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

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

ECE 2202 – Quiz #5A and 6A

November 21, 2019

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 40 minutes to work on this quiz.

Quiz 5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

Quiz 6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

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

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

ECE 2202 – Quiz #5B and 6B

November 21, 2019

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 40 minutes to work on this quiz.

Quiz 5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

Quiz 6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

Room for extra work

5. The circuit given below operates in steady-state. The voltage source value is 



1. Find the impedance of the load.
2. Find the reactance of the load.
3. Find the complex power absorbed by the load.
4. Find the reactive power absorbed by the line.
5. Find the power factor for the load.

5. The circuit given below operates in steady-state. The voltage source value is 



1. Find the impedance of the load.
2. Find the susceptance of the load.
3. Find the complex power absorbed by the load.
4. Find the reactive power absorbed by the line.
5. Find the power factor for the load.

6. Print your name.

Room for extra work

ECE 2202 Quiz 5A – November 21, 2019 – Solution:

The circuit given below operates in steady-state. The voltage source value is 



1. Find the impedance of the load.
2. Find the reactance of the load.
3. Find the complex power absorbed by the load.
4. Find the reactive power absorbed by the line.
5. Find the power factor for the load.

We begin by converting the circuit to the phasor domain, in the diagram that follows. Notice that we needed to convert the sine function to the cosine function, by subtracting 90 from the phase, before we transformed the voltage source. We chose to use rms phasors, so we divided the magnitude by the square root of two, to give the magnitude of the phasor voltage source. We also define the current around the loop, **Ia,rms** , in this same step.



Now, we can solve for the current by using complex Ohm’s Law to write



1. From the three series impedances in the load, we have



1. The reactance of the load is the imaginary part of the impedance of the load, so



1. We use the magnitude of the rms phasor current through the load to write



1. We use the magnitude of the rms phasor current through the line to write



1. The power factor of the load is the cosine of the phase of the impedance of the load, so



We know that it is lagging, because the angle is positive.

ECE 2202 Quiz 5B – November 21, 2019 – Solution:

5. The circuit given below operates in steady-state. The voltage source value is 



1. Find the impedance of the load.
2. Find the susceptance of the load.
3. Find the complex power absorbed by the load.
4. Find the reactive power absorbed by the line.
5. Find the power factor for the load.

We begin by converting the circuit to the phasor domain, in the diagram that follows. Notice that we needed to convert the sine function to the cosine function, by subtracting 90 from the phase, before we transformed the voltage source. We chose to use rms phasors, so we divided the magnitude by the square root of two, to give the magnitude of the phasor voltage source. We also define the current around the loop, **Ia,rms** , in this same step.



Now, we can solve for the current by using complex Ohm’s Law to write



1. From the three series impedances in the load, we have



1. The susceptance of the load is the imaginary part of the admittance of the load, where the admittance is the inverse of the impedance, so



1. We use the magnitude of the rms phasor current through the load to write



1. We use the magnitude of the rms phasor current through the line to write



1. The power factor of the load is the cosine of the phase of the impedance of the load, so



We know that it is leading, because the angle is negative.