**CS 3173 Basic Computer Architecture Exam 1 100 points**

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**Due September 12 at 5pm No late exams accepted**

Part 1: Programming in Java:

1. *(30 points)* Write a java program to calculate the duty cycle of a periodic pulse train, if logic

1 pulse duration t\_w equals 10.1, Period (T) equals 0.1.

1. **public** **class** Exam1
2. {
3. **public** **static** **void** main(String[] args)
4. {
5. **double** t\_w = 10.1;     // Logic 1 pulse duration (t\_w)
6. **double** period = 0.1;   // Period (T)
8. // Duty Cycle = (Logic 1 Pulse Duration / Period) x 100%
9. **double** dutycycle = (t\_w / period) \* 100;
11. System.out.println("A periodic pulse train with t\_w of " + t\_w
12. + " and period of " + period + " has a duty cycle of " + dutycycle + "%");
13. }
14. }
15. *(20 points)* Continue the above java program to print the results of the calculation to a file,

“output.txt”. Use try…catch blocks and catch input output exceptions.

1. **import** java.io.File;
2. **import** java.io.PrintWriter;
4. **public** **class** Exam1
5. {
6. **public** **static** **void** main(String[] args)
7. {
8. **double** t\_w = 10.1;     // Logic 1 pulse duration (t\_w)
9. **double** period = 0.1;   // Period (T)
11. // Duty Cycle = (Logic 1 Pulse Duration / Period) x 100%
12. **double** dutycycle = (t\_w / period) \* 100;
14. **try**
15. {
16. File file = **new** File("output.txt");
17. PrintWriter output = **new** PrintWriter(file);
19. output.println("A periodic pulse train with t\_w of " + t\_w
20. + " and period of " + period + " has a duty cycle of "
21. + dutycycle + "%");
23. output.close();
24. }
25. **catch** (Exception e)
26. {
27. System.out.println("Error during file creation process, exiting.");
28. System.exit(0);
29. }
30. }
31. }

Part 2: Questions and Problem Solving:

1. *(5 points)* What can happen if a slow digital sample rate used to measure a sound wave?

**A slow digital sample rate can cause small details and anomalies to be lost.**

1. *(5 points)* What is the interface between the environment and the electronics in a

computer system?

**Sensors are the interface between the environment and the electronics**

1. *(5 points)* What are the digits of a binary number system?

**In binary, numbers only use the digits 0 and 1**

1. *(10 points)* If a computer system clock is 2000 hertz, what is the computer system clock

period duration?

**If a computer is running at 2000 Hz, its clock period is 1/2000 = 0.0005**

1. *(5 points)* Convert binary 10101 to decimal.

**101012 = 2110**

1. *(5 points)* Convert binary 10101 to hexadecimal.

**101012 = 1516**

1. *(5 points)* Convert ABC in hexadecimal to binary.

**ABC16 = 1010101111002**

1. *(10 points)* If an analog range is 10, the number of bits in a computer processor is 32,

calculate the resolution of the computer system.

**Resolution = (Range) / (2^n – 1) = 10 / (2^32 – 1)**

**= 0.000000002**