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13MCA13

**First Semester MCA Degree Examination, Dec.2013/Jan. 2014**  
**Fundamentals of Computer Organization**

Time: 3 hrs.

Max. Marks:100

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

- 1 a. Perform the following number conversions:
  - i)  $(DAD)_{16} = ( )_{10}$
  - ii)  $(987.392)_{10} = ( )_8$
  - iii)  $(1101111010.100111)_2 = ( )_{16}$
  - iv)  $(8A7.5F)_{16} = ( )_8$
  - v)  $(734.604)_8 = ( )_2$

**(10 Marks)**
- b. Perform the subtraction  $(100)_2 - (110000)_2$   
Using :
  - i) 1's complement
  - ii) 2's complement.

**(05 Marks)**
- c. Represent the decimal number 8620 in (i) BCD (ii) Excess-3 code (iii) 2421 code  
iv) Binary number.  

**(05 Marks)**
- 2 a. Simplify the following Boolean function in : i) SOP ii) POS  
 $F(A, B, C, D) = \Sigma(0, 1, 2, 5, 8, 9, 10)$ .  

**(06 Marks)**
- b. Implement the following function with NAND gates (Use only 4 gates)  
 $F = \overline{wxz} + \overline{wyz} + \overline{xyz} + \overline{wxyz}$   
 $d = wyz$ .  

**(08 Marks)**
- c. Design a full-adder using two half-adders and an OR gate with truth table, logical expressions.  

**(06 Marks)**
- 3 a. Define a flip-flop and explain JK flip-flop with logic diagram and symbol. **(10 Marks)**  
b. Describe 4-bit binary ripple counter, with neat sketch. **(10 Marks)**
- 4 a. Discuss the basic operational concept of a system, with diagram. **(10 Marks)**  
b. List the types of computer with brief explanation. **(10 Marks)**  
c. What is Bus? Discuss single-bus structure.
- 5 a. What is addressing mode? Explain different addressing modes, with example. **(10 Marks)**  
b. Explain :
  - i) Byte addressability
  - ii) Straight-line sequencing
  - iii) Big and Little-Endian assignments.

**(10 Marks)**
- 6 a. Describe the use of DMA controllers in a computer system, with diagram. **(10 Marks)**  
b. What is bus arbitration? What are different approaches to bus arbitration? Explain.  

**(10 Marks)**
- 7 a. What is DRAM? With neat diagram explain internal organization of asynchronous dynamic memory chip. **(10 Marks)**  
b. Explain : i) ROM cell ii) Virtual memory iii) Cache memory. **(10 Marks)**
- 8 Write short notes on :
  - a. Universal gates
  - b. Shift register
  - c. Booth algorithm
  - d. Condition code flags.

**(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.