EE-202 Electronics

Chapter 5:

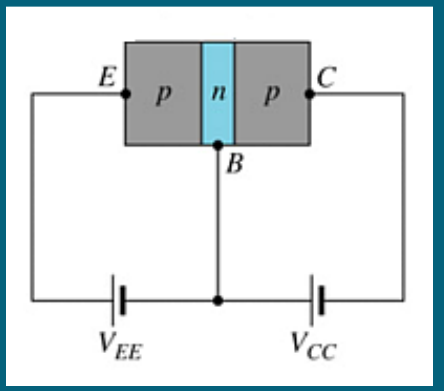
Bipolar Junction Transistors Common Base Configuration

Transistor Construction

Two types of transistors:

- ***pnp***
- ***npn***

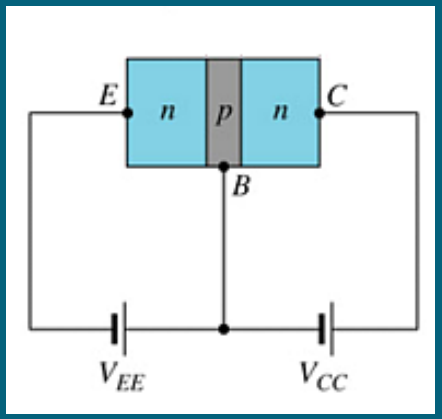
pnp



The terminals are:

- **E - Emitter**
- **B - Base**
- **C - Collector**

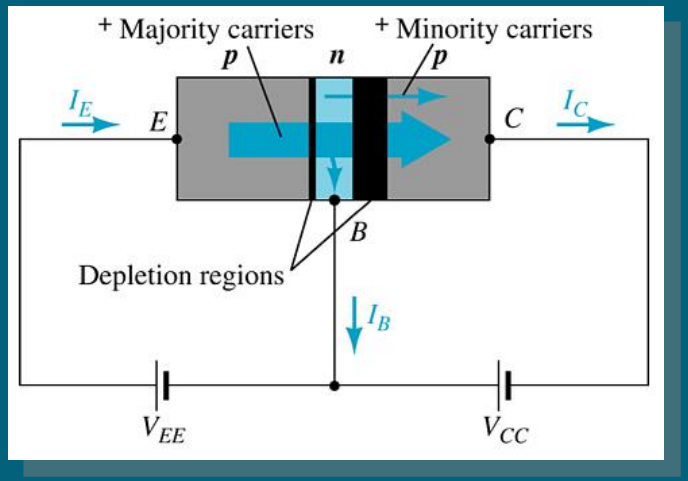
npn



Transistor Operation

For pnp transistor,
External sources, V_{EE} and V_{CC}, are connected as:

- **The E-B junction is forward biased**
- **The B-C junction is reverse biased**



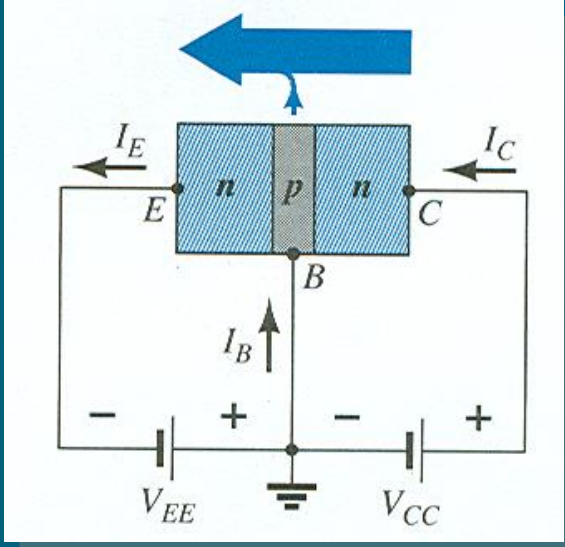
Currents in a Transistor

For npn transistor,
Emitter current is :

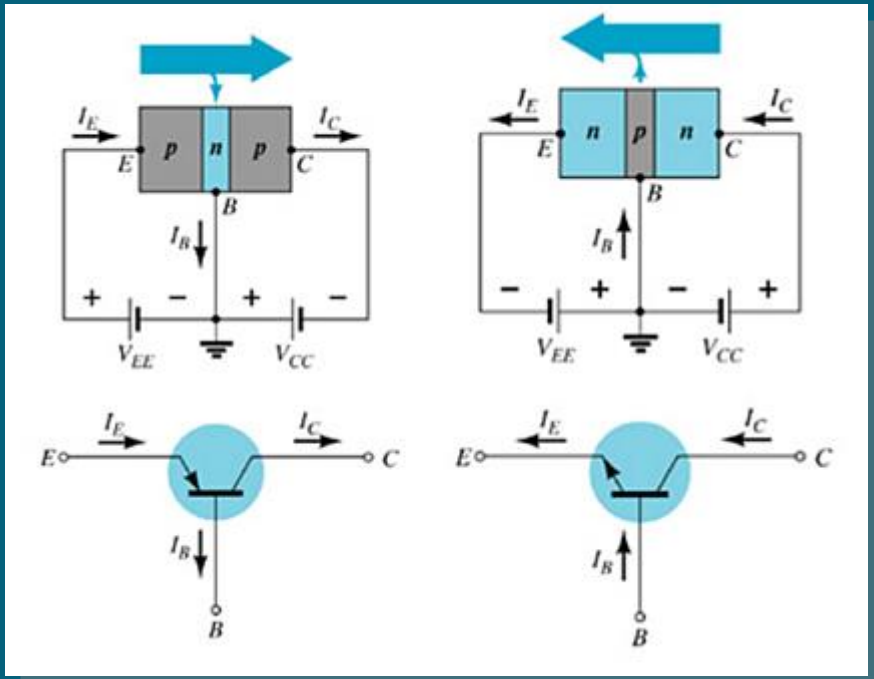
$$I_E = I_C + I_B$$

The collector current is :

$$I_C = I_{Cmajority} + I_{COminority}$$



Common-Base Configuration

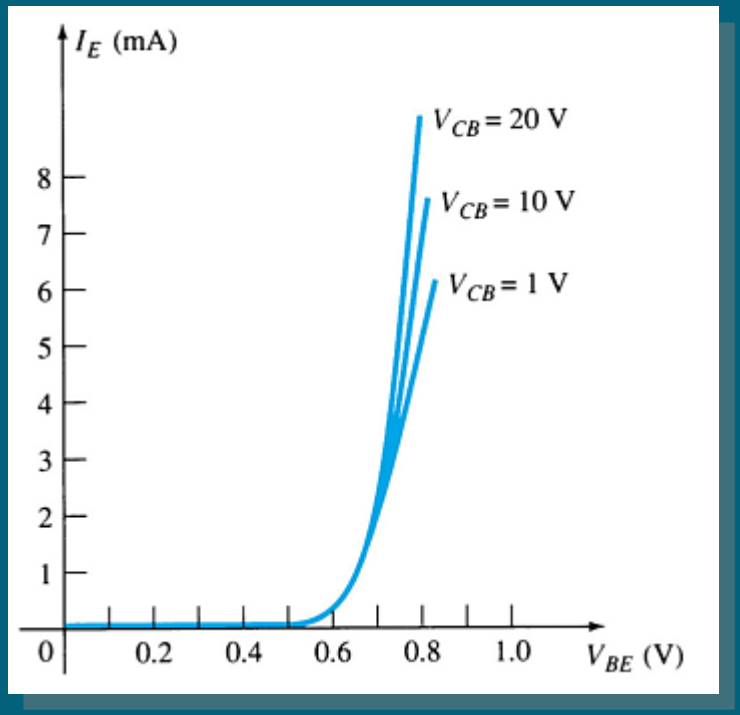


The base is common for input (E–B) and output (C–B) .

Common-Base Amplifier

Input Characteristics

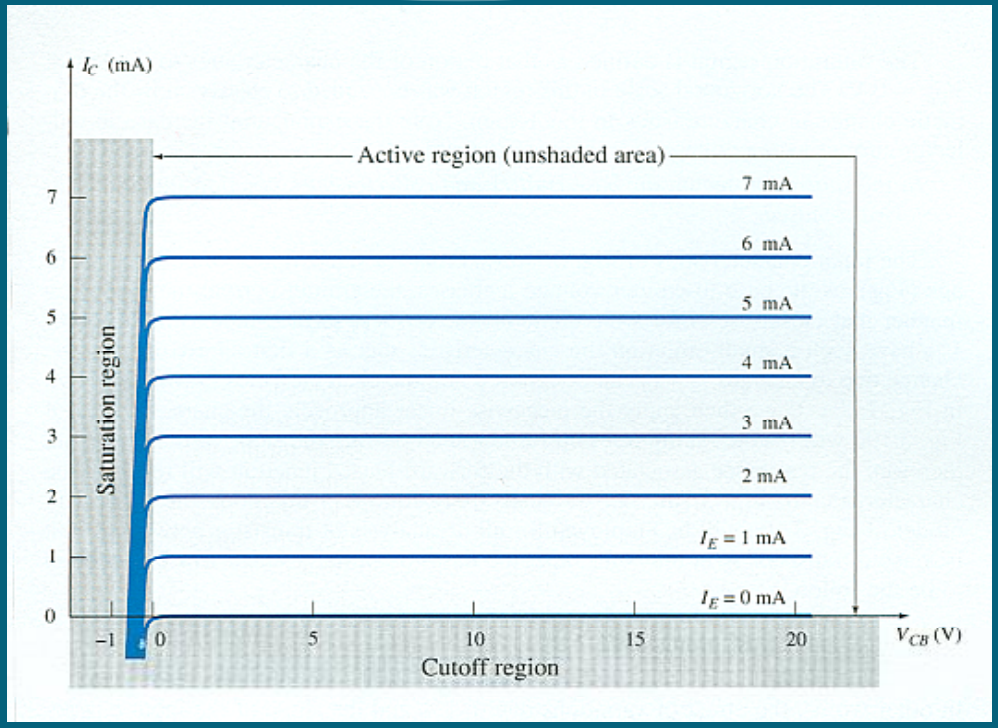
This curve shows the relationship between the input current (I_E) and input voltage (V_{BE}) for different levels of output voltage (V_{CB}).



Common-Base Amplifier

Output Characteristics

The relationship between output current ($I_{C)}$ and output voltage ($V_{CB)}$ for various levels of input current (I_E).



Operating Regions

Active—Operating range of the amplifier.

Cutoff—Transistor off. There is voltage, but little current.

Saturation—Transistor fully on. There is current, but little voltage.

Approximations

Emitter and collector currents:

$$I_C \cong I_E$$

Base-emitter voltage:

$$V_{BE} = 0.7$$