# Lab Session: BJT Amplifier

If one wishes to design the bias network for an amplifier for given values of $I_E$ and $V_{CC}$, following steps are to be followed:

1. Rule of thumb: $V_B = \frac{1}{3} V_{CC}$ ($V_B$ voltage across $R_2$).
2. $V_E = V_B - 0.7$
3. $R_E = \frac{V_E}{I_E}$
4. Assuming negligible base current, current through $R_1+R_2$,

   $I_1 = \frac{V_{CC}}{R_1+R_2} = 0.1\ I_E$

   $$R_1 + R_2 = \frac{V_{CC}}{0.1 I_E}$$
5. $V_B = \frac{R_2}{R_1+R_2} . V_{CC}$

   $R_2 = V_B \frac{(R_1+R_2)}{V_{CC}}$
6. $I_E$ to ensure the value of $R_E$.

   Obtain $I_E = \frac{(V_{BB}-0.7)\,(\beta+1)}{R_B+(\beta+1)R_E}$

   There could be slight variation in this value of $I_E$ from the nominal value. Adjust $R_E$ to get close approximation to nominal value of $I_E$.
7. $I_C = (\frac{\beta}{1+\beta} . I_E)$

   $V_C = \frac{2}{3} V_{CC}$

   $R_C = \frac{V_{CC}-V_C}{I_C}$

**Procedure:**

1. Design bias network for $V_{CC}$ = 10 V, $I_E$ =1 mA for a transistor with ß=400.
2. Connect the circuit as shown in figure 3(a).
3. Carry out DC analysis.
4. Connect the coupling capacitors and bypass capacitor (fig 3(b)).
5. Obtain the voltage gain with and without bypass capacitor.
6. Does it match with the theoretical values?

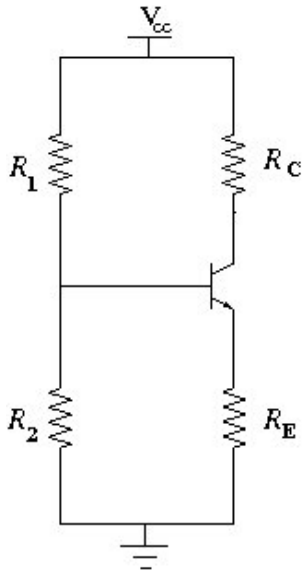


Figure 3 (a)

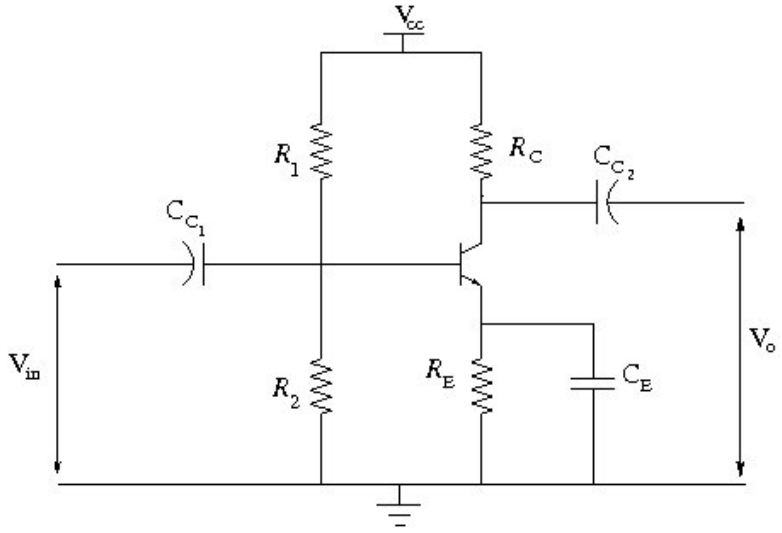


Figure 3 (b)