

Nanyang Technological University
School of Electrical & Electronic Engineering
E2002 Analog Electronics – Tutorial 6

1. The DC operating point of the common-emitter amplifier in Figure 1 has been calculated in Question 2 of Tutorial 5 to be $I_C = 50 \mu A$ and $V_{EC} = 10.86 V$. The pnp transistor Q_1 has $\beta = 100$ and $V_A = 75V$. Assume that the capacitors have infinite value, what are the voltage gain, input resistance, output resistance and current gain if $V_{CC} = V_{EE} = 15 V$, $R_I = 750 \Omega$, $R_1 = R_2 = 200 k\Omega$, $R_L = 100 k\Omega$, $R_C = 100 k\Omega$, $R_{E1} = 30 k\Omega$ and $R_{E2} = 250 k\Omega$.
 (Ans: $A_v = -1.62$, $R_{in} = 96.86 k\Omega$, $R_{out} \approx 100 k\Omega$, $A_i = -1.58$).

What is the amplitude of the largest ac signal that can appear at the output that satisfies the small-signal limit?

(Ans: 505.12 mV)

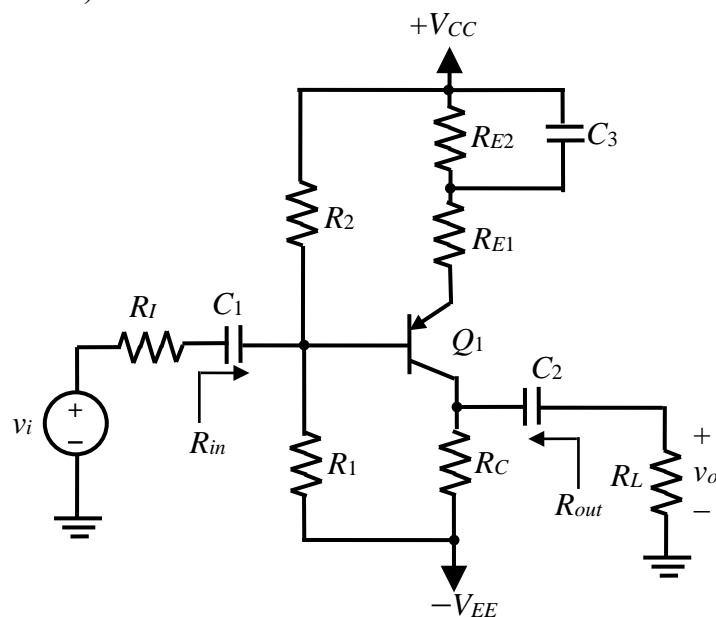


Figure 1

2. For the single stage amplifier in the Figure 2, find the mid-band voltage gain, input resistance and output resistance of this amplifier. What is the input signal range for this amplifier? Use $\beta = 100$, $V_A = 70V$ for the BJT transistors.
 (Ans: $A_v = -8.94$, $R_{in} = 7.18 k\Omega$, $R_{out} = 1.67 k\Omega$, $v_i \leq 11.96 mV$)

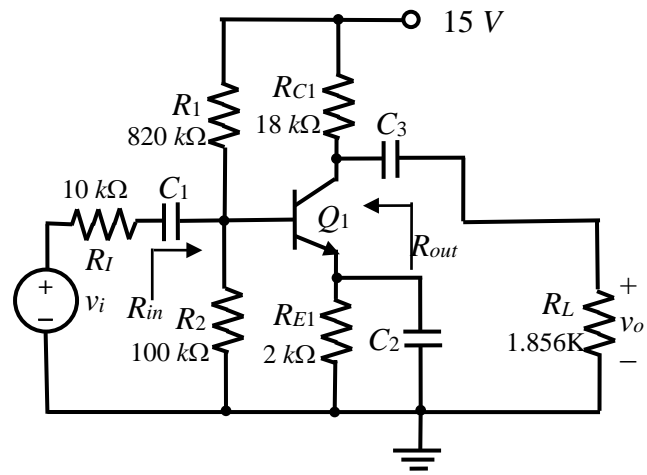


Figure 2