applied to a P- type semiconductor, these holes will act as Carriers of current. Due to it P – type semiconductor shows Conductivity much improved than what it was for pure semiconductor.

$$n_h \gg n_e$$



C.B

