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10MCA13

First Semester MCA Degree Examination, June 2012

Fundamentals of Computer Organization

Time: 3 hrs. Max. Marks:100

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

1 a. Perform the following conversions:
i) $(50)_7 = (\quad)_{10}$ ii) $(0.342)_6 = (\quad)_{10}$
iii) $(41)_{10} = (\quad)_8$ iv) $(001101010110.1101)_2 = (\quad)_{16}$ **(08 Marks)**

b. Briefly explain the various digital logic gates. Give graphical representation of a 3-input exclusive – OR gate with its truth table. **(06 Marks)**

c. State and prove Demargan's theorem. **(06 Marks)**

2 a. Simplify the following Boolean functions:
i) $y(wz' + wz) + xy$ ii) $[(CD)' + A]' + A + CD + AB$ iii) $xy + x'z + yz$ **(06 Marks)**

b. Express the following functions as a sum of minterms and as a product of maxterms.
$F(A, B, C, D) = B'D + A'D + BD$ **(06 Marks)**

c. Simplify the following using Karnaugh maps:
i) $F(A\ B\ C\ D) = \sum(4, 5, 6, 7, 15)$
ii) $F(A\ B\ C\ D) = \sum(0, 6, 8, 13, 14)\ \ d(A\ B\ C\ D) = \sum(2, 4, 10)$ **(08 Marks)**

3 a. Explain the different functional units of a computer. **(06 Marks)**

b. What is a bus? Explain the single bus structure, with an example. **(08 Marks)**

c. Explain the different registers that are available in the processor of a digital computer. **(06 Marks)**

4 a. Explain one-address, two-address and three-address instruction types, with suitable examples. **(06 Marks)**

b. Explain any five addressing modes, with examples. **(10 Marks)**

c. What do you mean by condition code or status register? Explain with a suitable example. **(04 Marks)**

5 a. What are interrupts? Explain the transfer of control through the use of interrupts using diagram. **(10 Marks)**

b. What is DMA? Explain the use of DMA controller in a computer system using a suitable example. **(10 Marks)**

6 a. Draw and explain the memory organization of $2M \times 32$ memory module using 512×8 static memory chips. **(10 Marks)**

b. What is cache memory? Explain any two cache mapping functions. **(10 Marks)**

7 a. Draw and explain the circuit arrangement of binary division. **(10 Marks)**

b. What is a carry look-ahead adder? Draw a block diagram of 4-bit carry look-ahead adder. **(10 Marks)**

8 Write short notes on any TWO:
a. Byte addressability
b. ROM
c. Booth's algorithm. **(20 Marks)**

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