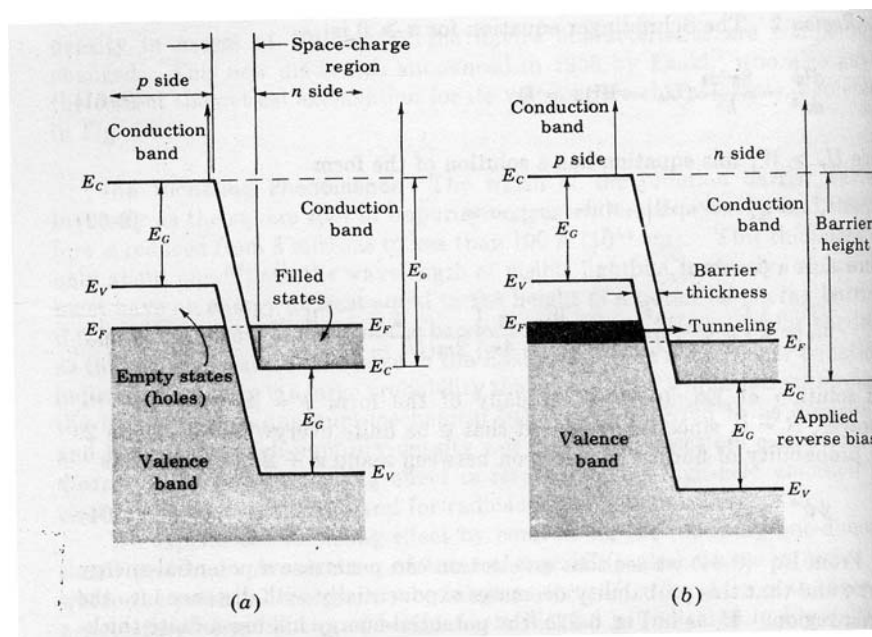


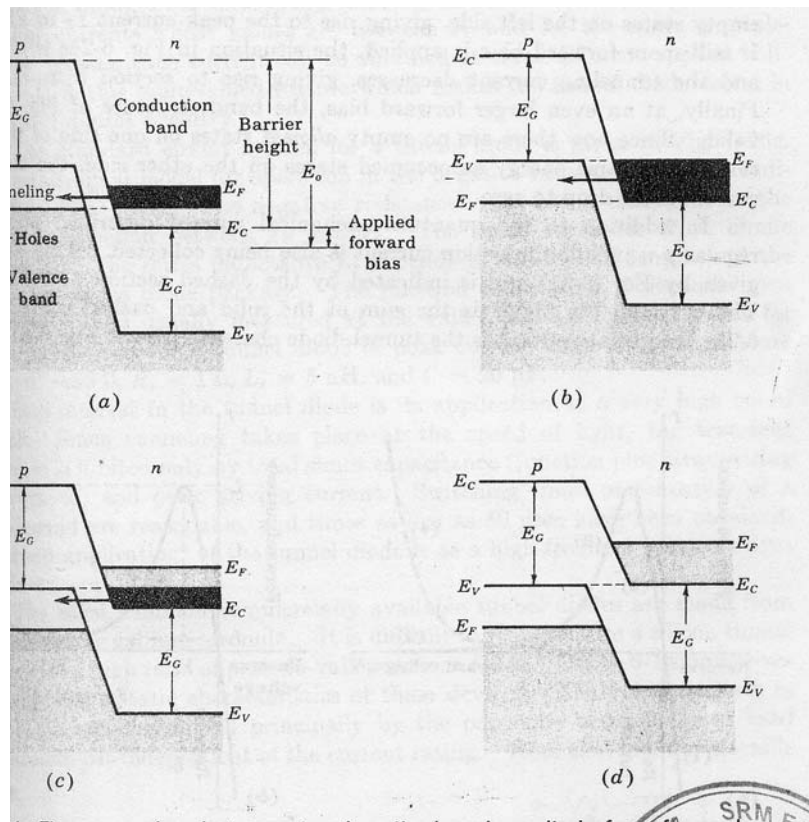
TUNNEL DIODE

A Tunnel Diode is a pn junction that exhibits negative resistance between two values of forward voltage. The tunnel diode is basically a pn junction with heavy doping of p type and n type semiconductor materials. Tunnel diode is doped 1000 times as heavily as a conventional diode. Heavy doping results in large no. of majority carriers. Because this large no. of carriers, most are not used during initial recombination that produces depletion layer. It is very narrow. Depletion layer of tunnel diode is 100 times narrower. Operation of tunnel diode depends on the tunneling effect.

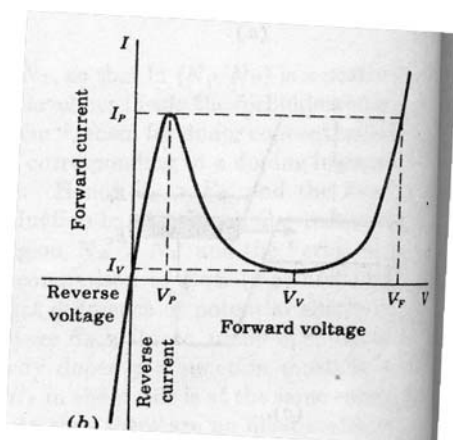
tunneling

The movement of valence electrons from the valence energy band to the conduction band with little or no applied forward voltage is called tunneling.





VI CHARACTERISTICS



As the forward voltage is first increased, the tunnel diode is increased from zero, electrons from the n region tunnel through the potential barrier to the potential barrier to the p region. As the forward voltage increases the diode current also increases until the peak to peak is reached. $I_p = 2.2 \text{ mA}$. Peak point voltage $= 0.07 \text{ V}$

As the voltage is increased beyond V_p the tunneling action starts decreasing and the diode current decreases as the forward voltage is increased until valley point V is reached at valley point voltage $V_v = 0.7 \text{ V}$ between V and P the diode exhibits negative resistance i.e., as the forward bias is increased, the current decreases. When operated in the negative region used as oscillator.