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10MCA13

First Semester MCA Degree Examination, June / July 2013
Fundamentals of Computer Organization

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

1. a. Perform the following number conversions : i) $(753)_8$ to $()_{10}$ ii) $(678)_{10}$ to $()_2$
 iii) $(01\ 01\ 01111\ 01101.1100)_2$ to $()_{16}$ iv) $(CE3A)_{16}$ to $()_2$ v) $(498)_{10}$ to $()_8$.
 (10 Marks)
 b. State and prove Demorgan's theorems. (05 Marks)
 c. "NAND gate is called universal gate". Justify your answer. (05 Marks)
2. a. Simplify the following logic expression using Karnaugh map. (06 Marks)
 $f(W,X,Y,Z) = W\bar{X}\bar{Y}\bar{Z} + \bar{W}X\bar{Y}.Z + \bar{W}\bar{X}\bar{Y}.Z + \bar{W}\bar{X}YZ + \bar{W}XYZ + W\bar{X}\bar{Y}Z = Y$.
 b. Explain full adder with a truth table. Also construct full adder using 2 half adders. (08 Marks)
 c. Perform the subtraction using complements method.
 i) $(+65) - (+35)$ ii) $(-78) - (-35)$ iii) $(-45) - (+22)$. (06 Marks)
3. a. Explain different functional units of a digital computer, with neat diagrams. (10 Marks)
 b. Explain the basic performance equation and tell how pipelining and superscalar operations improve the performance of a computer. (10 Marks)
4. a. What is meant by addressing modes? Explain the different addressing modes, with syntax and suitable examples. (10 Marks)
 b. What is bus? Explain single bus structure. (04 Marks)
 c. Write assembly language program to find sum of N numbers. (06 Marks)
5. a. Explain how DMA transfer will improve the data transfer rate in a computer. (10 Marks)
 b. What is interrupt? Explain how multiple devices are handled in interrupts. (10 Marks)
6. a. What is Bus Arbitration? Explain Bus Arbitration techniques in detail, with a neat diagram. (10 Marks)
 b. What is DRAM? With neat diagram, explain internal organization of asynchronous $2M \times 8$ dynamic memory chip. (10 Marks)
7. a. Discuss the booth algorithm used for signed multiplication. Perform $(-13) \times (+11)$ using the same technique. (10 Marks)
 b. Explain restoring binary division, with neat diagram. (10 Marks)
8. Write short notes on :
 a. Cache memory.
 b. IEEE floating point standard.
 c. Virtual memory.
 d. RISC and CISC. (20 Marks)

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.