across the diode.

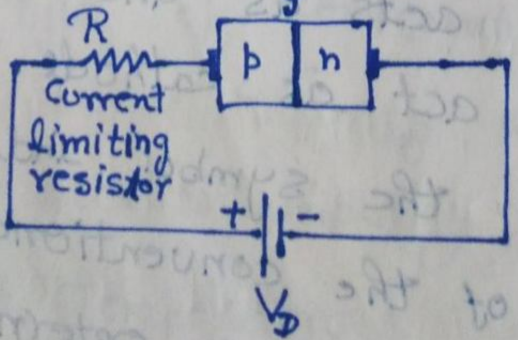
Biasing of Diode :-

Applying external d.c. voltage to any electronic device is called biasing.

Depending upon the polarity of the d.c. voltage externally applied to it, the biasing is classified as forward biasing and reverse biasing.

Forward Biasing :→ ($V_D > 0V$) - ON Condition

When an external d.c. voltage is connected in such a way that p-region is connected to positive and n-region to negative of the d.c. voltage then the biasing is called forward biasing.

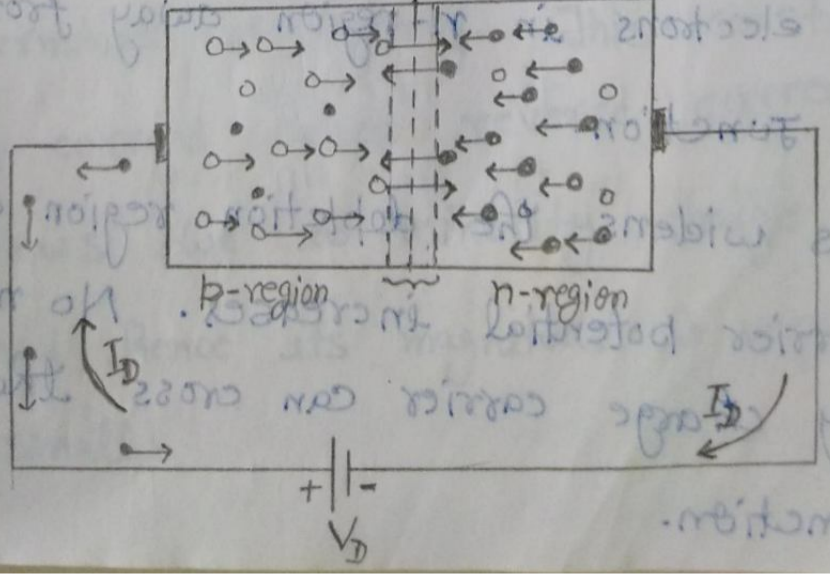


Forward biasing

The -ve of battery pushes the free electron against the barrier from n to p-region while +ve of battery pushes holes against barrier from p to n-region.

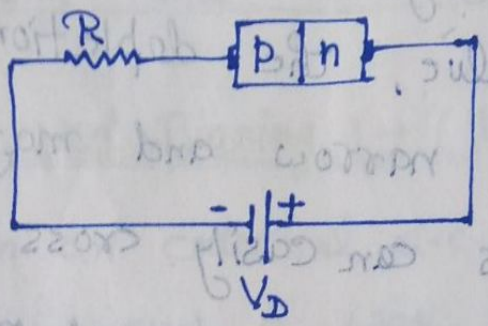
Due to this, the width of the depletion region reduces and consequently the barrier potential also reduces.

As applied voltage is increased, at a particular value, the depletion region becomes very narrow and majority charge carriers can easily cross the Junction. This large number of majority charge carriers constitutes a current called forward current.



Reverse Biasing ($V_D < 0V$) - OFF Condition

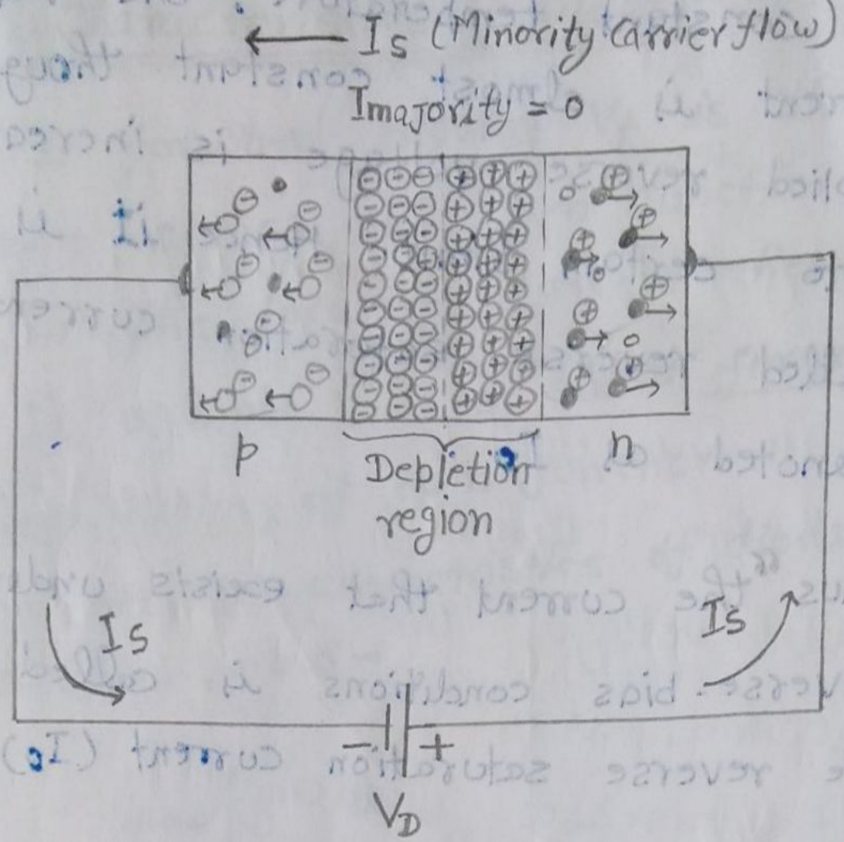
When an external d.c. voltage is connected in such a way that p-region is connected to -Ve and n-region to +Ve terminal of the d.c. voltage then the biasing is called reverse biasing.



Reverse Biasing

Here -Ve of battery attracts the holes in p-region and +Ve of battery attracts the electrons in n-region away from the junction.

This widens the depletion region and barrier potential increases. No majority charge carrier can cross the junction.



However due to increased barrier potential, the minority charge carriers i.e. free electrons on p-side are dragged towards +Ve terminal of battery while holes on n-side are dragged towards -Ve terminal of battery. This constitutes a current called reverse current. It flows due to minority charge carriers and hence its magnitude is very very small.

- For constant temperature, the reverse current is almost constant though applied reverse voltage is increased upto certain limit. Hence it is called reverse saturation current denoted as I_0.

Thus "the current that exists under reverse-bias conditions is called the reverse saturation current (I_0)"

<u>Note</u>:* The term saturation comes from the fact that it reaches its maximum level quickly and does not change significantly with increase in the reverse-bias potential.

* Is for
  Si – in the nA range
  Ge – in the low µA range