

EE312 Exp. #1

**RC Coupled CE Amplifier**

Report #1

**COURSE LECTURER:**

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Prepared by

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***CAUTIONARY REMARK: All questions will be answered in the assigned blanks. Don’t use extra place for the answers due to the fact that they are not guaranteed to be evaluated.***

**Part 1--Introduction:**  Explain the main objective of the first experiment on your own words. (5pt)

**Part 2--Procedure: a) Calculating AC gain of CE amplifier:** Extract mathematical expression of AC gain in the following circuit. (10pt)



Figure.1

**b)** Consider in the following tabulated values and Figure 1 above. For these values, calculate (hand-calculation) DC operational points and AC gain that is extracted in part a). Compare this value with your measurement results during the lab. Comment on results. (20pt)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| R1 | R2 | RE | RC | RS | RL | VCC | CC1 | CC2 | CE | Vin |
| 75K | 33K | 4.7K | 4.7K | 1K | 10K | 15V | 0.1μF | 0.1μF | 0.1μF | 100mV (p-p) @ 10kHZ |

Table.1

**c) Calculating corner frequencies**: Calculate fL and fH of the given circuit in Figure.1 above. Compare theoretical results with your measured values during the lab. Comment on the comparison if there are some differences. Discuss the influence of the bypass, coupling, internal, and stray capacitances on the frequency response. (15pt)

**Part-3—LT-Spice Simulation Part:** Construct Figure.1 in the LT-Spice by considering given values in Table.1 and utilizing BC 237 BJT model in the Appendix. **a) DC Analysis:** Give DC op. points. (10pt)

**b) AC Analysis:** Plot AC gain of the circuit and specify the cut-off frequencies. Compare them with your measured values during the lab. Repeat this analysis for CC1=CC2=CE=22μF. Comment on results.(15pt)

**c) Zin and Zout measuring:** Plot Zin and Zout in the frequency domain. (10pt)

**Part-4--Conclusion:** Conclude your report with your learning from this experiment on your own words. Moreover, you can discuss or criticize some over-expected or under-expected sides of the experiment. (10pt)

**Part-5--References:** If you have referred parts, specify their references below. (5pt)

***Appendix:***

***BC237 BJT Model Parameters for Spice Simulation:***

.MODEL BC237 NPN (IS=1.8E-14, ISE=5.0E-14, NF=0.9955, NE=1.46, BF=400, BR=35.5, IKF=0.14, IKR=0.03, ISC=1.72E-13, NC=1.27, NR=1.005, RB=0.56, RE=0.6, RC=0.25, VAF=80, VAR=12.5, CJE=13E-12, TF=0.64E-9, CJC=4E-12, TR=50.72E-9, VJC=0.54, MJC=0.33)