Common-Emitter BJT Amplifier DC and ac Small Circuit Equivalent Circuits

Prepared by Kambiz Alavi 2016

DC SIGNAL ANALYSIS CIRCUIT
Replace Capacitors with Open

Circuit for DC Analysis Yields

\[ V_{BEQ} \quad I_{BQ} \quad r_\pi \quad V_{CEQ} \quad I_{CQ} \]

SMALL SIGNAL ac ANALYSIS CIRCUIT
Set DC Voltage Sources to Zero Replace Capacitors with Short

BJT FORWARD ACTIVE ac SMALL SIGNAL MODEL

\[ r_\pi = n V_T/I_{BQ} \]

\[ r_\pi = \text{inverse of the slope of tangent to } (i_B \text{ vs } v_{BE}) \text{ curve} \]

Actual Circuit (a) and Small-signal midband equivalent circuits (b) from A. R. Hambley Electronics 2nd ed. © 2000 Prentice Hall Inc.