BİLKENT UNIVERSITY
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

EE 311 ELECTRONICS II

Experiment 2

Lab Report

BJT Amplifier

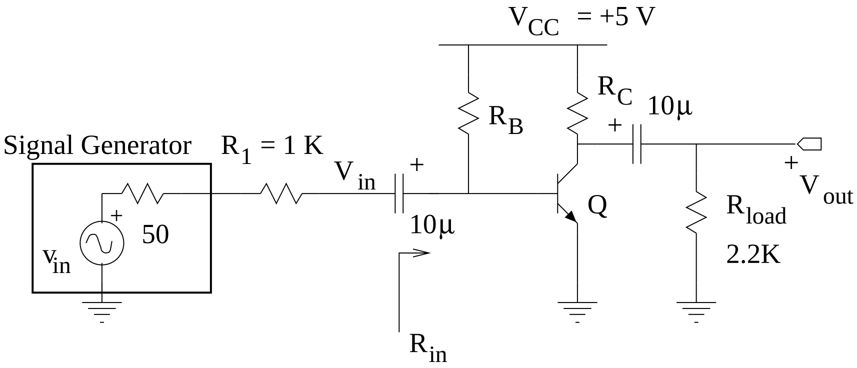
Student Name:

ID Number:

Date:

INTRODUCTION

In this experiment, you will design, construct, and evaluate a basic single-stage BJT amplifier. Your design will have to meet the specifications listed below.



PRELIMINARY WORK

1. Design a single-stage BJT amplifier based on the circuit topology given in the figure. Note that the amplifier is loaded by a 2.2 kΩ resistor. The nominal current gain for the transistor is $\beta_F = 350$ and the Early voltage can be taken as $V_A = \infty$. The following specifications must be met by the circuit:

- Voltage gain $A_v = v_{in}/v_{out} > 50$
- Input resistance $R_{in} > 2$ kΩ
- Peak-to-peak undistorted voltage swing at the output > 2 V

Determine the values of R_B and R_C. Use nominal 10% resistor values only. Try to leave some margin of safety in meeting the above specifications.

The resistor R_1 is included in the circuit to help measure the input resistance R_{in}. Measuring the AC voltage over R_1 will allow you to determine the AC current i_{in} at the input of the amplifier. Dividing v_{in} by i_{in} will allow you to determine R_{in}.

2. Perform the following SPICE simulations. Append the pages containing the input decks and the results of SPICE simulations to the end of this report.

(a) Measure midband voltage gain.

(b) Measure the frequency response for the voltage gain from 20 Hz to 1 MHz.

(c) Measure input resistance at midband.

(d) Measure the maximum output swing.

3. Plan a detailed experimental setup to verify that the amplifier you have designed satisfies the specifications. In other words, describe below, by sketching the test setup, how you are going to measure the performance of the circuit for each of the specifications.

EXPERIMENT:

Just verify that your design meets the specifications. In this report,

- Show the test setup for each specification measurement.
- Show the scope and multimeter readings.

Call the TA and demonstrate the performance of your circuit. If the design does not meet the specs, debug the circuit and change the element values appropriately. Your circuit should meet the specs before you leave the lab room!