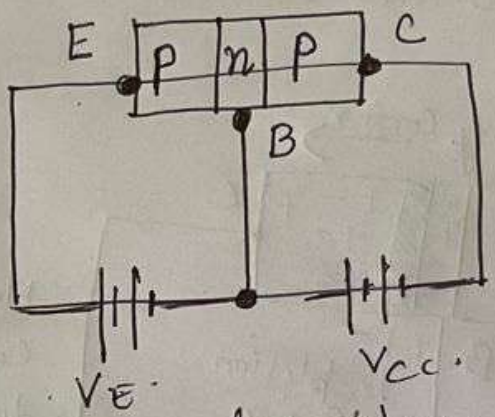
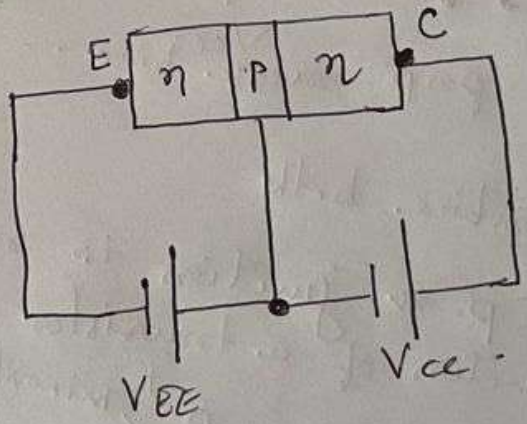
BJT (Bipolar Junction Transistors)

The transistor is a three-layer semiconductor device consisting of either two and one p-type layers of material or two p- and one n-type layers of material, called npn transistor and pnp transistor.



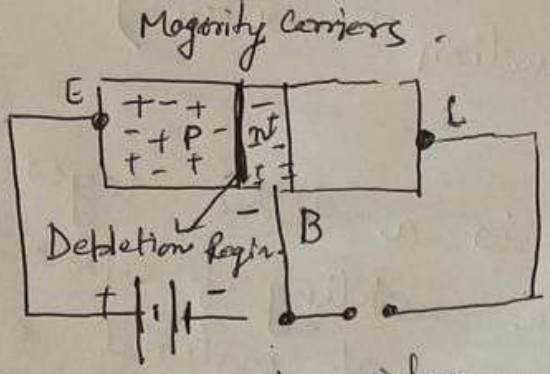
pnp transistor.



npn transistor.

Transistor Operation

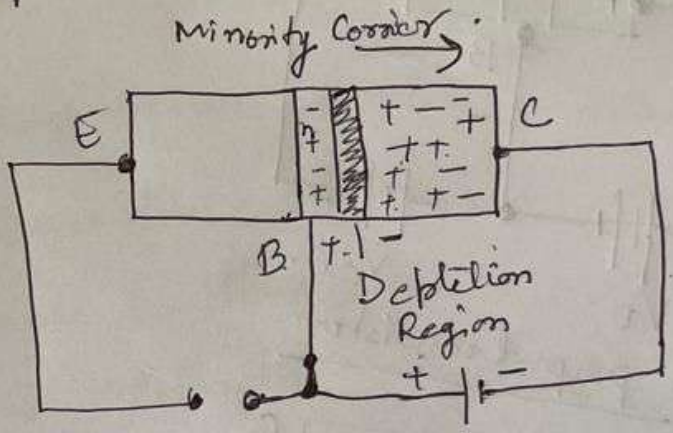
The operation of npn transistor is exactly the same if the roles played by the e^-s and holes are interchanged.



pnp - transistor.
Forward Bias

Due to forward bias the depletion region has been reduced in width resulting a heavy flow of majority carriers from the p- to n-type material.

Let us now remove the base to emitter bias of the pnp transistor.

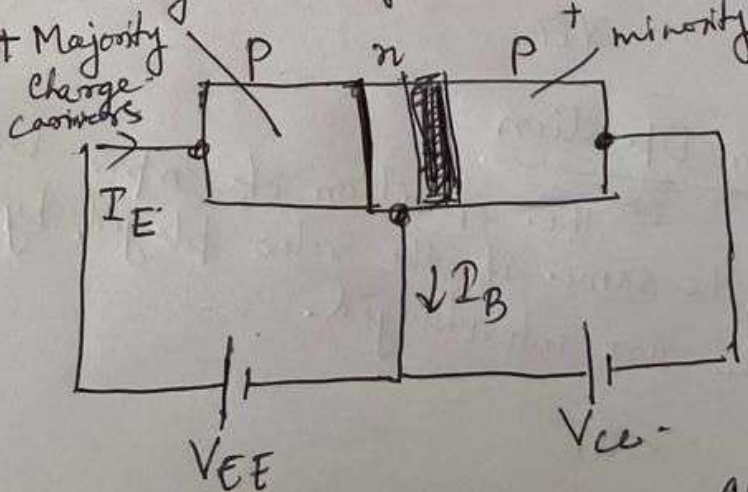


pnp - reverse bias.

Here the conduction is due to minority charge carriers.

If we combine both

One p-n junction is reverse biased while the other junction of a transistor is forward biased.



Majority and Minority charge carrier flow of a pnp transistor.

$$I_E = I_C + I_B$$

$$I_C = I_{C_{majority}} + I_{CO_{minority}}$$

The minority-current component is called the leakage current and is given the symbol I_{CO} i.e. I_C current with emitter terminal open

Three Configurations of BJT are

1. Common Base.
2. Common Emitter
3. Common - Collector.