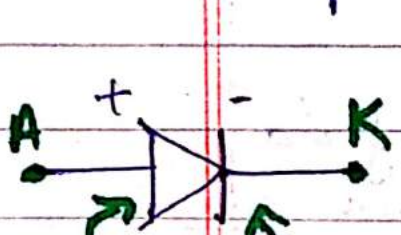
P-n Junction :-

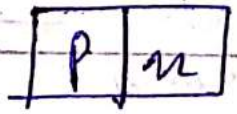
~~If a p type and a n type elements~~

* If a donar impurities (n type) are introduced into one side and acceptor (p type) into the other side of a single crystal of a semiconductor then a p-n junction is formed.



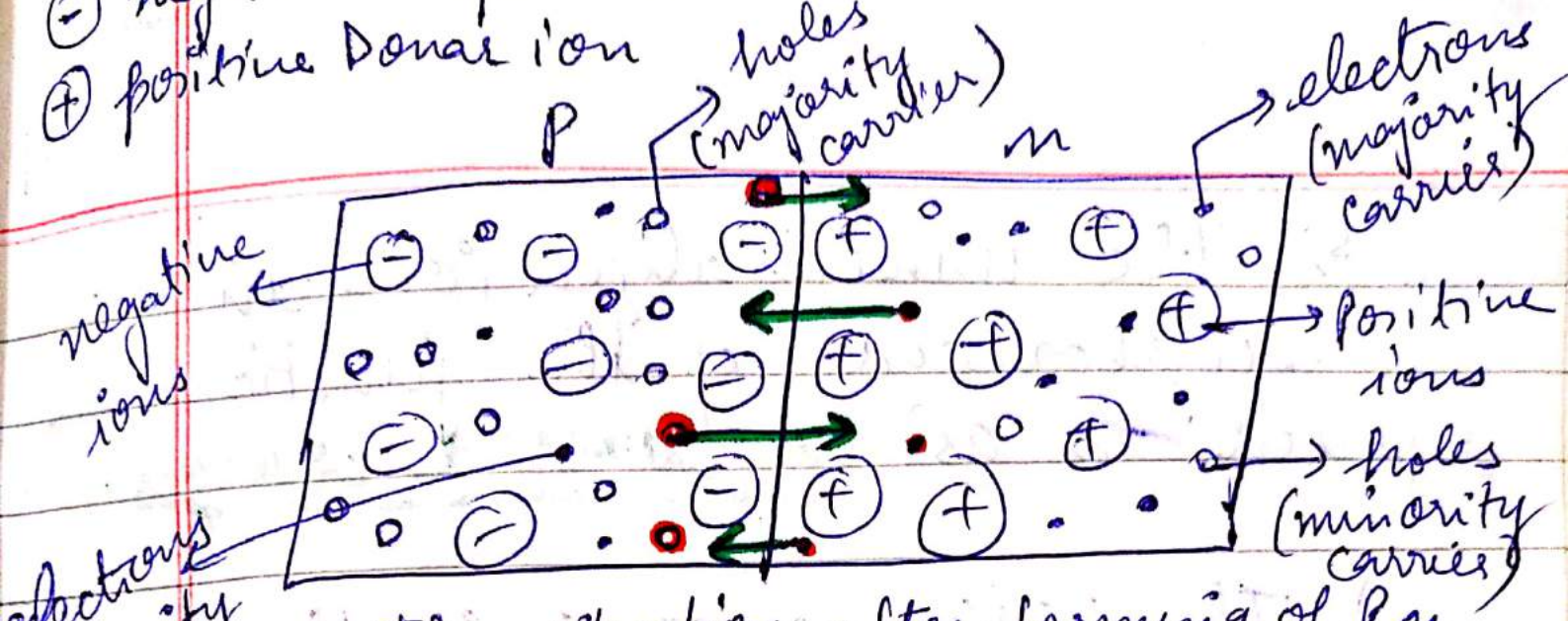
Anode (P region) Cathode (n region)

P-n junction Diode



* P-n junction diode conducts only in one direction. The resistance in the other direction is very high thus, unable to conduct.

⊖ negative acceptor ion
⊕ positive Donar ion



The situation after forming of P n junction
electrons (P side)
holes (towards n side)

1) The holes of p type diffuse to the right side across the junction and the electrons of n type diffuse towards left side of the junction
2) The diffusion of carriers occurs due to difference in concentration of carriers each side of the junction
3) Thus, both electrons & holes neutralizes each other.
4) But, the ions (which are immobile) are uncompensated near the junction

5) The unneutralized ions in the neighborhood of the junction are referred to as **uncovered charges.**

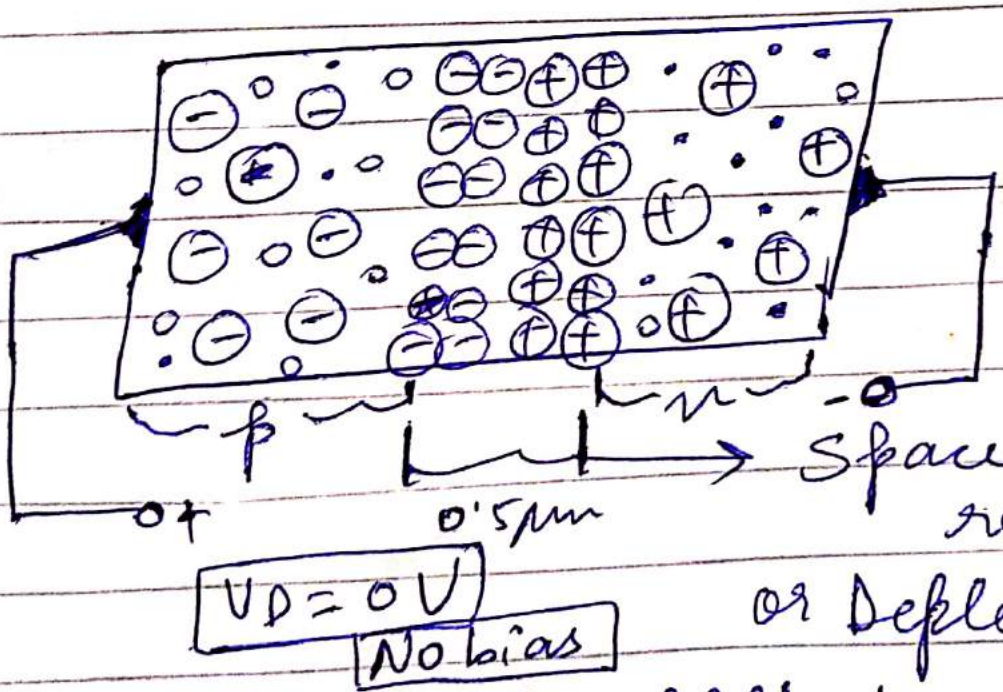
6) The region containing the uncompensated acceptor and donar ions is called **Depletion region.**

That is there is a depletion of mobile charges (holes and free electrons) in this region.

7) The electric field between the acceptor & donar ions is called barrier. The additional holes trying to diffuse into **N region** are repelled by uncompensated true charge of donar ions and the

additional electrons trying to diffuse into **P region** are repelled by uncompensated -ve charges on acceptor ions.

8) Thus, barrier is formed whose width is nearly 0.5 μm and is also, known as space charge region.



or Depletion width

Bias → refers to application of an external voltage across the two terminals of the device.

9) In the absence of bias or when (bias = 0) i.e $V_D = 0$ Volt the net flow of charge in one direction is zero.

Thus current is zero.

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Regards,

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