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10MCA13

**First Semester MCA. Degree Examination, January 2011**  
**Fundamentals of Computer Organization**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. Perform the following number conversions :  
 i)  $(400.99)_{10} = (?)_2$     ii)  $(6BCD)_{16} = (?)_8$     iii)  $(625.431)_8 = (?)_2$   
 iv)  $(101101.11)_2 = (?)_{10}$     v)  $(A35.B)_{16} = (?)_{10}$     vi)  $(671)_8 = (?)_{16}$ .    (12 Marks)  
 b. List and explain basic gates.    (05 Marks)  
 c. Implement the following expression using only NAND gates.  
 $Y = (a + c) (\bar{b} + \bar{d}) (\bar{a} + \bar{b} + \bar{c})$     (03 Marks)
- 2 a. Simplify the following expressions : i)  $Y = \overline{\overline{AB} + \overline{A} + AB}$   
 ii)  $Y = (\overline{A} \overline{B} \overline{C}) + \overline{A} \overline{B} C + \overline{A} B \overline{C} + A \overline{B} \overline{C} + A \overline{B} C + A B \overline{C}$     (04 Marks)  
 b. Perform the binary subtraction of the signed numbers : i)  $-35 - (+20)$     ii)  $-105 - (-40)$ .    (04 Marks)  
 c. Determine the minimal POS and minimal SOP for the Boolean functions.  
 $f(w, x, y, z) = \sum (7, 9, 11, 12, 13, 14) + d (5, 6, 15)$ .    (04 Marks)  
 d. Explain full subtractor, with a neat sketch.    (08 Marks)
- 3 a. With a neat diagram, explain the basic operational concept of a system.    (10 Marks)  
 b. List and explain the types of computers.    (06 Marks)  
 c. What is SPEC rating? Explain.    (04 Marks)
- 4 a. Write assembly functions to evaluate  $ax^2 + bx + c = y$ , using one, two and three – address instruction formats.    (06 Marks)  
 b. What is an addressing mode? Explain register, direct and indirect addressing modes, with suitable examples.    (07 Marks)  
 c. What are conditional code flags? Explain.    (04 Marks)  
 d. Define assembler directives. Elaborate any two assembles directives.    (03 Marks)
- 5 a. What is interrupt nesting? Explain.    (06 Marks)  
 b. Why bus arbitration is required? Illustrate the two approaches of bus arbitration.    (10 Marks)  
 c. List the functions of an I/O interface.    (04 Marks)
- 6 a. How read and write operations take place in  $1K \times 1$  memory chip? Explain its configuration in detail.    (08 Marks)  
 b. What is the use of cache memories? Explain any one cache mapping function.    (07 Marks)  
 c. Explain the working of a static RAM cell.    (05 Marks)
- 7 a. Indicate the computational details of multiplication operation 17 with -3 using Booth's algorithm and verify the number of summands with fast multiplication algorithm (bit pair).    (10 Marks)  
 b. Explain restoring and non – restoring division methods, with examples.    (10 Marks)
- 8 Write short notes on :  
 a. DMA    b. Byte addressability  
 c. Virtual memory    d. State NAND gate as universal gate.    (20 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

