Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (please print)

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ECE 2300 – Quiz #2

October 2, 2013

Keep this quiz closed and face up until you are told to begin.

1. This quiz is closed book, closed notes. You may use one 8.5” x 11” crib sheet, or its equivalent.

2. Show all work on these pages. Show all work necessary to complete the problem. A solution without the appropriate work shown will receive no credit. A solution which is not given in a reasonable order will lose credit.

3. It is assumed that your work will begin on the same page as the problem statement. If you choose to begin your work on another page, you must indicate this on the page with the problem statement, with a clear indication of where the work can be found. **If your work continues on to another page, indicate clearly where your work can be found. Failure to indicate this clearly will result in a loss of credit.**

4. Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.

5. Do not use red ink. Do not use red pencil.

6. You will have 35 minutes to work on this quiz. A

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

Room for extra work

For a set of identical devices, each one can be modeled by a current source in parallel with a resistance. Each device is characterized by the plot in Figure 1, where the reference polarities are defined in Figure 2.

Assume that two of these identical devices are placed in the circuit in Figure 3. Note that the polarity for each device is show with the terminal labels A and B, as given in Figure 2. Find the power delivered by each of these two devices.

 



Room for extra work

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (please print)

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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6. You will have 35 minutes to work on this quiz. B

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

Room for extra work

For a set of identical devices, each one can be modeled by a current source in parallel with a resistance. Each device is characterized by the plot in Figure 1, where the reference polarities are defined in Figure 2.

Assume that two of these identical devices are placed in the circuit in Figure 3. Note that the polarity for each device is show with the terminal labels A and B, as given in Figure 2. Find the power delivered by each of these two devices.

 



Room for extra work

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (please print)

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ECE 2300 – Quiz #2

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5. Do not use red ink. Do not use red pencil.

6. You will have 35 minutes to work on this quiz. C

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

Room for extra work

For a set of identical devices, each one can be modeled by a current source in parallel with a resistance. Each device is characterized by the plot in Figure 1, where the reference polarities are defined in Figure 2.

Assume that two of these identical devices are placed in the circuit in Figure 3. Note that the polarity for each device is show with the terminal labels A and B, as given in Figure 2. Find the power delivered by each of these two devices.

 



Room for extra work

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (please print)

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ECE 2300 – Quiz #2

October 2, 2013

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5. Do not use red ink. Do not use red pencil.

6. You will have 35 minutes to work on this quiz. D

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

Room for extra work

For a set of identical devices, each one can be modeled by a current source in parallel with a resistance. Each device is characterized by the plot in Figure 1, where the reference polarities are defined in Figure 2.

Assume that two of these identical devices are placed in the circuit in Figure 3. Note that the polarity for each device is show with the terminal labels A and B, as given in Figure 2. Find the power delivered by each of these two devices.

 



Room for extra work

ECE 2300 -- Quiz #2 – October 2, 2013 – Solution

For a set of identical devices, each one can be modeled by a current source in parallel with a resistance. Each device is characterized by the plot in Figure 1, where the reference polarities are defined in Figure 2.

Assume that two of these identical devices are placed in the circuit in Figure 3. Note that the polarity for each device is show with the terminal labels A and B, as given in Figure 2. Find the power delivered by each of these two devices.

 



Solution:

We begin drawing the equivalent circuit for the device. This circuit is given as follows.



Note that we are careful to label terminals A and B. Then, we write KCL for the closed surface drawn on this diagram to obtain


Now, we have the model for the device, which we can plug into the circuit in Figure 3.



Again, keeping the terminal labels helps us get the polarities of the current sources correct. Writing KCL for the top node gives us



Thus, the power delivered by the device is





This answer will be valid for either device, since they have the same voltage across them, and the same current through them. For a set of identical devices, each one can be modeled by a current source in parallel with a resistance. Each device is characterized by the plot in Figure 1, where the reference polarities are defined in Figure 2.

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