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13MCA13

First Semester MCA Degree Examination, Dec.2015/Jan.2016
Fundamentals of Computer Organization

Time: 3 hrs. Max. Marks:100

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

1 a. Perform the following number base conversions.
i) $(365)_8 = ?_{16}$ ii) $(3FD)_{16} = ?_2$ iii) $(526.72)_{10} = ?_8$
iv) $(306.D)_{16} = ?_{10}$ v) $(11011011.100101)_2 = ?_{16}$ **(10 Marks)**

b. Perform the following subtractions by using
i) r's complement $(1010100)_2 - (1000100)_2$
ii) (r – 1)'s complement $(3250)_{10} - (72532)_{10}$ **(10 Marks)**

2 a. Find the complement of the given function by using De Morgan's Theorem.
$F = x'y + xy'$ **(03 Marks)**

b. Find minimal SOP – SUM of products and POS product of SUMs by using K – Map.
$F(A, B, C, D) = \Sigma_m (0, 2, 4, 5, 6, 7, 8, 10)$. **(07 Marks)**

c. What is Adder? Design a full adder circuit diagram by using 2 half adders. Derive the expressions for sum and carry from the truth table. **(10 Marks)**

3 a. Explain Booth Algorithm for signed numbers. Find the solution for (+13) * (-6). **(10 Marks)**

b. Implement the following function by using 8 × 1 multiplexer.
$F(A, B, C, D) = \Sigma (0, 1, 3, 4, 8, 9, 15)$. **(05 Marks)**

c. Explain the sequence of steps to implement the given function by using only NOR gates.
$F = (A+B)(C+D)E$ **(05 Marks)**

4 a. What is flip-flop? Explain the working principle of T – flip flop with logic diagram and truth table. **(10 Marks)**

b. What is Ripple counter? Explain BCD Ripple counter with neat diagram. **(10 Marks)**

5 a. Explain connection between memory and processor. Discuss about the flow of execution of instructions. **(08 Marks)**

b. What is performance? Discuss about any five factors affecting the performance of a computer. **(07 Marks)**

c. Define bus. Explain single bus architecture. **(05 Marks)**

6 a. What is addressing? Explain any 5 types of addressing modes with example for each. **(12 Marks)**

b. Write a note on condition code flags. **(04 Marks)**

c. Write an assembly language code for the given expression by using one, two and three address instructions in a single program.
expr = (A * B) + (C * D) **(04 Marks)**

7 a. What is interrupt? Explain about simultaneous request handling by the processor. **(10 Marks)**

b. What is Bus Arbitration? Explain about the two approaches of Bus Arbitration. **(10 Marks)**

8 a. Explain direct mapping and associative mapping functions of cached memory organization. **(10 Marks)**

b. Write a note on the following :
i) Virtual memory
ii) Read only memories. **(10 Marks)**

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