Breakdown Voltage →

It is the minimum reverse votage at which p-n junction breaks down with sudden rise in reverse current.

Breakdown in Reverse Biased →

There are two types of breakdown

1- Breakdown due to avalanche effect

2- Breakdown due to zener effect

1- Breakdown due to Avalanche effect :→

As the voltage across the diode increases in the reverse bias region, the velocity of the minority carriers responsible for the reverse saturation current (I_o) will also increases. Eventually, their velocity and associated Kinetic energy ($W_K = \frac{1}{2}mv^2$) will be sufficient to release additional carriers through collisions with

otherwise stable atomic structures. That is an ionisation process will result whereby valence electrons absorb sufficient energy to leave the parent atom. These additional carriers can then aid the ionization process to the point where a high avalanche current is established and the avalanche breakdown region occurs.

2- Breakdown due to Zener effect :→

The breakdown of p-n junction may occur because of one more effect called zener effect. When a p-n junction is heavily doped the depletion region is very narrow. So under reverse bias condition the electric field across the depletion layer is very intense. Such an

intense field is enough to pull the electrons out of the valence shell of the stable atom. So this is not due to collision of carrior with atom.

Such a creation of free electrons is called zener effect. These minority carriers constitutes very large change in current and mechanism is called zener breakdown.