

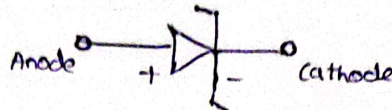
## Unit - 2

(1) Zener Diode as V-I characteristics.

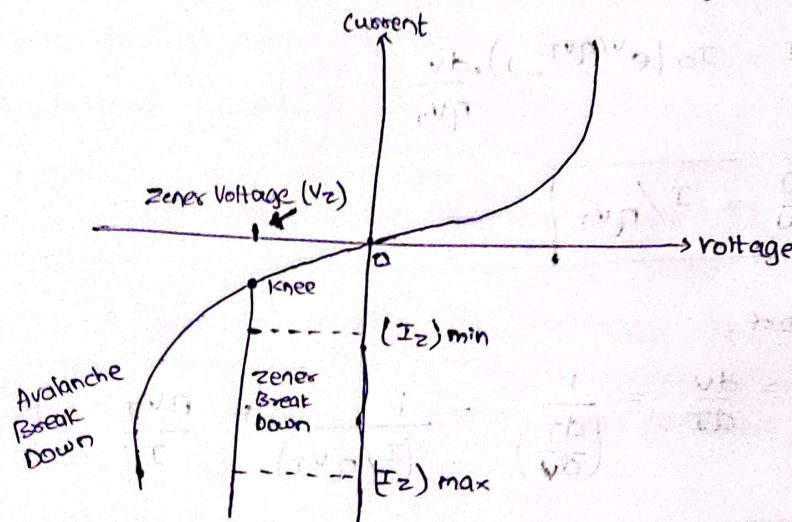
(A) Zener Diode as V-I characteristics:

→ Zener Diode is a reverse biased heavily-doped silicon (P-N) junction diode which is operated in break down region.

→ The symbol of Zener Diode is shown in fig below,



→ The V-I characteristics is shown below,



→ When a Zener is in forward-bias, its characteristics are just as those of ordinary diode.

→ When a Zener diode is reverse-biased, it has sharp breakdown voltage called Zener Voltage ( $V_z$ )

→ From fig, the Zener Voltage ( $V_z$ ) remains constant. This ability of diode is called Regulating Ability.

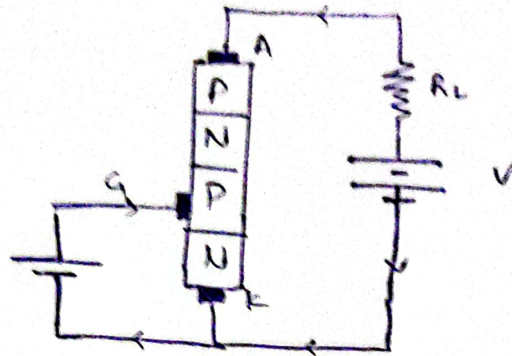
→ There is a minimum value of Zener current ( $I_z$ ) which should be maintained to keep diode in Break Down region.

→ There is a maximum value of Zener current ( $I_{z\max}$ ) above which the Zener Diode may be damaged.



(a) SCR Diode.

(A) Silicon Controlled Rectifier (SCR) Diode:



- The silicon controlled Rectifier (SCR) is a four layer, three junction and three terminal device
- The end 'P'-region is anode, the end 'N'-region is cathode and the inner 'P'-region is the gate
- SCR has two stable and reversible operating states.
- The change over from 'off-state' to 'on-state', called 'turn-on' can be achieved by increasing forward voltage beyond breakdown voltage.
- If the forward voltage is less than breakdown voltage, it can be turned on by applying positive voltage between gate and cathode. This method is called Gate control.
- Once the SCR Diode is in 'on-state' the gate loses control.
- The SCR takes certain time to 'switch-off'.
- SCR's are used in devices such as regulators, lamps (dimming lamps) and motors.
- The merits of SCR are, when the SCR is in 'on-state' the losses are less.
- The demerit of SCR is, the gate has no control when SCR is turned on, additional protection circuits are required.