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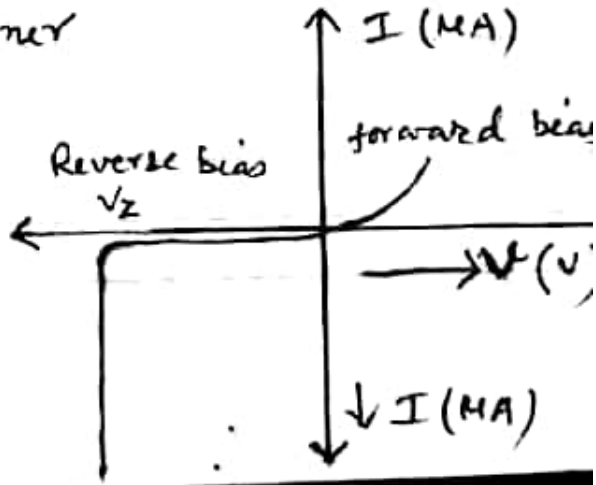
Zener diode 2-1(S)

Q→ What is Zener diode? Give its symbol. Sketch and explain the I-V characteristic of zener diode.

Ans :- Zener diode :- A junction diode specially designed to operate only in the reverse breakdown region continuously (without getting damaged) is called a Zener diode. The symbol of a Zener diode shown in fig.

Symbol of Zener diode.

I-V characteristic of a Zener diode :- The I-V characteristic of a junction diode is shown in fig. When the applied reverse voltage (V) reduces to the breakdown voltage (V_z) of the zener diode, the current suddenly increases. Thus after the breakdown voltage (V_z), a large change in the current can be produced by almost insignificant change in the reverse bias voltage. In other words, Zener voltage remains constant, even though current through the zener diode varies over a wide range. This property of of the zener diode is used for regulating supply voltage.



Cause of Zener breakdown :-

In a zener-diode, both p and n-sides are heavily doped with acceptor and donor impurities respectively. Due to this the depletion layer formed is very thin. Even a small reverse bias voltage of 5V sets up a very high electric field of 5×10^6 V m^{-1}. This field is strong enough to pull valence electrons from the host atoms on the p-side which are accelerated to n-side. These electrons give rise to a large reverse current or breakdown current.

The emission of electrons from the host atoms due to high electric field is known as internal field emission. The breakdown of the diode due to internal field emission is called Zener breakdown.

Use :- It is used as a voltage regulator.