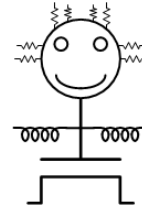




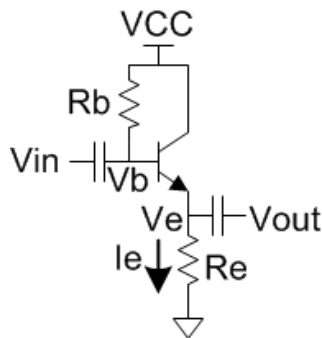
E84: Introduction to Electrical Engineering



Lab 6: Transistors

Warm-Up

- 1) Derive the DC operating point (V_b , V_e , I_b , I_e) of the emitter follower circuit below. Sketch a small signal model and use it to compute the gain, and input and output impedance.



Lab

- 1) Design an AC-coupled amplifier with a gain of about 10 using a 2N3904 NPN transistor. The amplifier should accept a ± 0.2 V input waveform with a frequency of 100 Hz – 10 kHz and should produce a ± 1.8 to 2.2 V output waveform centered around 0. The amplifier must operate with a source impedance up to 100 Ω and must be able to drive a load as low as 200 k Ω .

Extra Credit:

Design a circuit to play flashlight tag. The circuit should include a LPT2023 NPN phototransistor and a LED. The LED should light brightly when the phototransistor is tagged by a beam of light. There is no need to simulate this circuit.

The LPT2023 has two terminals. The collector is the longer leg and the emitter is the shorter leg. When the phototransistor is biased with the collector at a higher voltage than the emitter and optical power is applied, a small current proportional to optical power is generated.