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**Department of Computer Science and Engineering**

**FINAL EXAMINATION Summer 2014**

**CSE 340: Computer Architecture**

**Total Marks: 50 Time Allowed: 2.00 Hours**

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

## Question No. 1

1. Design an ALU with logic gates and explain its operation. [6 marks]
2. Simplify the below Boolean algebra equations: [4 marks]
   * 1. (X+

###### Question No. 2

1. Design a 3-bit counter using T flip-flop (rising edge). Explain the operation using appropriate timing diagram(s). [5 marks]
2. Consider. [5 marks]
   * 1. Express Y as sum-of-product considering inputs A,B and C.
     2. Draw the circuit for sum-of-product in (i).

**Section 2(Answer ANY TWO) –20 Marks**

Question No. 3

1. Perform simple binary multiplication of and . [3 marks]
2. What is JAL. Explain how JAL works with diagram. [2 marks]
3. Modify 32-bit MIPS register file design to a 64-bit register file and justify your design. [5 marks]

## Question No. 4

1. Convert **-89.7124** into **IEEE-754** single point floating point representation. Also show the hex equivalent of the representation. [5 marks]
2. **X**=0100 0110 1100 0000 0000 0000 0000 00002 **Y**=0100 1011 1010 0000 0000 0000 0000 00002 representing single precision **IEEE 754** floating-point numbers, Find **X+Y**. Also show its decimal equivalent? [5 marks]

## Question No. 5

1. Define throughput, response time, and effective CPI. [3 marks]
2. Write the MIPS code of the C code given below. [4 marks]
3. Draw the formats of different instruction types in MIPS. [3 marks]

**Section 3(Answer ANY TWO) –20 Marks**

## Question No. 6

1. What is datapath? [1 marks]
2. Compare single cycle datapath, multicycle datapath and pipelining. [4 marks]
3. Explain different pipelining hazards with necessary figures. [5 marks]

## Question No. 7

1. Draw single cycle datapaths for the below instructions: [8 marks]
   * 1. Add $14,$15,$17
     2. J Exit1
2. What are the purposes of program counter? [2 marks]

## Question No. 8

1. Draw a pipelined datapath with appropriate labeling. [6 marks]
2. What is Virtual Memory? Explain memory hierarchy with necessary figure. [4 marks]

##### THE END