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| No. of Questions | **7** |

**Department of Computer Science and Engineering**

**FINAL EXAMINATION SPRING 2014**

**CSE 340: Computer Architecture**

**Total Marks: 75 Time Allowed: 2.20 Hours**

* Answer any **Five (5)** questions out of the given **Seven (7)** questions.

###### Question No.1

1. Convert the below given C code into equivalent MIPS code: 6

if ( i != j )

h = i + j;

else

h = i - j;

k = h + i;

1. Explain Big Endian and little Endian addressing. 3
2. Explain MIPS addressing mode with necessary diagrams. 6

Question No. 2

1. For each of the MIPS instruction: 3+9
   * + Specify as much machine code as possible and leaving unknown fields blank. Also specify the instruction type
     + Draw the single cycle datapath for these instructions. Include only the parts of the datapath that are used in the instruction. Specify the bit width of any lines you draw.
2. srl $8,$9,10
3. sw $16,100($17)
4. j 1000
5. What do you mean by sign extension and zero extension? 3

## Question No. 3

1. Draw the hardware for sequential multiplication algorithm. Show the content of various registers in multiplication hardware when multiplying 10102 × 10012. 8
2. Use IEEE754 binary floating addition method to add 1.310 and 0.78110? Also show its decimal equivalent. 7

## Question No. 4

1. Define CPU execution time, CPI and effective CPI. 3
2. Show the IEEE 754 binary representation for the floating point number -17.310.

Also show the equivalent hex representation. 4+3

1. With x=1 101 1101two and y=0 110 1010two representing single precision IEEE754 floating point numbers, where first bit is for sign followed by 3 bits for exponent and remaining bits for mantissa. Find x+y and its equivalent decimal value. 5

## Question No. 5

1. Compare single cycle datapath, multicycle datapath and pipelining. 3
2. What do you mean by pipelining hazards? Explain all of them with appropriate diagrams. Also mention how to overcome the hazards. 10
3. What do you mean by finite state machine? 2

## Question No. 6

1. What do you mean by physical and virtual memory? 3
2. Consider an old computer with a hard disk of only 1 GB, main memory of 16 MB, and a cache with 512 blocks of 8 words each. Suppose the hard disk and main memory are partitioned into pages, and suppose each page is 2 KB. 5
   1. How many pages are there on the hard disk. How many pages are there in main memory?
3. Convert each of the MIPS pseudoinstructions into real MIPS instructions that perform the equivalent operation. 7
   * 1. ble $s1,$s2, Exit # Branch if less than or equal
     2. blt $s1,$s2, Exit # Branch if less than

## Question No. 7

1. What makes pipelining easy to implement. 3
2. Explain the steps involved in load instruction. 5
3. Explain memory hierarchy in detail with appropriate diagram? 7

##### THE END