**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID: \_\_\_\_\_\_\_\_\_\_\_\_**

**Department of Computer Science and Engineering**

**MIDTERM EXAMINATION**

**Summer 2013**

**CSE340: Computer Architecture**

**Total Marks:** **40**  **Time Allowed: 1 hour**

* Answer **ANY FOUR** questions.
* Return the question with your answer script

Question 1

1. What do you mean by Datapath, Memory hierarchy and Multiprocessor system? Explain with appropriate figures. **4.5**
2. Define ISA and ABI. **2**
3. What are the different instruction formats in MIPS? Give representation of different instruction formats. **3.5**

Question 2

1. Encode the following MIPS instructions. For each instruction, you should identify the format type (R, I, or J format): **3**
   1. addi $s1, $s3, 3 # $s1 is register 17 and $s3 is register 19, op=8
   2. sw $s1, 12($sp) # $sp is register 29 (stack pointer),op=43
   3. add $t2, $s3, $s4 # $t2 is register 10, $s4 is register 20,op=0

1. The following problems deal with translating from C to MIPS. Assume that the variables f,g,h,i, and j are assigned to registers $s0, $s1, $s2, $s3, and $s4, respectively. Assume that the base address of the arrays A and B are registers $s6 and $s7, respectively.
2. f=g+h+B[4]
3. for(i=0;i<10;i++) f+=g;

For the C statements above, what is the corresponding MIPS assembly code? **5**

1. What type instruction is **JAL**? How would you represent **JAL 199** in the register? What would be the value in **$ra**/**$31? 2**

Question 3

1. Explain various addressing modes in MIPS. **4**
2. Multiply (5x-3) using Booth’s algorithm. **4**
3. What do you mean by zero and sign extension? **2**

Question 4

1. Convert **-91.6875** into **IEEE-754** single point floating point representation. Also show the hex equivalent of the representation. **5**
2. 1 01000111 10000100000000000000000 convert this to decimal value using **IEEE754 32-bit** floating point representation. **5**

Question 5

1. **X**=0100 0110 1100 0000 0000 0000 0000 00002 **Y**=1011 1110 1010 0000 0000 0000 0000 00002 representing single precision **IEEE 754** floating-point numbers, Find **X+Y**. **6**
2. Our favorite program runs in **10** seconds on computer A, which has a **4 Ghz** clock. We are trying to help a computer designer build a computer, B, that will run this program in 6 seconds. The designer has determined that a substantial increase in the clock rate is possible, but this increase will affect the rest of the CPU design, causing computer B to require **1.2** times as many clocks cycles as computer A for this program. What clock rate should we tell the designer to target? **4**