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10MCA13

First Semester MCA Degree Examination, June/July 2011
Fundamentals of Computer Organization

Time: 3 hrs. Max. Marks:100

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

1 a. Perform the following conversion:
i) $(83)_{10} = (\ )_2$ ii) $(24.6)_8 = (\ )_{10}$ iii) $(6284)_{10} = (\ )_8$
iv) $(17A)_{16} = (\ )_2$ v) $(3527)_8 = (\ )_{16}$ **(10 Marks)**

b. i) Subtract using 2's complement $(11100)_2$ from $(10011)_2$
ii) Subtract using 2's complement $(1110)_2 - (1001)_2$ **(05 Marks)**

c. Obtain 1's complement of $(101100)_2$ and 2's complement of $(10101)_2$. **(05 Marks)**

2 a. Construct a logic circuit using basic gates $Z = \overline{(\overline{(A+B)}C)}D$ and convert using only NAND and NOR logic. **(10 Marks)**

b. Simplify the following Boolean expressions:
i) $\overline{(\overline{A}+B+\overline{C})}+(B+\overline{C})(\overline{B}+C)$ ii) $\overline{\overline{AB}+\overline{A}+AB}$ **(10 Marks)**

3 a. What is full adder? With the truth table of full adder, obtain the logical expression for sum and carry terms and implement the same using two half adders. **(10 Marks)**

b. Simplify the following using K-map method. $F(A,B,C,D) = \Pi M(3, 4, 5, 6, 7, 8, 9, 10)$. **(05 Marks)**

c. Determine the minimal sop & pos for the Boolean function
$f(w, x, y, z) = \Sigma m(0, 3, 4, 7, 8) + \Sigma d(10, 11, 12, 14, 15)$ **(05 Marks)**

4 a. Explain the basic operational concepts of a digital computer, with a neat diagram. **(10 Marks)**

b. Explain the Big-Endian and Little-Endian assignments for byte and word addressing with a neat diagram. **(10 Marks)**

5 a. What is an addressing mode? Explain the different addressing modes. **(10 Marks)**

b. What is an interrupt? Explain how multiple devices are handled in interrupts. **(10 Marks)**

6 a. Explain DMA controller, with a neat diagram. **(10 Marks)**

b. Explain the direct mapped cache and associative mapping, with a neat diagram. **(10 Marks)**

7 a. Discuss Booth's algorithm to multiply two signed numbers with example $(-13)\times(+11)$. **(10 Marks)**

b. Explain the integer division using restoring method and non-restoring division method, with a suitable example. **(10 Marks)**

8 Write short notes on:
a. Assembler directives
b. IEEE floating point standards
c. Bus arbitration
d. Cache memory **(20 Marks)**

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