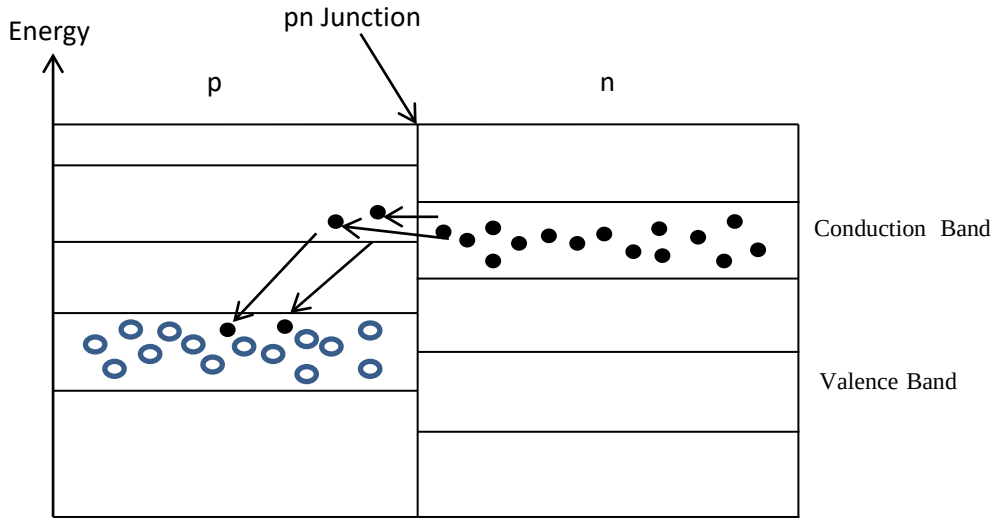
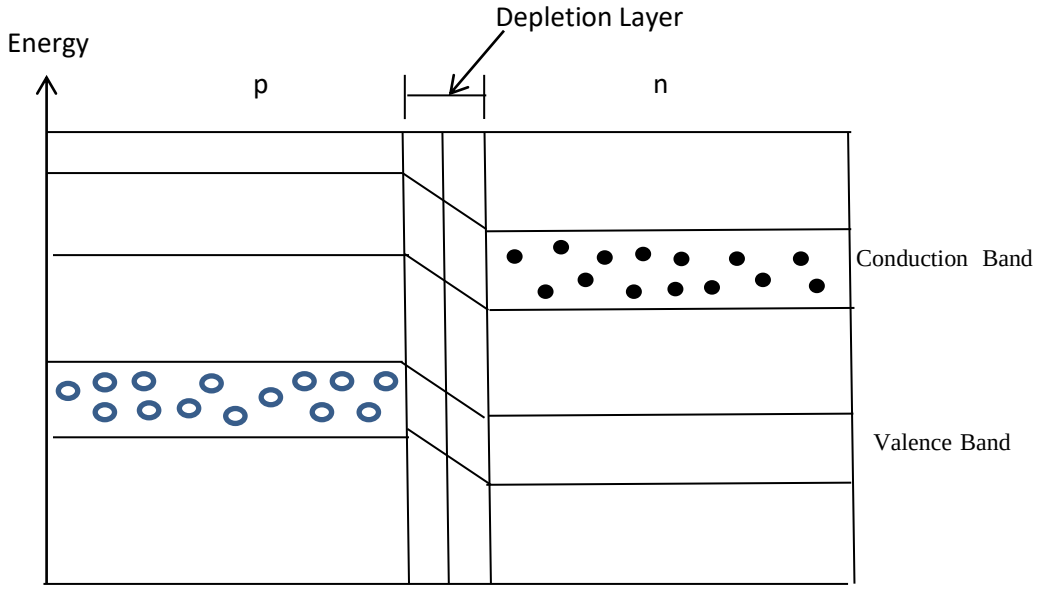
1-4.2 Energy Diagram of the pn Junction

- pn junction at the instant of formation with electrons diffuse from the n-type to the p-type region.

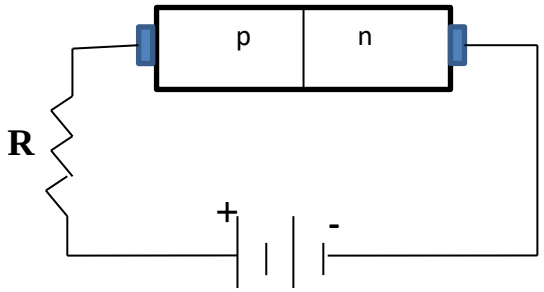


- As diffusion continues, the depletion layer begins to form. Also, the energy bands in the n-region "Shift Down'' as the electrons of higher energy are lost to diffusion.



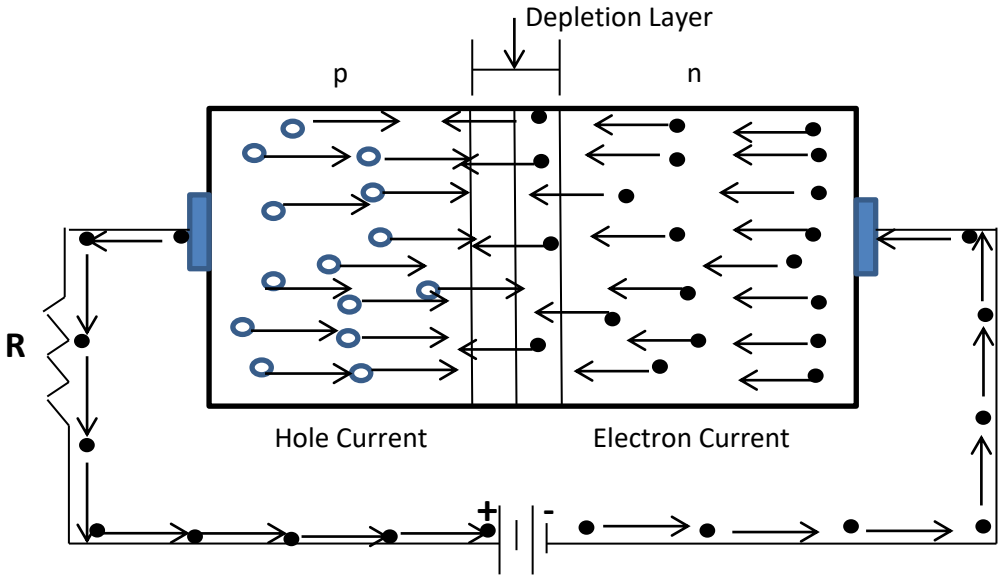
1-4.3 Biasing the pn Junction

A. The Forward Bias: When a dc voltage is applied in which the negative terminal of the battery is connected to the n-region, while the positive the positive terminal is connected to the p-region.

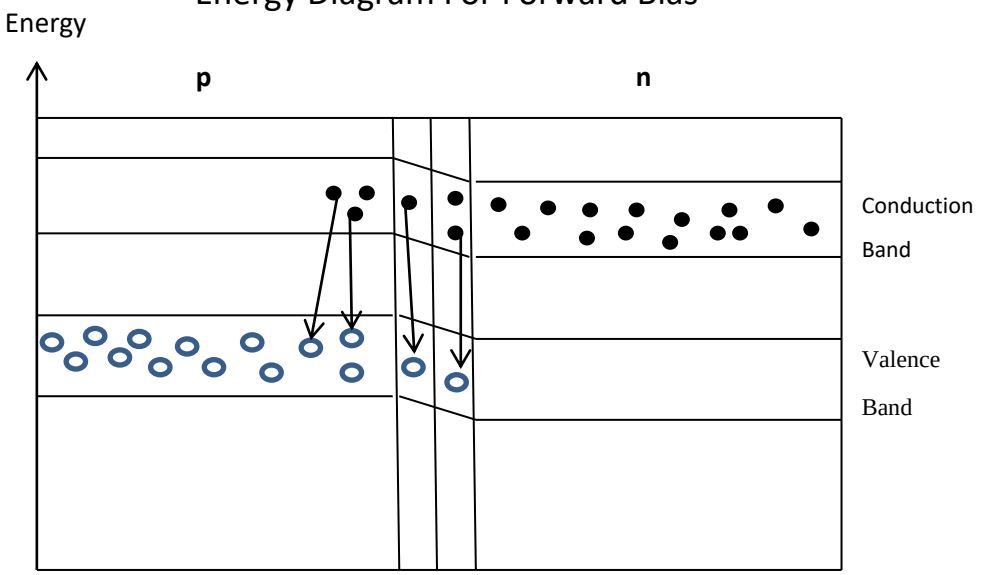


When does the barrier potential is overcome ?

When the external voltage source provides the n-region electrons with enough energy to penetrate the depletion layer and cross the junction, where they combine with the p-region holes.

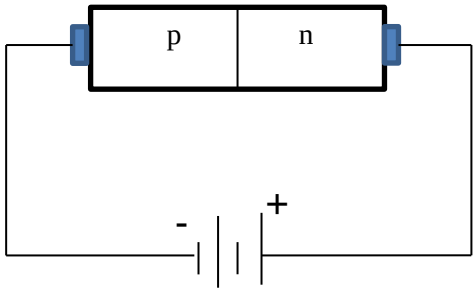


Energy Diagram For Forward Bias



B. The Reverse Bias

It is the condition to prevent current across the pn junction.



- The negative terminal of the battery attracts holes in the p-region, while the positive terminal attracts electrons away from the pn junction.
- As electrons and holes move away from pn junction, the depletion layer widens as more positive ions are created in the n-region and more negative ions are created in the p-region.