

**University of Glasgow—University of Electronic Science and Technology of China Joint
School**

INTRODUCTORY ELECTRONICS (UESTC1007)

Final Exam

1430-1630 23rd of June 2016

Use one answer sheet for each of the four questions in this exam.

Show all work on the answer sheet.

**Make sure that your University of Glasgow and UESTC Student Identification Numbers
are on all answer sheets.**

**An electronic calculator may be used provided that it does not allow text storage or
display, or graphical display.**

**All graphs, schematics, and sketches should be clearly labelled and sufficiently large
so that all elements are easy to read.**

**The numbers in square brackets in the right-hand margin indicate the marks allotted to
each part of the question.**

1. Given the circuit in Figure Q1.1:
 - a. Draw the circuits that will be used when superposition is applied to the circuit below. [10]
 - b. Write the set of equations for each of your circuits that would be used to solve for V_x and V_y . [10]
 - c. Find the values for V_x and V_y . [5]

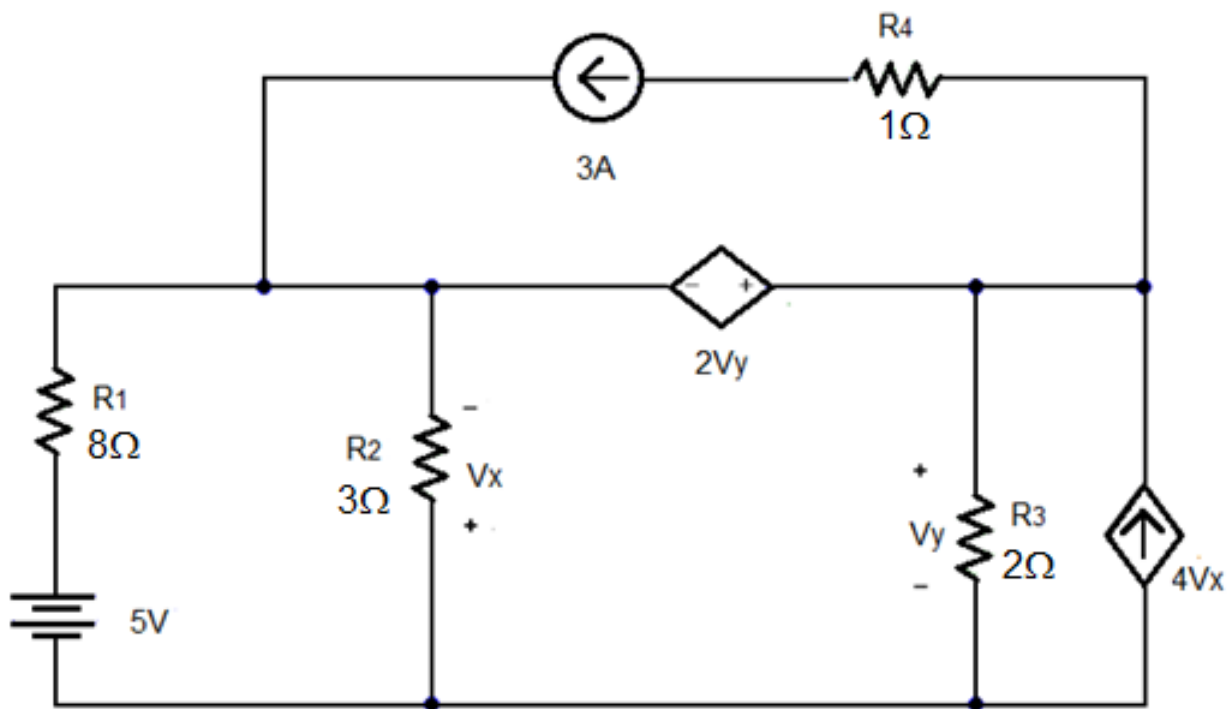


Figure Q1.1

2. Given the voltage transfer characteristics of an amplifier circuit shown in Figure Q2.1

- a. Determine the gain of the amplifier. [5]
- b. Is the amplifier an inverting or noninverting amplifier? [2]
- c. Draw the schematic of a circuit, using a single operational amplifier, which will produce the transfer characteristic shown in the figure. [6]
- d. Determine the value of each passive component used in the circuit that you drew. [4]
- e. Determine the values of V^+ and V^- supplies that are used to power the nearly ideal op amp. [4]
- f. How would be voltage transfer characteristic change if the op amp is ideal? [4]

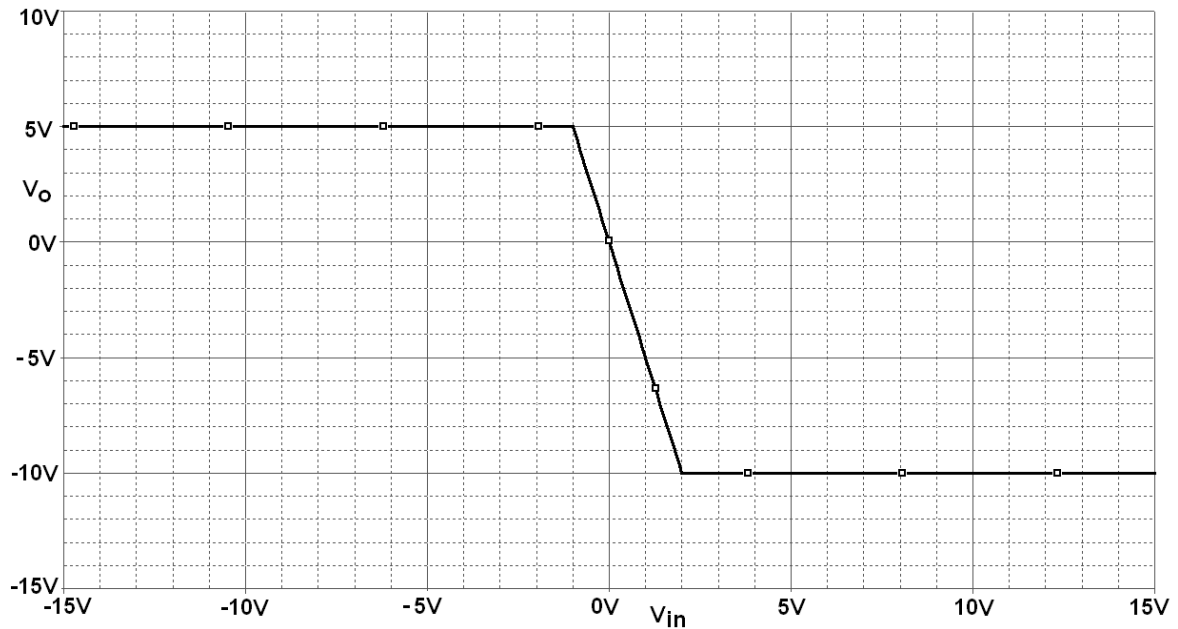


Figure Q2.1

3. For the circuit in Figure Q3.1, the load resistor is R_L :

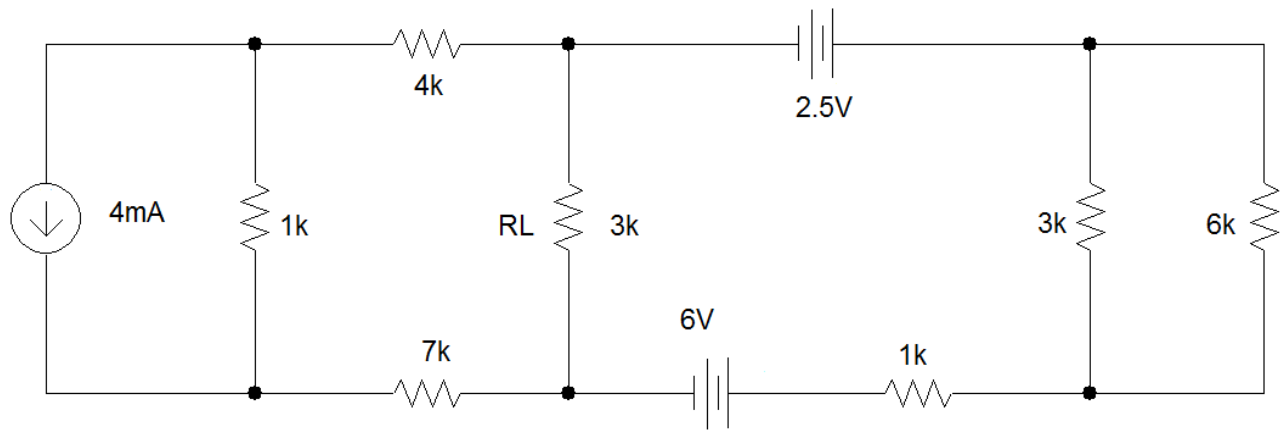


Figure Q3.1

- a. Draw the Norton equivalent circuit and show the steps that were used to determine the component values. [10]
- b. Draw the Thévenin equivalent circuit and show the steps that were used to determine the component values. [5]
- c. Calculate the current through R_L and the voltage across R_L for the:
 - i. Thévenin equivalent circuit. [5]
 - ii. Norton equivalent circuit. [5]

4. For the circuit shown in Figure Q4.1:]

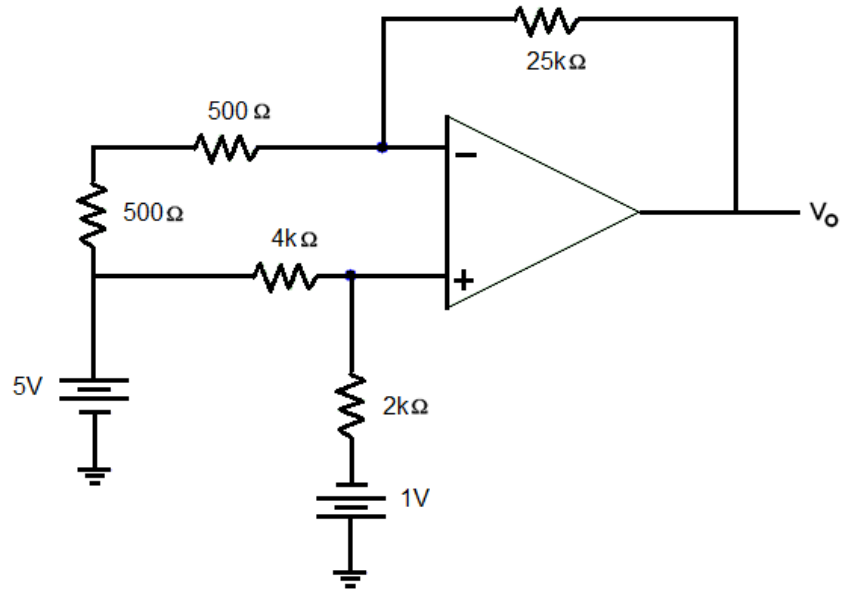


Figure Q4.1

- Write the assumptions for an ideal operation amplifier. [10]
- Calculate the value for V_o . [15]