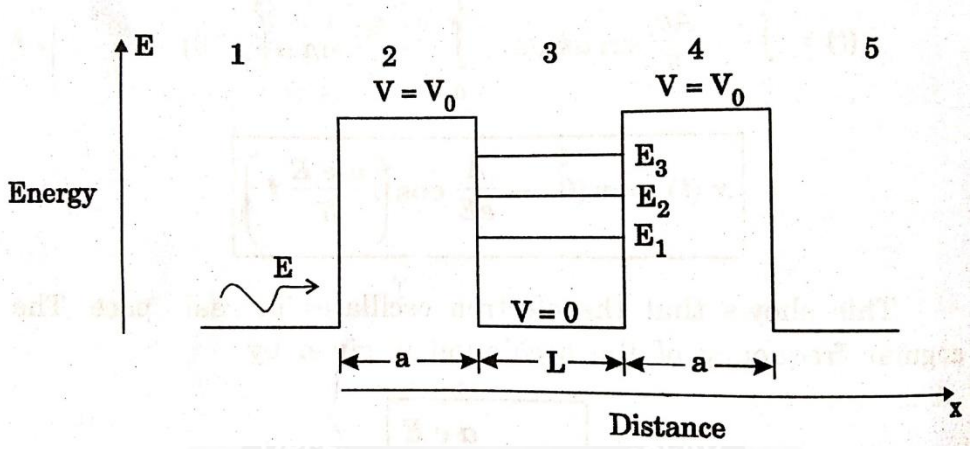
## RESONANT TUNNELLING

The transition probability of the double symmetric barrier is maximum and hence the tunnelling current reaches peak value when the energy of electron wave is equal to the quantised energy state of the well.This phenomenon is called resonant tunnelling.

**Explanation:**

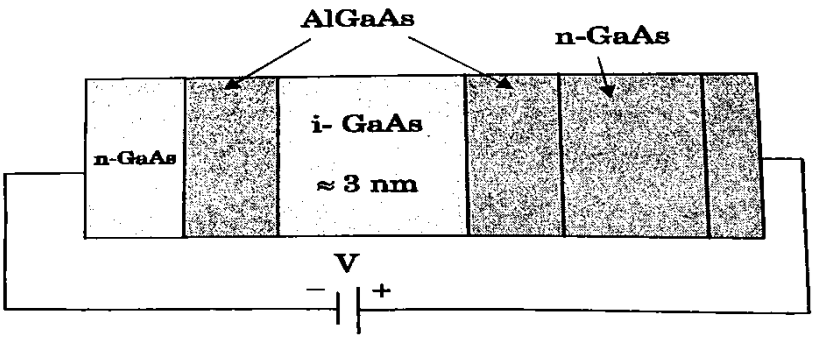
Let us consider two barriers of width a separated by a distance L. Two barriers are very thin to allow tunnelling and they form quantised energy states.



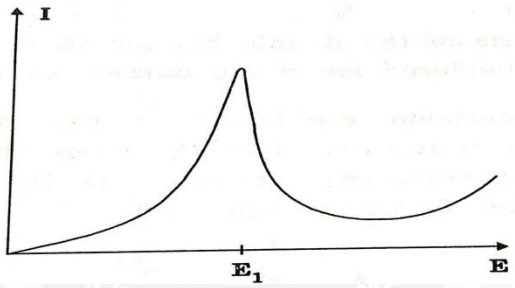

When the energy of incoming electron(E) is equal to one of the energy state of well($E_n$) , the electron can tunnel through the barrier.

**Resonant tunnelling diode:**

Diode is made by n-type GaAs(region 1 and 5) . Barrier is made by AlGaAs or AlAs(region 2 &4).Intrinsic layer is made by GaAs(region 3).Tunnelling is controlled by voltage across the device




When electron energy is different from the energy of discrete state then the transmission is low.As E tends to $E_n$ transmission will increase and becomes maximum when $E=E_n$ After that as E increases the current will decrease.This decrease in current with increase in bias voltage is called negative resistance.




Advantages

- Resonant tunnelling diode is very compact
- They are capable of ultra high speed operations.

Appliations

- RTDs are very good rectifiers.
- They are used in digital logic circuits.
- They are used in inverters,memory cells and transistors.