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

**Department of Computer Science and Engineering**

**MIDTERM EXAMINATION**

**Summer 2014**

**CSE340: Computer Architecture**

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

Return the question with your answer script

**Section 1(Answer ANY ONE) –10 Marks**

Question 1

1. A circuit has four inputs A, B, C, D, representing the sixteen natural binary integers from 0000 (0) to 1111 (15). A is the most significant bit and D is the least significant bit. The output of the circuit, F, is true when the input is divisible by a multiple of 4, 5, 6, or 7, with the exception of 15, in which case the output is false. Zero is not divisible by 4, 5, 6, or 7. **6**
   * 1. Draw the truth table to represent the algorithm
     2. From the truth table obtain a simplified sum of product expression for F by means of Boolean algebraic techniques.
2. Design the circuit of an ALU and explain its operation. **4**

Question 2

1. Design a shift register using D-FF which can perform the below functionality: **5**
   * 1. Shift Left
     2. Shift Right
     3. Store Data
     4. Clear All
2. Design a fast adder and explain its operation.  **5**

**Section 2(Answer ANY TWO) –30 Marks**

Question 3

1. Explain various addressing modes in MIPS. 7
2. Design a refined multiplication hardware. Show the status of the Product register step by step when you multiply 1110 by 1001. **8** **3**

Question 4

1. Convert **-71.6875** into **IEEE-754** single point floating point representation. Also show the hex equivalent of the representation. **7**
2. **X**=0100 0001 1100 0000 0000 0000 0000 00002 **Y**=1100 1001 1010 0000 0000 0000 0000 00002 representing single precision **IEEE 754** floating-point numbers, Find **X+Y**. Also show its decimal equivalent. **8**

Question 5

1. Convert the following MIPS instructions. For each instruction, you should identify the format type (R, I, or J format): **6**
   1. **addi $14,$15,73**
   2. ori $t2,$s0,4
   3. **J 1101**
2. Write the equivalent MIPS code for the given C function: **6**

*if (i<=j) f=g-h; else f=g+h;*

1. Define overflow and zero extension. **3**