

Indian Institute of Technology, Delhi
ELL304 Analog Circuits
Tutorial 4, 20 August 2015

1. The pnp device in Fig 1 has a β of 100. Choose values of resistors appropriately so that $I_{CQ} = 1 \text{ mA}$, the amplifier has an approximate gain of 5, and maximum possible symmetric peak-to-peak swing is obtained at the output. Make sure that the current through R_1, R_2 is $20\times$ the base current required by the device.
2. The npn device in Fig 2 has a β of 100. Find the small signal gain of the amplifier, and the maximum possible symmetric swing at the output of the amplifier. $R_1 = 5 \text{ k}\Omega, R_2 = 5 \text{ k}\Omega, R_E = 1 \text{ k}\Omega$.
3. In Fig 3, find the voltage gain, the maximum possible symmetric swing at the output of the amplifier.
4. In Fig 4, estimate the voltage gain of the circuit. If the capacitor used to bypass the $3.3 \text{ k}\Omega$ resistor had not been there, what would the voltage gain be? If R_C was not a resistor, but an inductor, (bypass capacitor across $3.3 \text{ k}\Omega$ is present) what would the voltage gain and output impedance be?

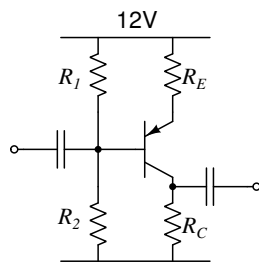


Fig 1

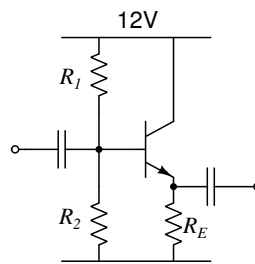


Fig 2

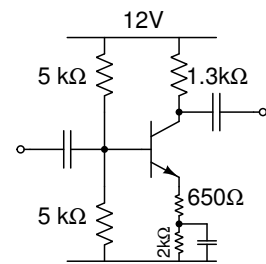


Fig 3

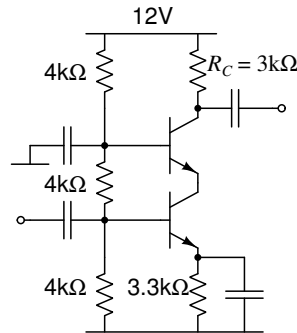


Fig 4