T.D.C. part III (Hons)

Topic:- Mechanism of Current Conduction in PNP & NPN Transistor.

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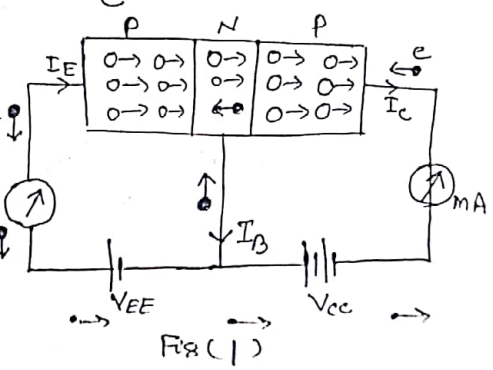
PNP Transistor:- Fig(1) shows a PNP transistor with emitter-base junction as forward biased and collector-base junction as reversed-biased. The operation of PNP transistor is as follows:

The holes of P region (emitter) are repelled by the positive terminal of battery V_{EE} towards the base. This potential barrier at emitter junction is reduced as it is forward biased and hence the holes cross this junction and penetrate into N region. This constitute the emitter current I_E. The width of base region is very thin and it is lightly doped and hence only two to five percent of the holes recombine with the free electrons of N-region. This constitute the base current I_B, which of course, is very small. The remaining holes (95% to 98%) are able to drift across the base and enter the collector region. They are swept up by the negative voltage V_{cc}. This constitutes the collector current I_C.

Thus we conclude that current conduction within PNP transistor takes place by hole and in external circuit electrons are responsible for the current.



Fig(1)

OPERATION OF PNP transistor

The biasing of a NPN transistor is shown in fig (2). The emitter junction is forward biased because electrons are repelled from the negative emitter battery terminal V_{EE} towards the junction. The collector junction is reverse biased because electrons are flowing away from the collector junction towards the positive collector battery terminal V_{cc}.

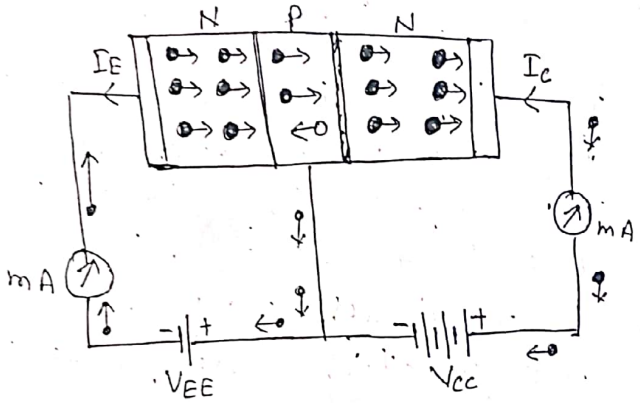


fig (2)

The electron in the emitter region are repelled from the negative terminal of battery towards the emitter junction. Since the potential barrier at the junction is reduced due to forward bias and base region is very thin and lightly doped, electron cross the p-type base region. A few electrons combine with the holes in p-regions and are lost as charge carrier. Now the electrons in N-region (collector region) readily swept up by the positive collector voltage V_{cc}. For every electron flowing out the collector and entering the positive terminal of battery V_{cc}, an electron from the negative emitter