ECE 101 Final Exam – 20 points total Fall 2014

This exam consists of 10 multiple-choice or short-answer questions worth 2 points each. Circle the single correct answer or fill in the blank. If you don't agree with any of the multiple-choice answers, write your own response in for "other". All resistors on the test are in Ω. Don't forget to put your name on the exam and to turn in your formula sheet.

Good luck!

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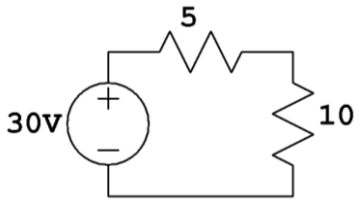
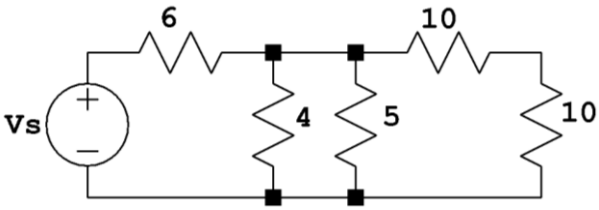
1. What is the power absorbed by the 10 Ω resistor in this circuit?



(i) 20 W (ii) 40 W (iii) 60 W (iv) 90 W

(v) other: _____

2. What is R_{eq} seen from the voltage source in this circuit?



R_{eq} = _____ Ω.

3. A power supply is set to provide 10 V dc with a maximum current limit of 100 mA. The output is connected to a 10 Ω resistor. What voltage and current will be measured in the resistor?

(i) 10 V and 1 A

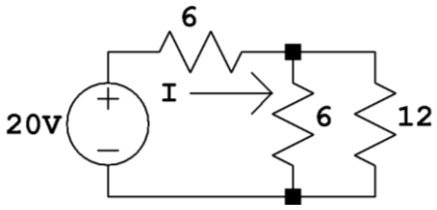
(ii) 10 V and 1 A initially, but then the resistor will probably overheat.

(iii) 10 V and 100 mA

(iv) 1 V and 100 mA

(v) other: _____

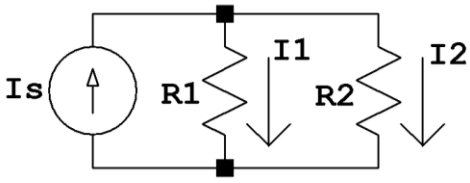
4. What is I in this circuit?



(i) 2 A (ii) 10/3 A (iii) 5/3 A (iv) 5/6 A

(v) other: _____

5. If $R_1 << R_2$ in this circuit, is $I_1 << I_2$, $I_1 >> I_2$ or $I_1 = I_2$?



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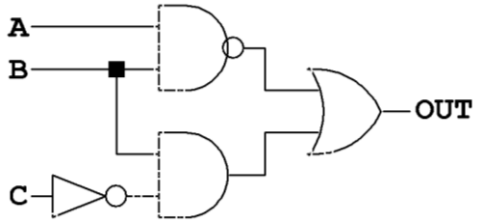
6. What is the output of this logic circuit?



(i) $\overline{AB} + B\overline{C}$ (ii) $\overline{A}\,\overline{B} + B\overline{C}$

(iii) $\overline{\overline{AB} + B\overline{C}}$ (iv) $(\overline{A + B}) \cdot (B + \overline{C})$

(v) other: _____

7. Three inputs A, B and C are available. Draw a logic circuit whose output is $(A + \overline{B}) \cdot (C + \overline{A})$.

8. Here is a logic situation. Class will be cancelled if it snows, or if the teacher is sick and no alternate teacher is available. Using the following definitions:

S = 0 no snow S = 1 snow
T = 0 teacher not sick T = 1 teacher is sick
A = 0 alternate not available A = 1 alternate is available
C = 0 class is not cancelled C = 1 class is cancelled

Which is the logic equation that describes this situation for the class to be cancelled?

(i) $S + TA$ (ii) $\overline{S} \cdot (\overline{T} + A)$ (iii) $S \cdot (T + \overline{A})$ (iv) $S + T\overline{A}$ (v) other: _____

9. Below are directions for a lab experiment. Find and correct two mistakes in these directions. (There are more, but you only need to do two.)

Connect pin 1, 4 and 6 to +V, -V and ground. Feedback resistor must be connected between pins 3 and 5 for stability operation. Bypass capacitors should always to be used for noise redaction. Apply to input signal to pin 2 and observe the output at pin 7, adjusting the input as neccessary for linearization output.

10. A quality assurance engineer is told by her boss to approve a product release, although the product did not pass all its tests. Which statement below is the most ethical response?

(i) The engineer should approve the product to avoid the risk of being fired. Losing her job would cause her family hardship, and supporting her family is her highest responsibility.

(ii) She should do what her boss says. She may disagree, but her highest responsibility is to the employer who is paying her salary.

(iii) She should do what her boss says, but report her boss to upper management. This way she doesn't get in trouble, but avoids responsibility if the product harms anyone.

(iv) She should refuse to approve the product. A product which did not pass its tests could be harmful to the public, and public welfare is her highest responsibility.

(v) Other: _____