

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

Introductory Electronics (UESTC1007)

Mid-Term Exam

19:00-21:00 2016-May-06

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

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

Show all work on the answer sheets!

**Correct answers without work may not receive full credit. Incorrect answers
without work may not receive partial credit.**

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

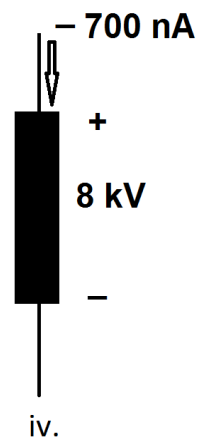
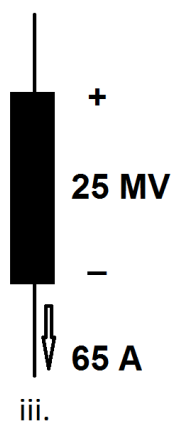
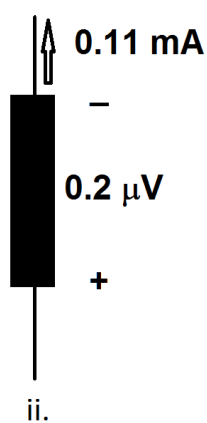
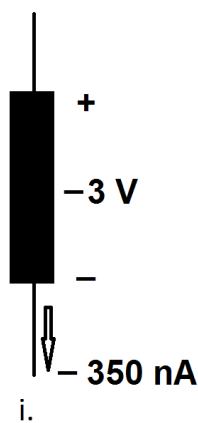
1. Energy, Power, Voltage, Current, Charge

- a. A 20 W solar panel system creates an output voltage of 400 V. [5]
- Determine how much current flow from the solar panel.
 - How much energy will this system produce during 4 hours – assume that there is constant sunlight during this time.

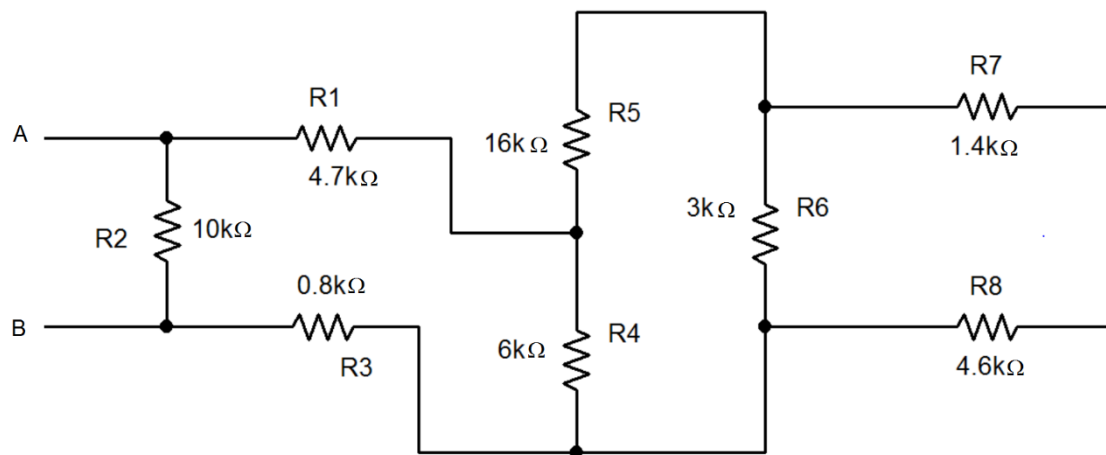
- b. A 2 k Ω resistor dissipates 1mW of power. [2]
- Calculate the voltage across the resistor.
 - Calculate the current flowing through the resistor.

- c. A 3.7 V lithium ion battery has a capacity of 150 mA-h. [2]
- How much charge is stored in the battery?

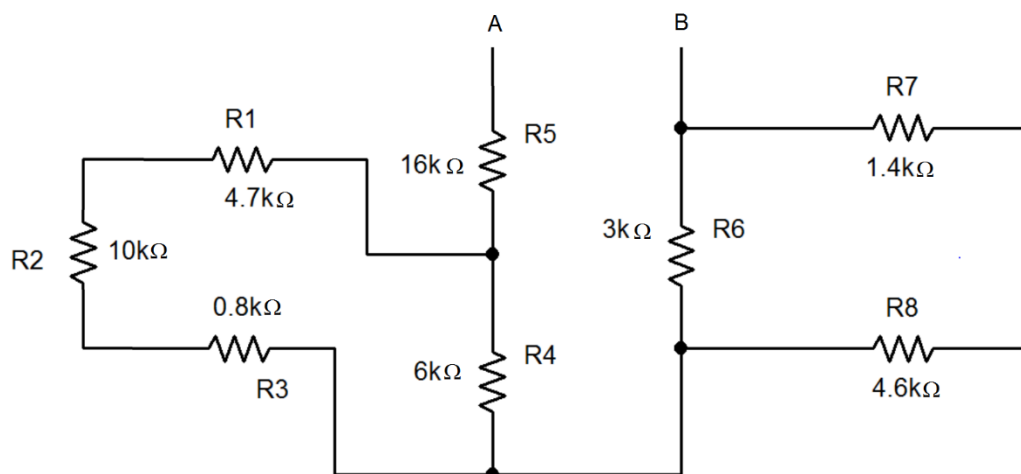
- d. For each of the following set of components: [12]
- Calculate the power using the passive sign convention.
 - State whether the component is generating or dissipating power.



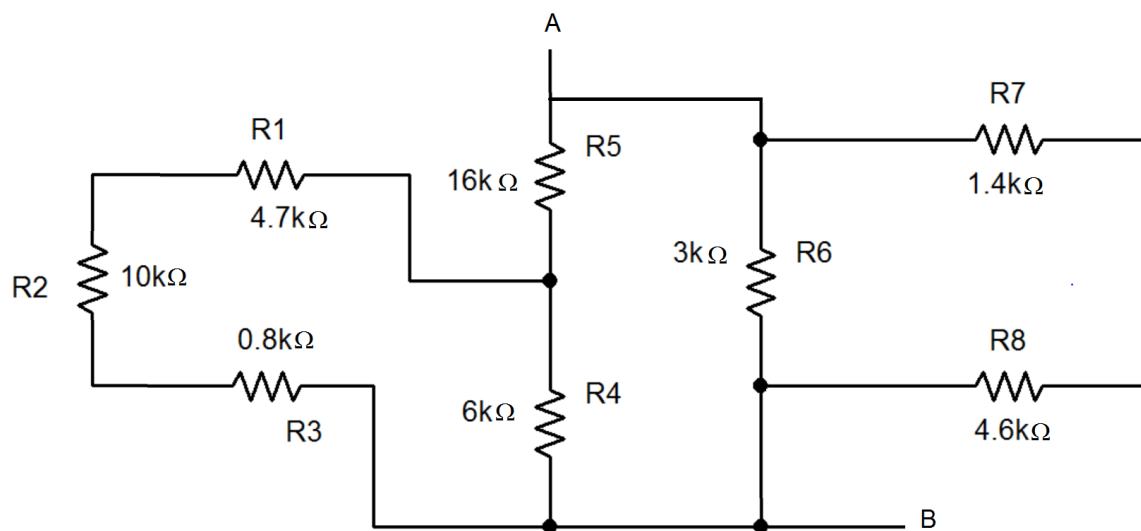
2. Determine the value of an equivalent resistor that could be placed between the terminals labeled A and B that could replace the resistor network. [18]
- a.



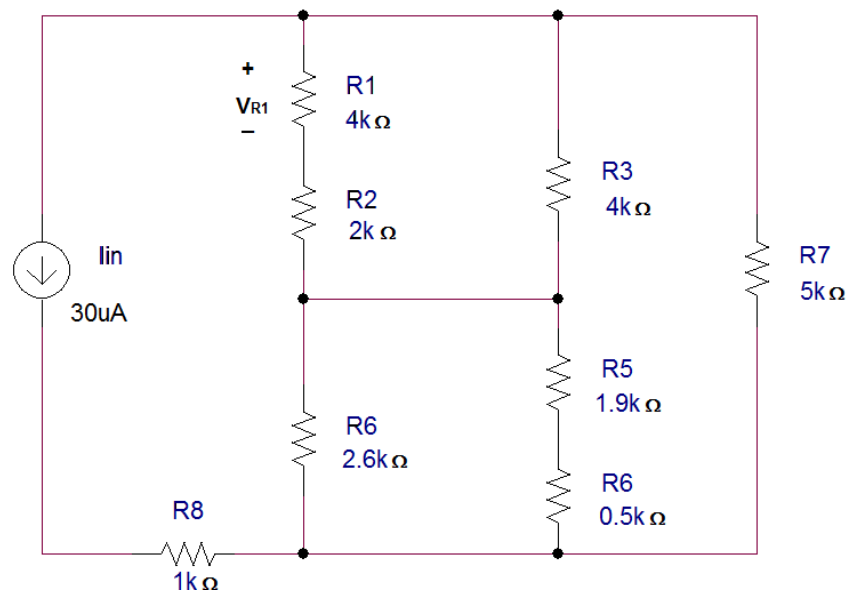
b.



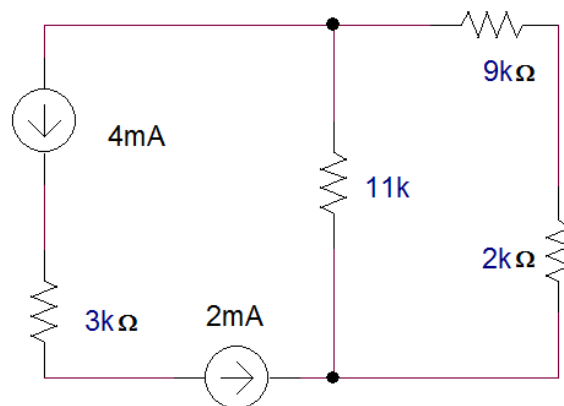
c.



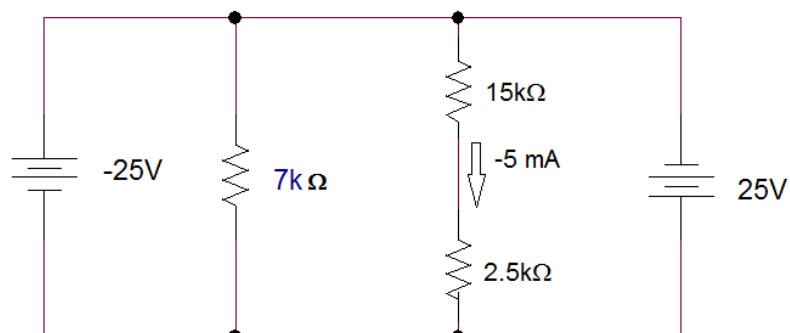
3. For the circuit below:



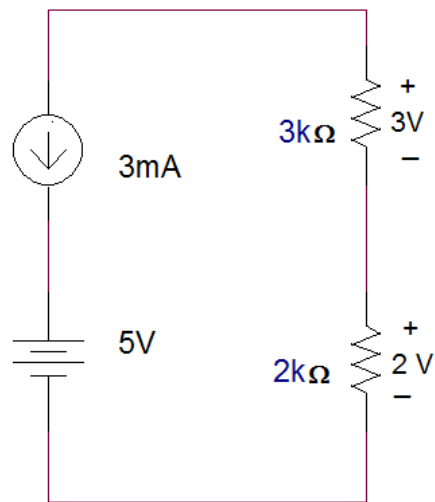
- Use a combination of equivalent resistance, Ohm's Law, and voltage division to calculate the voltage V_{R4} and I_{R2} . [10]
 - Use a current division to verify your answer for the current I_{R2} . [3]
4. State is wrong with the circuits shown below and explain why using Ohm's Law, KCL, and/or KVL. [18]
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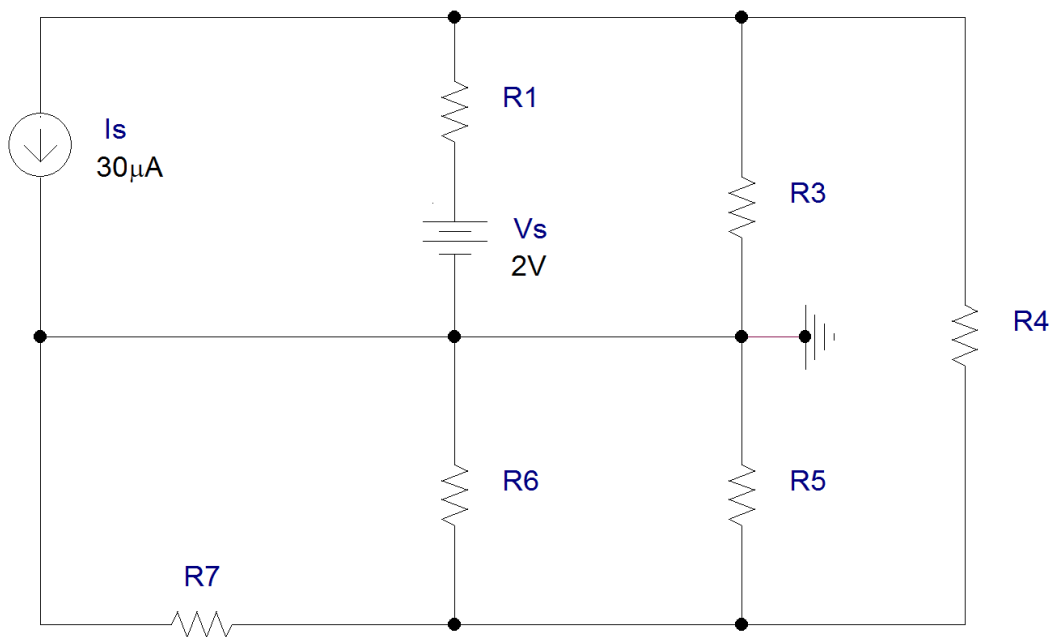
b.



c.



5. For the circuit shown below:



- Using Nodal Analysis, write the set of equations that will be used to determine the voltages at each of the nodes in the circuit. [15]
- Using Loop Analysis, write the set of equations that will be used to determine the loop currents in the circuit. [15]