

Lab 8 (30 points)

8-1 Transistor Junctions are Diodes (2 points)

1 point for measuring $V(BC)$

1 point for measuring $V(BE)$

8-2 Emitter Follower (6 points)

1 point for screenshot of 1V 1kHz no offset sine wave input and output

1 point for explaining why the emitter follower is getting cut off

1 point for screenshot of higher amplitude input and output that has bumps below ground

1 point for explaining the bumps below ground (see the hint)

1 point for screenshot of higher amplitude input with $V(EE)=-15V$ and output

1 point for explaining why the emitter follower is now giving the full wave. Also explain the voltage drop.

8-3 Input and Output Impedance of Follower (7 points)

a) Output Impedance

1 point for explaining the purpose of using a blocking capacitor

1 point for screenshot of $<1V$ input and output (don't forget to include the capacitor and 1K load) with voltage measurements on screen

1 point for calculating $R(Out)$ from the measurements from your screenshot

b) Input Impedance

1 point for screenshot of $<1V$ input and output (make sure you remove the capacitor and 1K from your previous circuit) with voltage measurements on screen

1 point for calculating $R(In)$ from the measurements from your screenshot

2 points for inferring your transistor's β value

8-4 Transistor Current Gain (8 points)

Resistor values you need: 1 M Ω , 500 k Ω , 200 k Ω , 100 k Ω , and 50 k Ω

1 point for finding the limiting I_C current for all the above resistors

2 points for estimating the base current I_B for all different I_B s (Hint: Assume $V_{BE} = 0.6 V$ and calculate I_B as $(5.0V - 0.6V) / (R + 4.7k\Omega)$)

5 points for plotting I_C vs I_B (for all five resistors) with and

fitting the line in order to infer the f_l value

8-5 Common-Emitter Amplifier (7 points)

1 point for gain of the amplifier

1 point for screenshot of a few hundred mV input at ~ 1 kHz and output (Do NOT use AC coupling on your oscilloscope.)

2 points for quiescent operating point based on the value of the resistors

1 point for selecting a good load value

1 point for screenshot of $<1V$ input and output (don't forget to include the capacitor and 1K load) with voltage measurements on screen (Hint: This is very similar to Section 6-3.)

1 point for calculating $R_{(Out)}$ from the measurements from your screenshot