

## EE321 – Lab 12

**Bipolar Junction Transistors, Part III**  
**A Two-Stage BJT Amplifier**

Design a two-stage BJT amplifier. The amplifier should respond to AC signals — i.e you may capacitively couple the input and output and stages of the amplifier. You can use 2N3904 (NPN) and/or 2N3906 (PNP) BJTs.

The magnitude of the gain should be 30 (between 25 and 35) with a load of 500 ohms; a 10 V<sub>pp</sub> output should be undistorted.

Design and analyze the amplifier before coming to lab. Be sure to determine the bias voltages ( $V_E$ ,  $V_C$  and  $V_B$  for each transistor), the overall gain, and the input ( $R_{in}$ ) and output ( $R_{out}$ ) resistances.

Simulate and check the design with PSpice.

Build and test your amplifier.

1. Measure the bias voltages and compare them to the calculated values.
2. Measure the gain at 1 kHz and 10 kHz.
3. Measure  $R_{in}$  and  $R_{out}$  as you did in previous labs.

When done write a (word-processed) report on the lab (in addition to the notes kept in your lab notebook). The report should be fairly short — include a schematic of the design, the analysis of the bias voltages (using simple theory), gains and input and output resistances, and the measured bias voltages, gains and input and output resistances. Include and discuss the PSpice analysis.