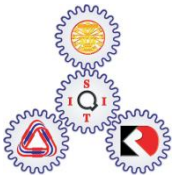


Sirindhorn International Institute of Technology

Thammasat University at Rangsit

School of Information, Computer and Communication Technology

ECS 203: Problem Set 1

Semester/Year: **2/2015**
Course Title: Basic Electrical Engineering
Instructor: Asst. Prof. Dr. Prapun Suksompong (prapun@siit.tu.ac.th)
Course Web Site: http://www2.siit.tu.ac.th/prapun/ecs203/

Due date: Jan 25, 5 PM

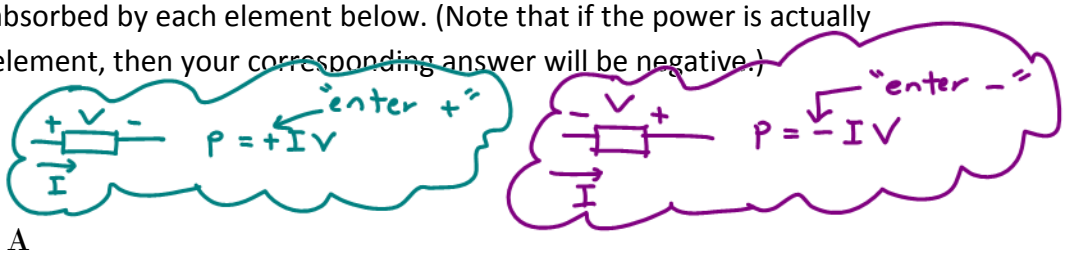
Instructions

1. Solve all problems. (5 pt)
   a. Write your name and ID on the top of **every** submitted page.
   b. For each part, write your explanation/derivation and answer in the space provided.
2. ONE sub-question will be graded (5 pt). Of course, you do not know which part will be selected; so you should work carefully on all of them.
3. There is no need to submit (or even print out) page 1 (this cover sheet).
4. Late submission will be rejected.
5. ***Write down all the steps*** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.

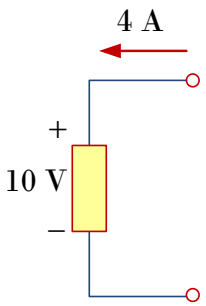
Questions

1) Find the power absorbed by each element below. (Note that if the power is actually supplied by the element, then your corresponding answer will be negative.)

Recall that there are only two cases:



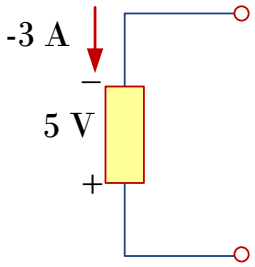
a)



"enter +"

$P = +IV = (4A)(10V) = 40\ W$

b)

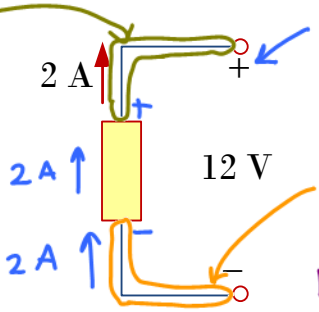


"enter -"

$P = -IV = -(-3A)(5V) = 15\ W$

All location on this line belongs to the same node. So, the "+" label can be drawn anywhere.

c)



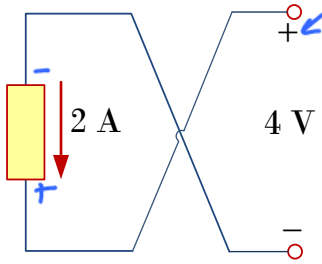
If having the "+" and "-" terminals here is confusing, you can move them closer to the element.

All location on this line belongs to the same node. So, the "-" label can be drawn anywhere.

"enter -"

$P = -IV = -(2A)(12V) = -24\ W$

d)



Again, we move the "+" and "-" terminals closer to the element.

"enter -"

$P = -IV = -(2A)(4V) = -8\ W$

[Based on Alexander and Sadiku, 2009, Q1.16]

2) Calculate the power absorbed by each element in Figure 1. (Note that if the power is actually supplied by the element, then your corresponding answer will be negative.)

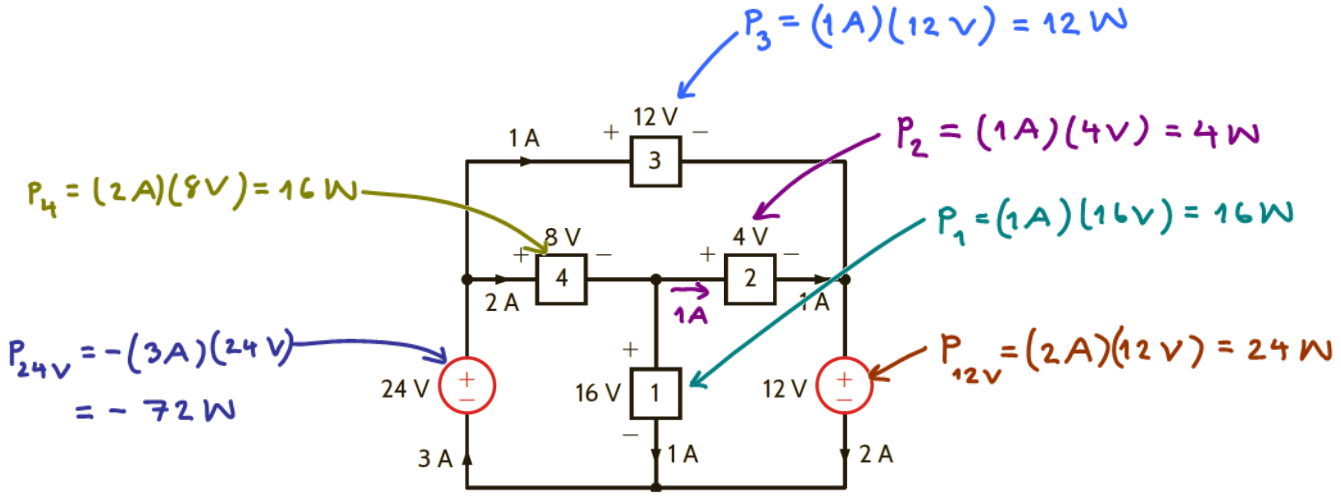


Figure 1

$P_1 = 16W$, $P_2 = 4W$, $P_3 = 12W$, $P_4 = 16W$, $P_{12V} = 24W$, $P_{24V} = -72W$

Note that their sum = 0.

[Based on Irwin and Nelms, 2015, E1.6]

3) [Alexander and Sadiku, 2009, Q1.18b] Calculate the power absorbed by each element in Figure 2. (Note that if the power is actually supplied by the element, then your corresponding answer will be negative.)

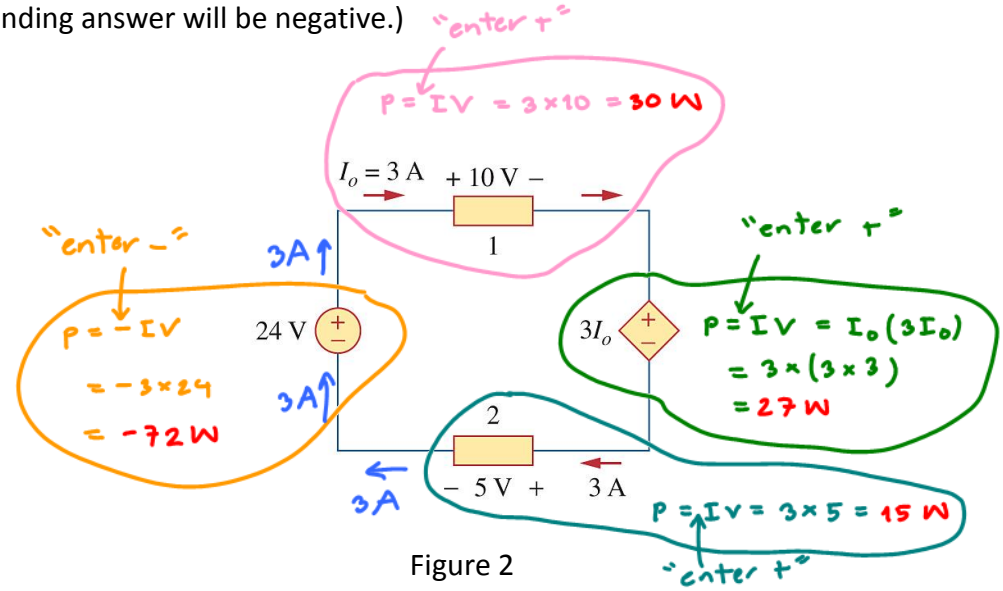


Figure 2

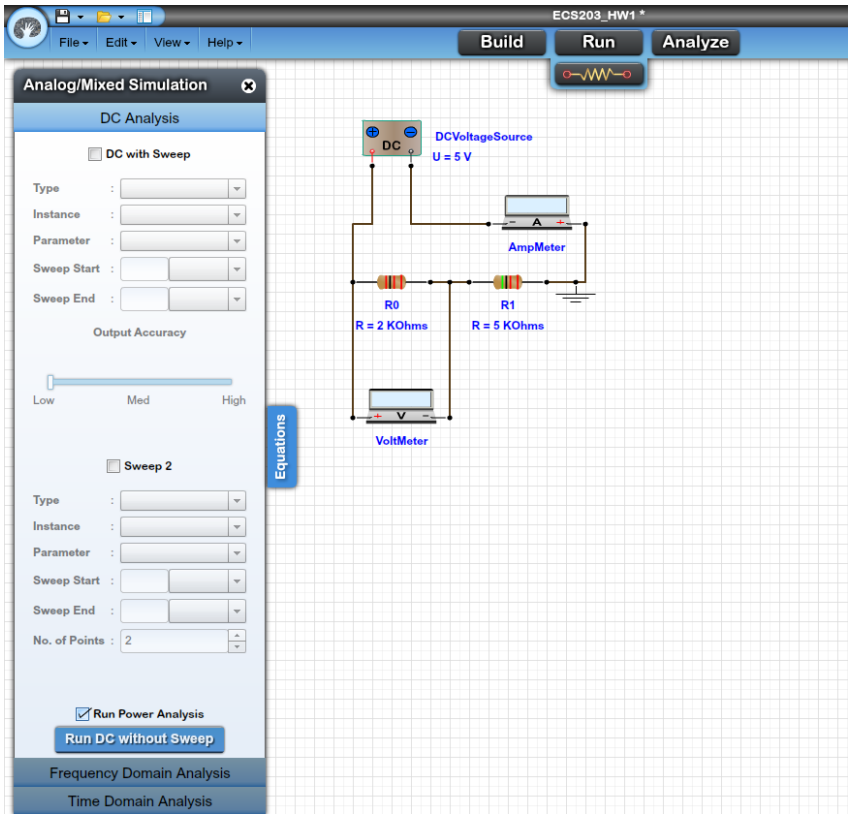
Note that when we add all the powers, we have $-72+30+27+15 = 0$.

4) Indicate the type of the dependent source in Figure 2.

We first need to find which element is the dependent source. To do this, simply look at the element that has ◇ shape.
Next, because the symbol(s) inside the ↗ is "±", we know that it is a voltage source. Finally, its value is $3I_o$ where I_o is a current somewhere in the circuit. Therefore, the value of the voltage source is controlled by a current.

Conclusion: current-controlled voltage source

5) Access the following circuit at http://www.docircuits.com/circuit-editor/43223/ecs203-hw1.



You will need to register and log-in before you can run the simulation.

a) Click the "Run DC without sweep", record the values that are displayed on the voltmeter and the ammeter.

b) Change the resistance (right-click the resistor and select "Edit Properties") of R1 to be the same as the last four digit of your student ID. (For example, if your ID is 5722770237, the resistance of R1 should be 237 Ω.) Now, click the "Run DC without sweep", record the values that are displayed on the voltmeter and the ammeter. (You may have to press the "Run" button on the top first.)