Practice Exam
ENGR 120 – Fall 2007

Note: This practice exam is similar in format to what you may expect for your first exam in this class. Do not assume that this practice exam represents every type of problem that you may see on your exam, or that the percentage values for each set of problems on this exam will be the same as those on your exam.

Part I. Written Exam

This part of the exam is closed book, closed notes. You may use a calculator. You may write ONLY on this exam.

Fill in the Blank (30 points; 6 points each). Write the most correct answer in the blank. You should not show your work.

1. A resistor with color markings of "blue-green-red" has an approximate resistance of _____ ohms.

2. A conductor easily lets go of its _____ electrons.

3. To stop a servo motor from turning, you should program your robot to send a pulse width of _____ ms.

4. When you want a formula in EXCEL to refer to a specific cell, you must either give the cell or use _____ addressing.

5. The number 10101110_2 is equivalent to what base-10, or decimal number? _____.

Multiple Choice (30 points; 5 points each). Circle the best answer for each question.

Referring to Figure 1, answer questions 1-4:

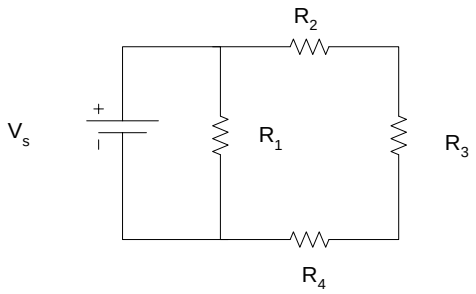

Figure 1. Circuit diagram for Multiple Choice Questions 1-4.

1. The resistors that are in parallel with each other are:
   (a) R_2 and R_4
   (b) R_1 and R_3
   (c) Both R_2 and R_4 along with R_1 and R_3
   (d) R_1 and (R_2 + R_3 + R_4)
   (e) None of the above

2. The voltage drop across R_1 =
   (a) V_s
   (b) R_1 times the current through R_1
   (c) The sum of the voltage drops across R_2, R_3, and R_4
   (d) None of the above
   (e) Answers (a), (b), and (c)

3. If R_{eq} = 100Ω and V_s = 10V, the current leaving the voltage source must be
   (a) 1000A
   (b) 1000W
   (c) 0.1A
   (d) 0.1W
   (e) None of the above

4. If V_s = 5V, the current through R_1 = 1A and the current through R_3 = 2A, then
   (a) The current leaving the voltage source = 3A
   (b) The current through R_2 = 2A
   (c) The power generated by the voltage source = 5W
   (d) The power generated by the voltage source = 15W
   (e) None of the above
   (f) Answers (a), (b), and (d)
   (g) Answers (b) and (c)

Referring to Figure 2, answer questions 5 – 6:

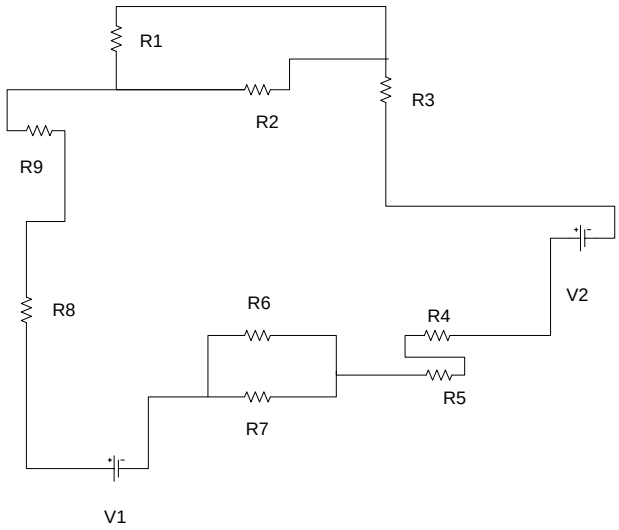

Figure 2. Circuit Diagram for Multiple Choice Questions 5-6

5. R_1 and R_2 are:
   (a) in series
   (b) in parallel
   (c) neither (a) nor (b)
   (d) both (a) and (b)

6. R_8 and R_9 are:
   (a) in series
   (b) in parallel
   (c) neither (a) nor (b)
   (d) both (a) and (b)

Work-Out Problem (10 points). For the following problem, SHOW ALL WORK. Present your solution using the engineering format. You may want to write a draft solution on the back of the exam, and then write your solution neatly in the space provided.

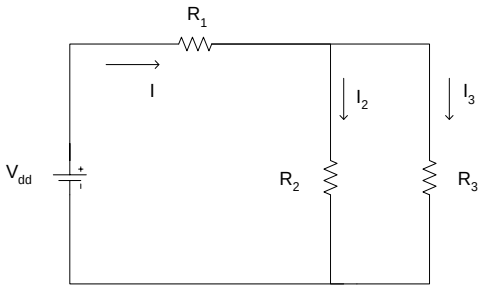

Figure for Work-Out Problem

Given that V_{dd} = 5V, R_1 = 100Ω, R_2 = 50Ω, and R_3 = 150Ω, find

(a) I; and

(b) The total power generated by V_{dd}

Part II. Computer Exam (30 points; 10 points each).

For this part of the exam, you must use your computer. You may not refer to old MathCAD or EXCEL worksheets; however, for the programming question you may refer to programs you have written. After you complete each problem, show your work to the instructor so that he or she can write notes on how well you completed each part.

1. Develop a MathCAD worksheet that will convert a set of values from °F to °C. The range of values for °F should be 0 to 100 in increments of 10°. Plot the values in a graph with proper engineering format.

   Instructor code: _____

NOTE: *We are using Arduinos instead of Boe-Bots. However, the problem below still provides an example of the type of problem that could be included in the exam.*

2. Write a Boe-Bot program that will produce a set of tones each time the instructor presses a whisker. The tones should follow the same pattern each time: On for a quarter-second, off for a half-second, and on for a half-second. Each time the whisker is pressed, the frequency of the first tone should be 2000Hz and the frequency for the second tone should be 2500Hz.

   Instructor code: _____

3. Develop a spreadsheet that creates a table of values of the sine and the cosine of an angle. The angles should range from 0° to 360° in increments of 10°. Format the table by showing units in the headings for each column, bolding the headers, and formatting the numbers in the sine and cosine columns to show 3 decimal places to the right of the decimal point. Plot both the sine and cosine against the angle. Be sure to format the graph with proper engineering format.

   Instructor code: _____