

ROBOTICS AND COMMUNICATIONS SYSTEMS ENGINEERING TECHNOLOGY
DIFFERENTIAL AMPLIFIERS LAB
3RD SEMESTER, SR. INSTRUCTOR TIM LEISHMAN

General Objective:

Upon completion of this lab, the student will be able to:

- A. Calculate voltages, currents, gains, slew rate, common mode rejection ratio for differential amplifier circuits.
- B. Construct, measure, and demonstrate the proper use of the test equipment.

References:

- Theory notes
- First Year Text & Lab books
- [MPQ3904](#)

Check-Off Sheet:

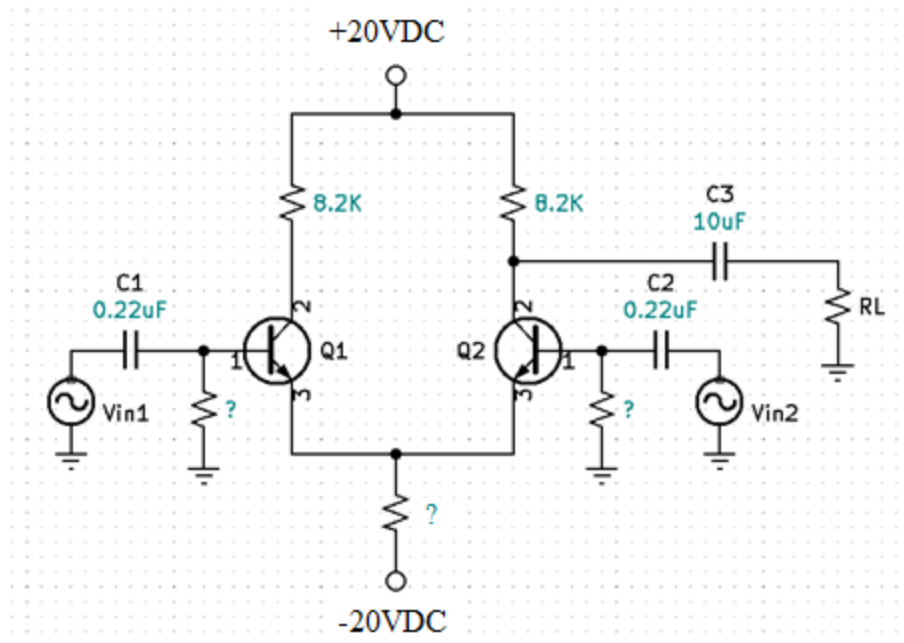
- [Check-Off Sheet](#)

Specific Objectives:

Notes.

- a. Theory Notes
- b. First year Text & Lab books

1. Differential Amplifier



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- a. For the above Diff-Amp circuit, Optimize and show the following calculations.
 - 1.all DC biasing voltages.
 - 2.Single Ended Input (open loop) gains and waveforms.
 - 3.Common Mode gains and waveforms.
 - 4.Differential Mode gains and waveforms.

5.Instructor Check
 - b. Construct and measure previously calculated values.
 - c. Draw measured waveforms.
 - d. Annotate data in a Table and analyze the calculated vs. measured data and waveforms.
 - e. **Instructor Check**
 - f. Replace the tail resistor with a constant current source and repeat steps a-c.
 - g. Compare the differential and common mode gains of the tail resistor circuit to the constant current source circuit.
 - h. **Instructor Check**
2. Design a Single Ended Inverting Differential Amplifier with variable gain control.
 - a. Show circuit schematic and all calculations.
 - b. Measure and document waveforms and gains.
 - c. Measure and document $V_{outmaxp}$.
 - d. Measure and document frequency response.
 - e. **Instructor Check**
 3. Design a Single Ended Non-Inverting Differential Amplifier with variable gain control.
 - a. Show circuit schematic and all calculations.
 - b. Measure and document waveforms and gains.
 - c. Measure and document $V_{outmaxp}$.
 - d. Measure and document frequency response.
 - e. **Instructor Check**
 4. Complete Conclusion and submit completed Check-Off sheet and Lab writeup in Moodle.