Ryerson University

Department of Electrical, Computer, & Biomedical Engineering
Faculty of Engineering & Architectural Science

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Instructor:	Md Waselul Haque Sadid

Assignment/Lab Number:	Post-Lab #7
Assignment/Lab Title:	CC Amplifier

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*By signing above you attest that you have contributed to this written lab report and confirm that all work you have contributed to this lab report is your own work. Any suspicion of copying or plagiarism in this work will result in an investigation of Academic Misconduct and may result in a "0" on the work, an "F" in the course, or possibly more severe penalties, as well as a Disciplinary Notice on your academic record under the Student Code of Academic Conduct, which can be found online at: http://www.ryerson.ca/senate/current/pol60.pdf

ELE404 Lab 7

Table Of Contents:

1. Introduction

The lab report for Common-Collector Amplifiers is provided below. The experiment was conducted with an additional Ta copy of experimental results attached below in this document.

2. Objective:

The objective of this experiment is to analyze circuits with Bipolar-Junction transistors to test the characteristics of a common-collector amplifier. The property focused on in this experiment is buffering and testing the multi-stage amplifier.

3. Circuits Under Analysis

Figure 1.1 Displays a Common-Emitter Amplifier circuit with direct load under analysis for E1 and E2.

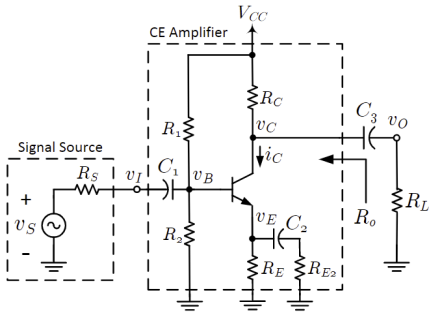

Figure 1.1 Common-Emitter Amplifier Circuit for E1 and E2.

Figure 1.2 Displays a Common-Emitter Amplifier circuit with buffered load under analysis for E3.

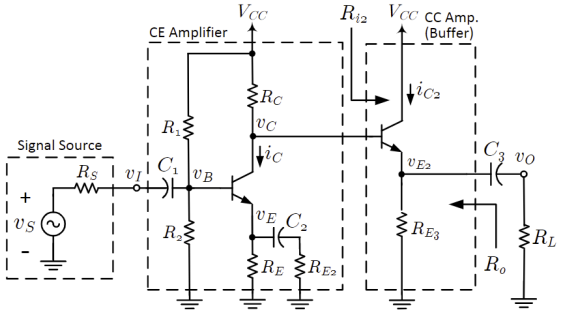

Figure 1.2 Common-Emitter Amplifier Circuit for E3.

4. Experimental Results:

E1.

Amplifiers	Jumpers	$V_c[V]$	$V_E[V]$	$I_c[mA]$	$V_{E2}[V]$	$I_{c2}[mA]$
CE (Figure 1)	None	11.865	7.606	4.39	–	–
Two-Stage (Figure 2)	K-L	12.010	7.609	4.45	11.154	9.29

E2. a)

Amplifier	Jumpers	$v_I[Vrms]$	$v_c[Vrms]$	$v_{E2}[Vrms]$	$v_o[Vrms]$	$A_{vo}[V/V]$
CE	None	6.3×10^{-3}	0.71359	–	–	0

Since V_0 is 0

E2. b)

Amplifier	Jumpers	$v_I[Vrms]$	$v_c[Vrms]$	$v_{E2}[Vrms]$	$v_o[Vrms]$	$A_{vo}[V/V]$
CE	K-N	6.4×10^{-3}	0.457	–	0.457	71.41

E3. a)

Amplifier	Jumpers	$v_I[Vrms]$	$v_c[Vrms]$	$v_{E2}[Vrms]$	$v_o[Vrms]$	$A_{vo}[V/V]$
CE	K-L	6.3×10^{-3}	0.705	0.705	–	0

E3. b)

Amplifier	Jumpers	$v_I[Vrms]$	$v_c[Vrms]$	$v_{E2}[Vrms]$	$v_o[Vrms]$	$A_{vo}[V/V]$
CE	K-L, M-N	6.3×10^{-3}	0.6583	0.644	0.642	101.9

5. Conclusion and Remarks:

C1.

Table C1 a): Calculated and measured DC voltages for the CE amplifier of **Figure 1.**

	$V_c[V]$	$V_E[V]$	$V_{E2}[V]$
Calculated Values [from Table P1]	12.01	7.57	-
Measured Values (from first column, table E1)	11.865	7.606	-
Percent Error, e%	1.21%	0.47%	-

Table C1 b): Calculated and measured DC voltages for the two-stage amplifier of **Figure 2.**

	$V_c[V]$	$V_E[V]$	$V_{E2}[V]$
Calculated Values [from Table P2]	12.03	7.58	11.32
Measured Values (from second column, table E1)	12.010	7.609	11.154
Percent Error, e%	0.166%	0.383%	1.47%

C3.

The CC amplifier has high input impedance and low output impedance characterizing it as a unity gain buffer. Thus even if there is a heavy load resistance the equivalent resistance value would still be small, leading to good voltage gain.

Calculating R_{i2} :

$$r_{\pi} = \frac{\beta}{40I_{C2}} = \frac{150}{40(9.29A)} = 0.4035$$

$$R_{i2,\,load} = r_{\pi} + (1 + \beta)(R_{E3}||R_{L}) = 0.4035 + (151)(1.2||0.180) = 23.635\,\Omega$$

$$R_{i2,\,no\,load} = r_{\pi} + (1 + \beta)(R_{E3}) = 0.4035 + (151)(1.2) = 181.597\,\Omega$$

From these calculations we can see that the value of $R_{i2,\,no\,load}$ is numerically closer in value to the load resistance of 180 ohms.