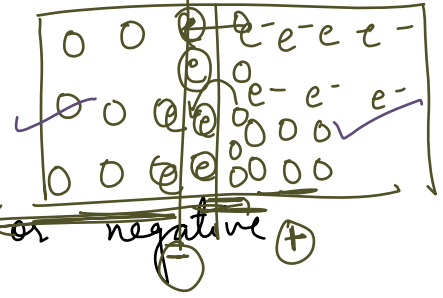
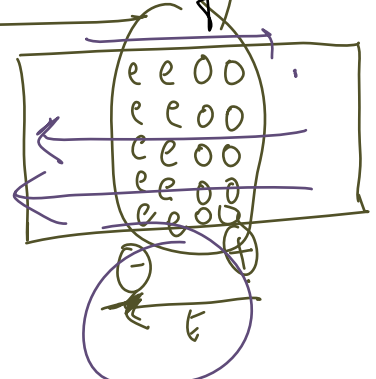


As an electron diffuses from n \rightarrow p due to the concentration gradient, it leaves behind an ionised acceptor which is immobile.



As the holes continue to diffuse, a layer of negative charge or negative (+) or space charge region on the p-side of the junction is developed. The space charge region on either side of the junction is known as depletion layer.

The thickness of the depletion region is in the order of one-tenth of micrometers.



Diffusion current is large and drift current is small.

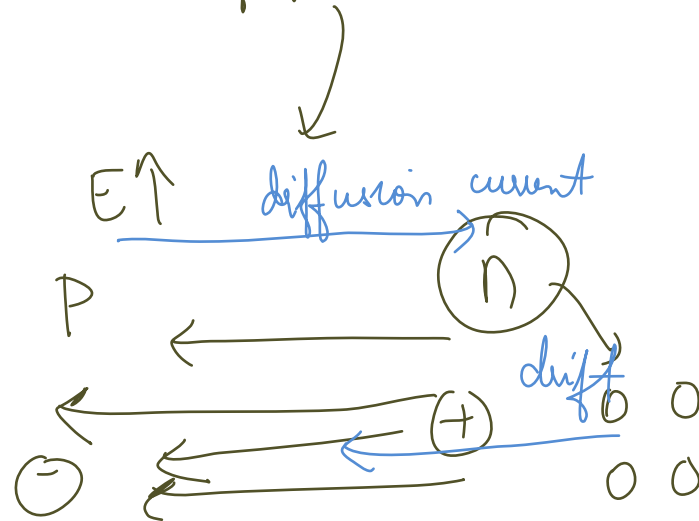
Initially, diffusion current is large and drift current is small -

↓
majority carriers

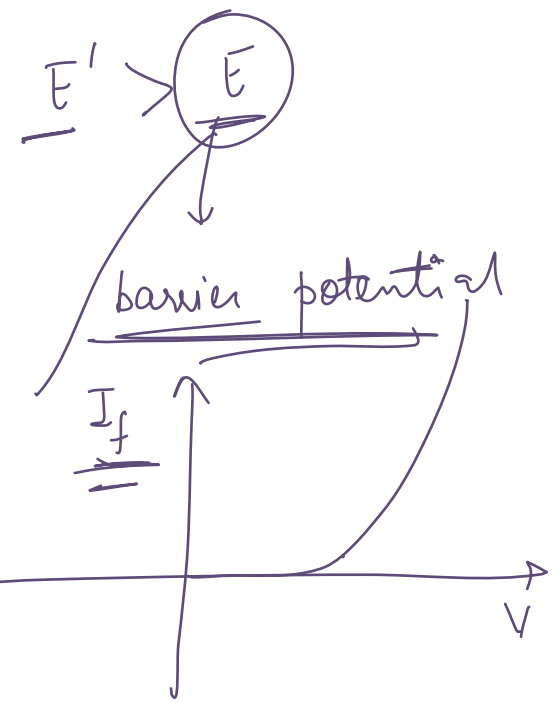
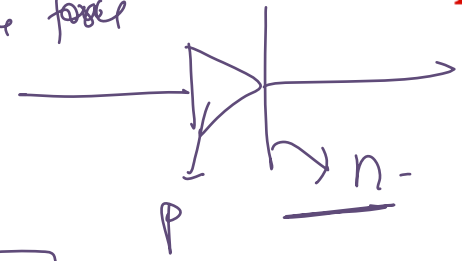
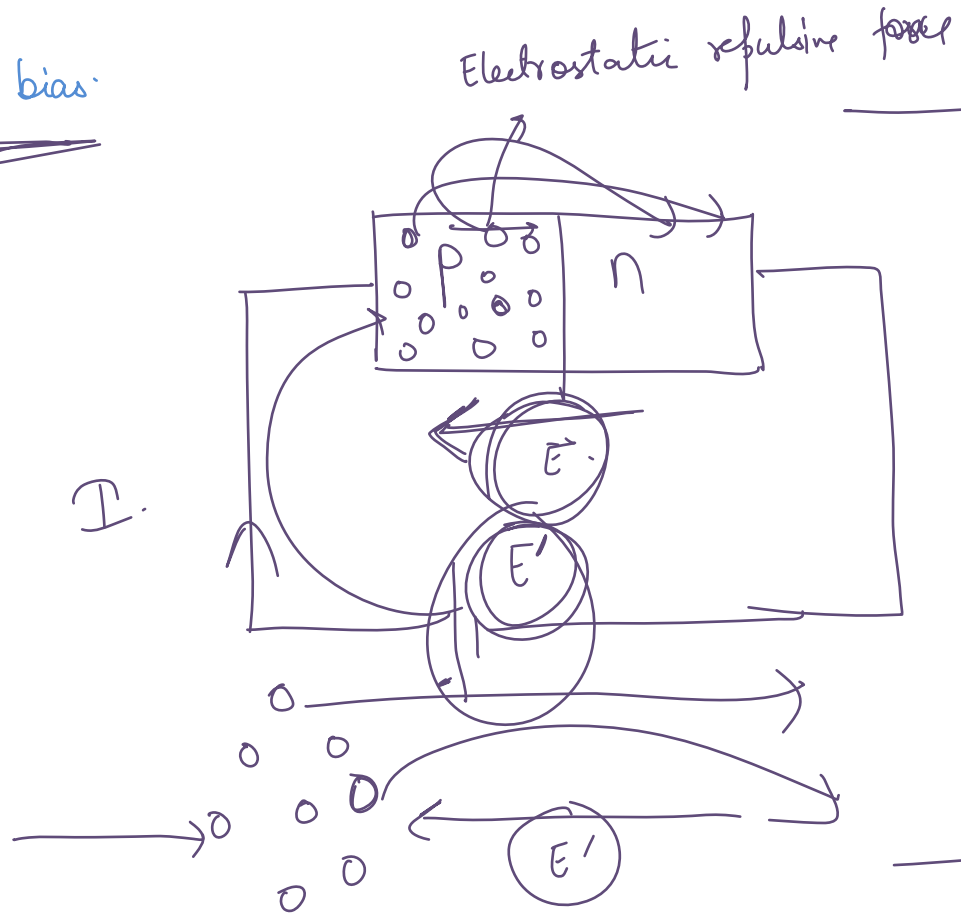
↓
minority carriers

As diffusion ↑, the charge region on either side of junction ↑.

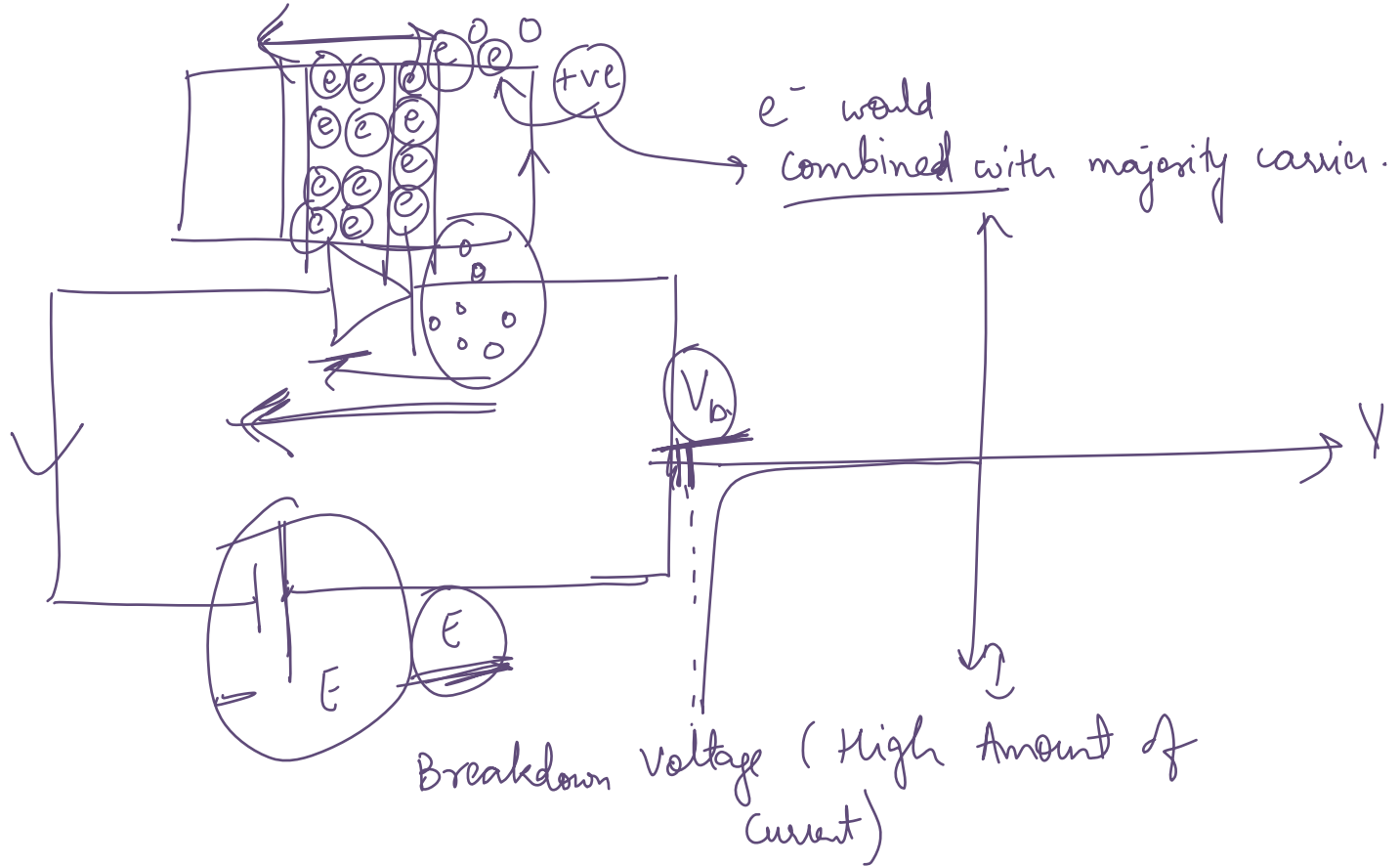
In equilibrium condition,
diffusion current will be equal to
drift current



Forward bias

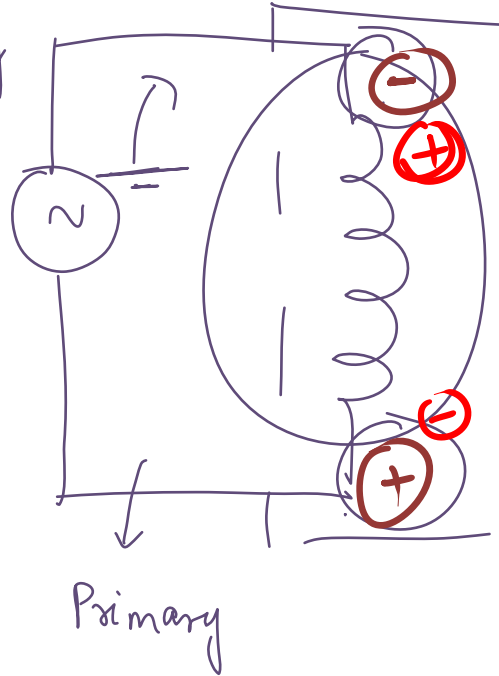


Reverse Bias:



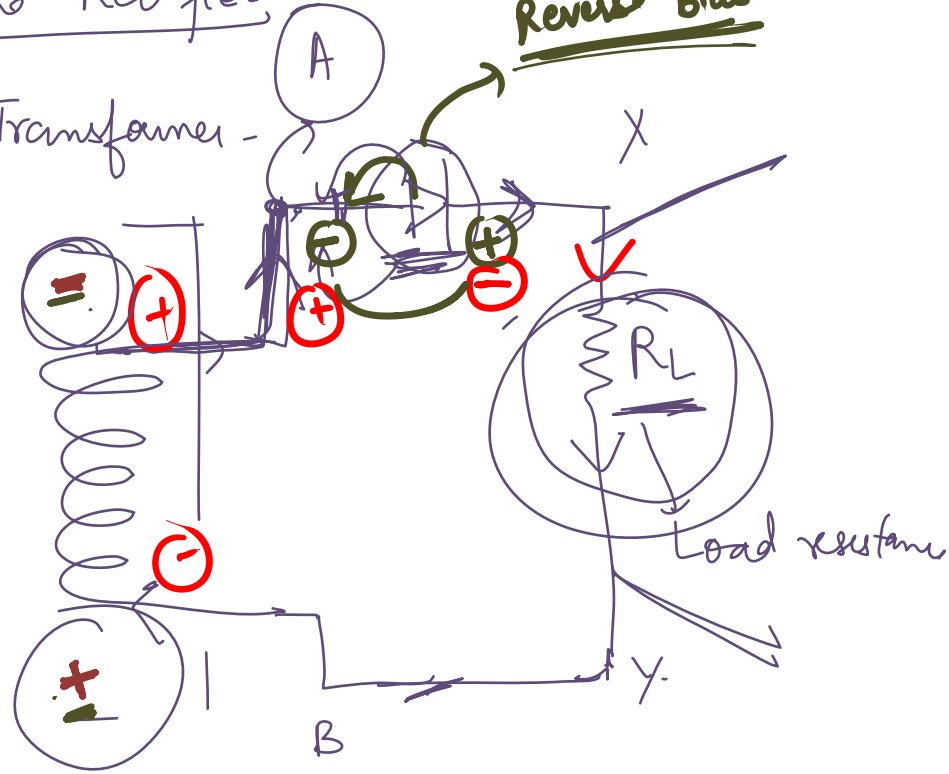
Rectifier

In P-n junction diode, current flows only when it is forward biased, current will be zero when it is reverse biased.



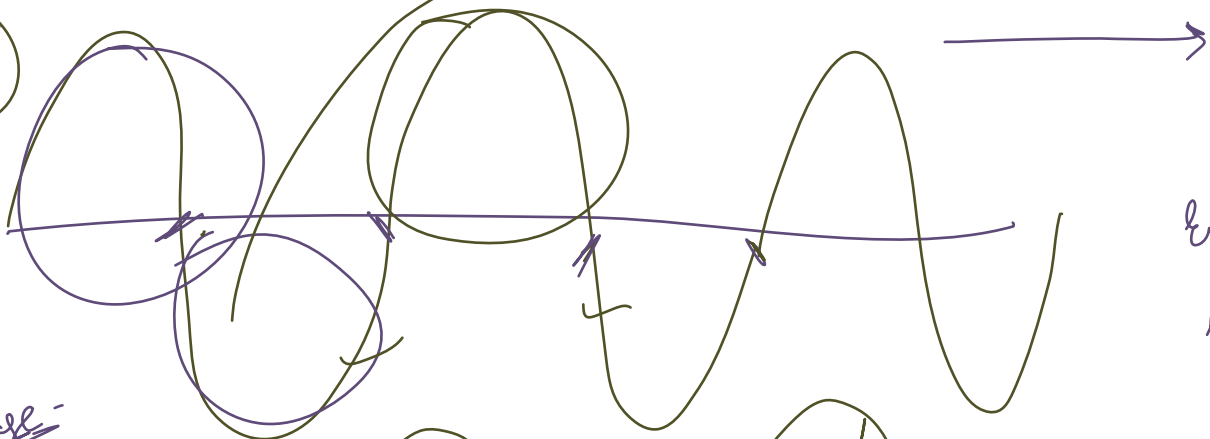
Half wave Rectifier:

Transformer -

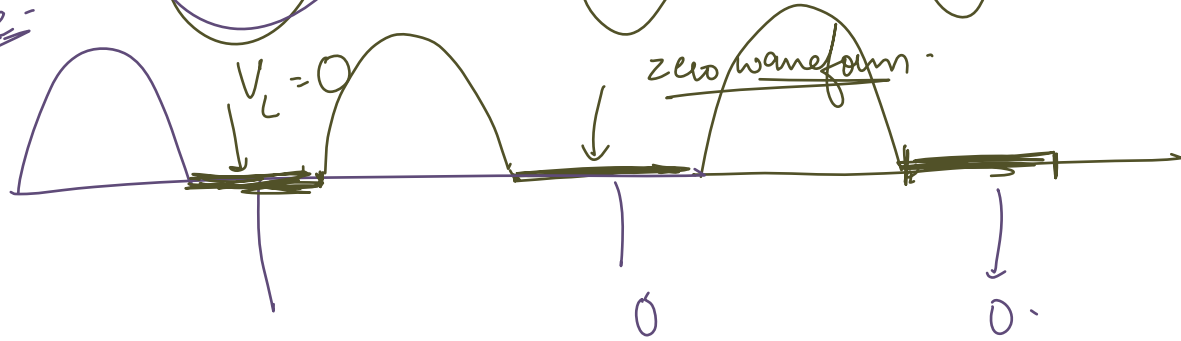


Voltage at A

direction is reversed.



Output Voltage -
(R_L)



Energy gets wasted in the negative half cycle

Efficiency $\sim 41\%$