

ELG3336

Lab. 2: A BJT Common Emitter  
Amplifier

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24 September 2014

# Objectives

- The main objectives of this experiment are
  - To understand the operation of BJT and common-emitter (CE) amplifier
- The experiment will help the students to learn the BJT CE amplifier.

# Theory

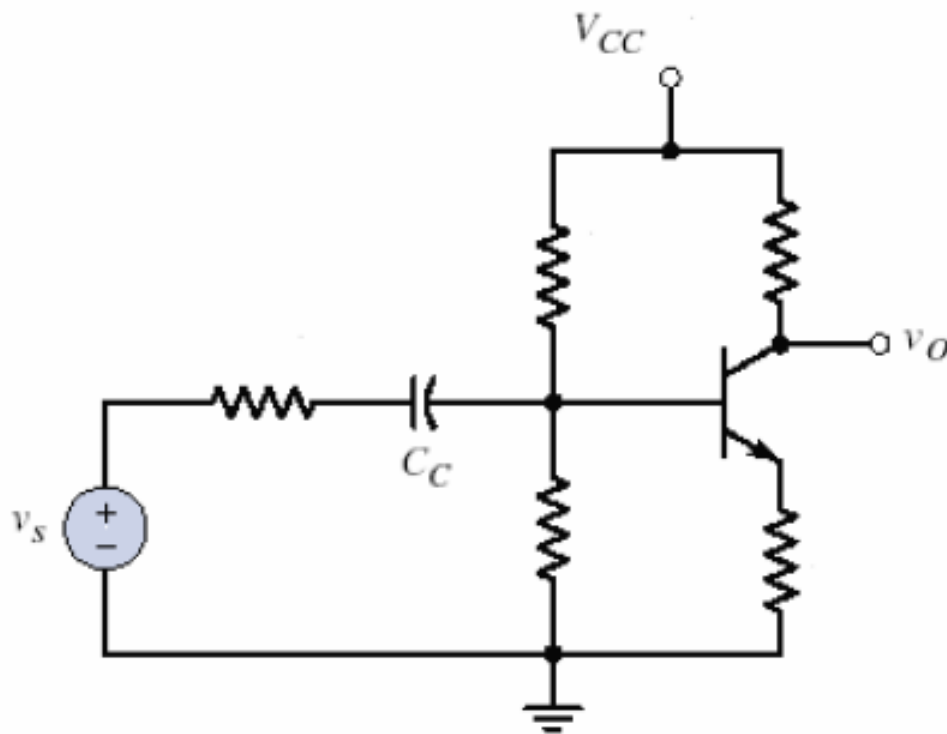
- Study Section 10.2 of the textbook.

# Equipment and Components

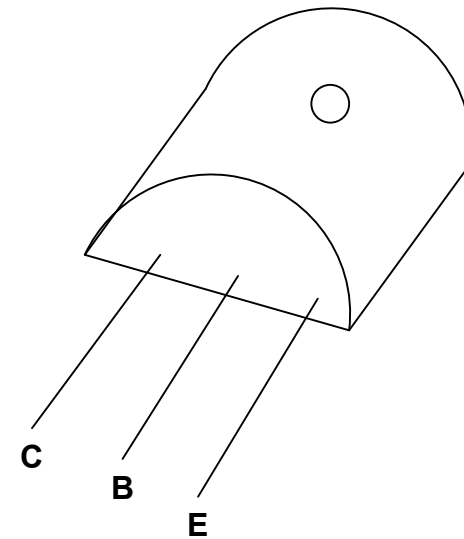
- 2N3904 transistor (NPN type BJT)
- DC power supply
- Oscilloscope
- Digital multimeter
- AC signal generator

# CE Amplifier

- Refer to the lab document.



BJT: 2N3904



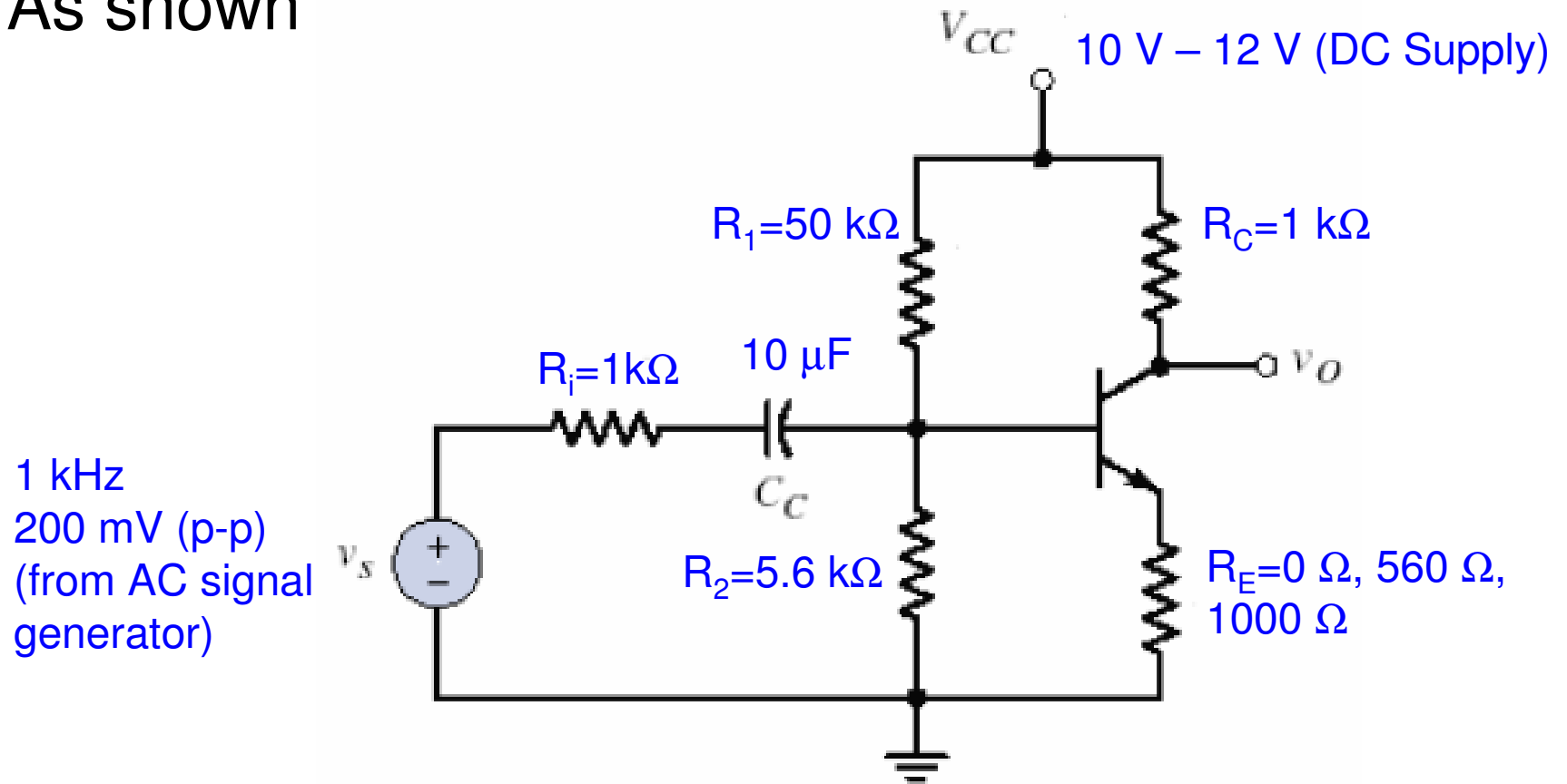
Pin identification

# Procedure

- Connect the circuit given below and name the components.
- Chose proper values for the components  $C_C$ ,  $R_1$  and  $R_2$  (possibly similar values to the ones given in the textbook, if available 50 k $\Omega$  and 5.6 k $\Omega$ ). You may choose  $C_C=10$   $\mu$ F. It is always good to have  $I_C=1$  mA. Use  $R_C = 1$  k $\Omega$ .
- Use 1 kHz signal  $V_s$  with an amplitude that gives undistorted output signal  $V_o$ .
- $V_{CC}$  might be 10 V or 12 V.

# CE Amplifier Component Values

- As shown



# Lab. Tasks

- Task 1
  - Measure the gain of the amplifier ( $V_{o(p-p)} / V_{s(p-p)}$ ) for  $R_E = 0 \Omega$ . Measure  $V_{CE}$ .
  - Draw the input and the output waveshapes.
  - What will happen to the gain if we add a load  $R_L = 2 \text{ k}\Omega$ ?
- Task 2
  - Use  $R_E = 500 \Omega$  and follow the same procedure above
- Task 3
  - Use  $R_E = 1000 \Omega$  and follow the same procedure above
- So, in fact, we have 6 tasks in total (without and with the  $R_L$  in Tasks 1,2, and 3).



# Report

- Explain the function of each component in the amplifier circuit.
- Briefly describe the circuit and its objectives.
- Also, calculate the **theoretical gain** according to the selected component values. **Use theoretical techniques to solve the circuit.**
  - Assume  $\beta = 150$  and  $V_{BE} = 0.7 \text{ V}$ .
  - Compare the theoretical and experimental results.
  - **Do a critical analysis on your findings.**

# References

- ELG3336 textbook
- ELG3336 lab document available at
  - <http://www.site.uottawa.ca/~rhabash/ELG3331LAB1.pdf>
- Images used in this presentation have been borrowed mainly from the ELG3336 lab document. Some images may have been borrowed by searching through Google. Sources of the figures are acknowledged.

# Thank you.

- Ask us your questions. Make sure you understand the experiment completely.

