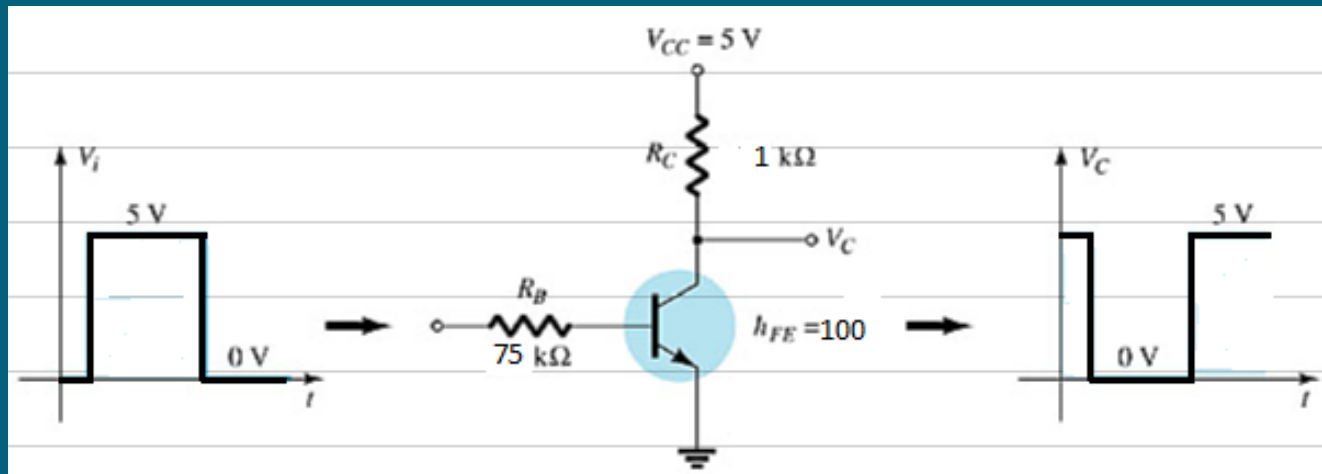# EE-202 Electronics-I-

Chapter :9
BJT DC Biasing

Miscellaneous Bias Configurations

Transistor Switching Circuits

Transistors can be used as electronic switches, when only the DC source is applied
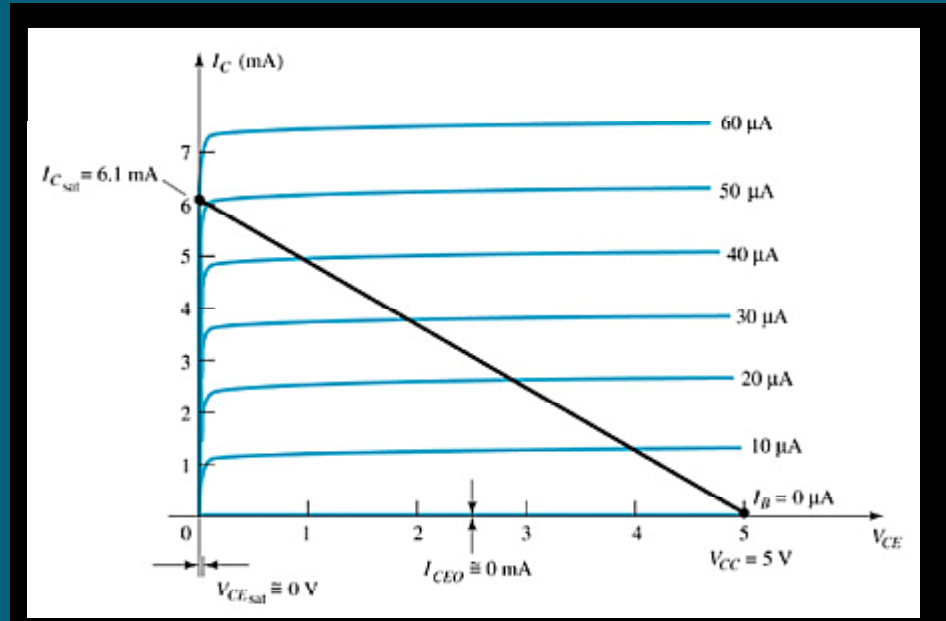
Switching Circuit Calculations

Saturation current:

$$I_{Csat} = \frac{V_{CC}}{R_C}$$

For saturation:

$$I_B > \frac{I_{Csat}}{\beta_{dc}}$$

Emitter-collector resistance:

saturation

$$R_{sat} = \frac{V_{CEsat}}{I_{Csat}}$$

cutoff
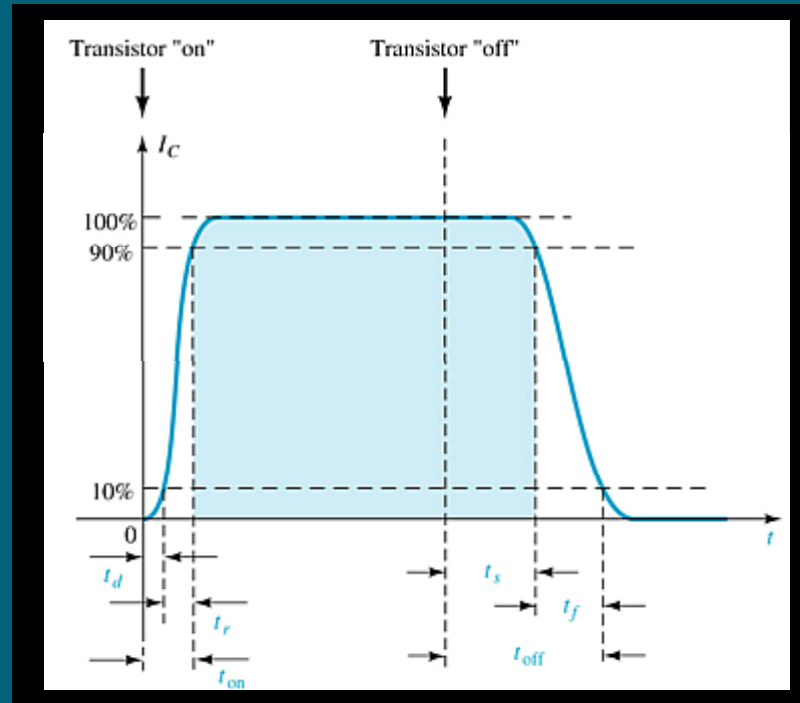
$$R_{cutoff} = \frac{V_{CC}}{I_{CEO}}$$

Switching Time

Transistor switching times:

$$t_{on} = t_r + t_d$$

$$t_{off} = t_s + t_f$$

Troubleshooting Hints

- **Approximate voltages**
  - $V_{BE} \cong 0.7$ **V for silicon transistors**
  - $V_{CE} \cong 25\%$ **to 75% of** V_{CC}
- **Open and short circuits can be tested with an ohmmeter.**
- **Test the solder joints.**
- **A transistor tester can be used to test the transistor.**

PNP Transistors

The analysis for *pnp* transistor biasing circuits is the same for *npn* transistor circuits. The only difference is the currents are flowing in the opposite direction.