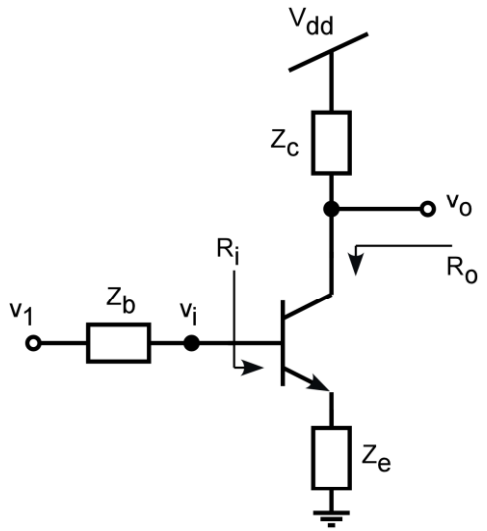
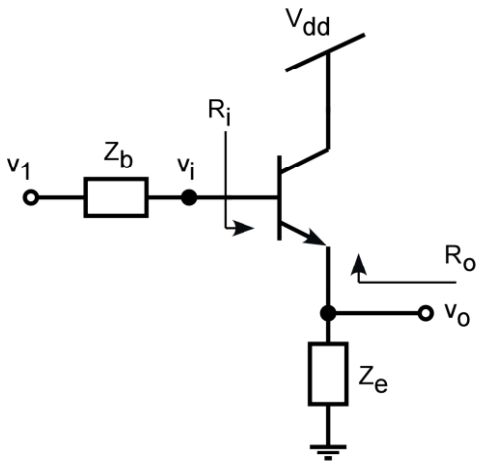
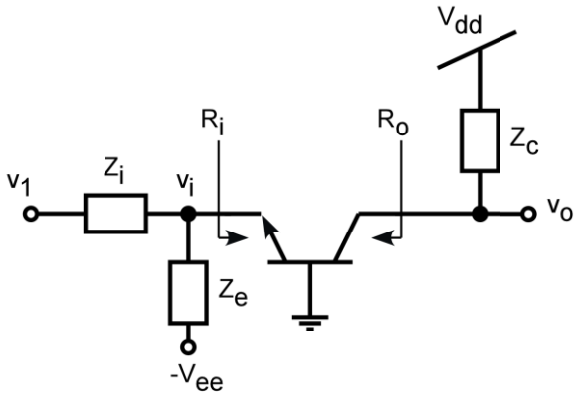
Last Lectures → Single Stage Amplifiers



Common Emitter - CE



Common Collector - CC



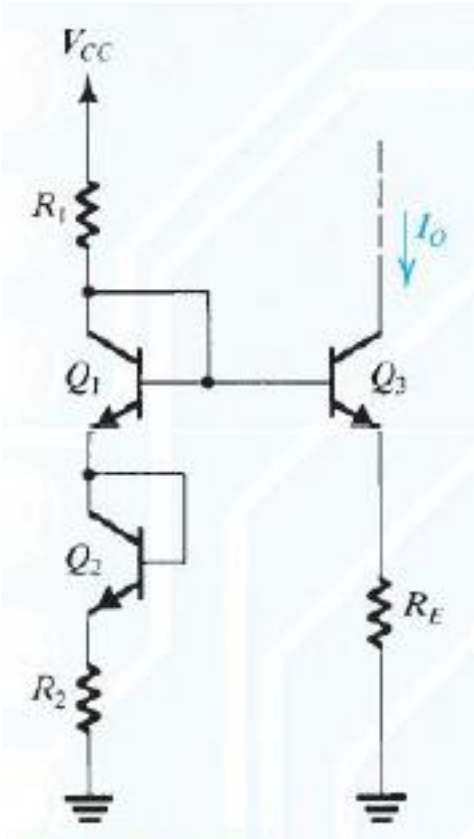
Common Base - CB

Single Transistor Bipolar Amplifier	Common-Emmitter CE	Common-Collector CC	Common-Base CB
Voltage Gain $A_v = \frac{v_o}{v_i}$	$\cong -\frac{g_m}{1+g_m Z_e} \cdot R_o // Z_c$	$\cong +\frac{g_m}{1+g_m Z_e} \cdot Z_e$	$= +g_m \cdot R_o // Z_c$
Input Resistance R_i	$= r_\pi (1 + g_m Z_e)$	$= r_\pi \ (1 + g_m Z_e)$	$\cong \frac{1}{g_m}$
Output Resistance R_o	$= r_o (1 + g_m Z_e)$	$\cong \frac{1}{g_m} + \frac{Z_b}{\beta_o + 1}$	$= r_o [1 + g_m (Z_i // Z_e)]$

Problem 6.140

For the given circuit, assuming all transistors to be identical with β infinite,

a) **derive an expression for the output current I_0, and show that by selecting $R_1=R_2$ and keeping the current in each junction the same, the current I_0 will be $I_0=V_{CC}/(2R_E)$**
b) **What must be the relationship of R_E to R_1 and R_2 be?**
c) **For $V_{cc}=10V$ and $V_{BE}=0.7V$, design the circuit to obtain an output current of 0.5mA.**
d) **What is the lowest voltage that can be applied to the collector of Q_3?**



Problem 6.148