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First Semester MCA Degree Examination, Dec.2014/Jan.2015
Fundamentals of Computer Organization

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. Perform the following number conversion:
- $(123.12)_{10} = (?)_8$
 - $(123.12)_8 = (?)_{16}$
 - $(6BCD)_{16} = (?)_8$
 - $(1011011.0001) = (?)_{10}$
 - $(625.471)_8 = (?)_2$. (10 Marks)
- b. Explain different basic gates with truth table and logic diagram. (06 Marks)
- c. Construct a logic circuit using basic gates $\Sigma = (A + B + \overline{CDE}) + \overline{BCD}$. (04 Marks)
- 2 a. Simplify using Demorgan's theorem.
- $\overline{A + BC + AB}$
 - $\overline{(\overline{AB})(\overline{BC})(\overline{CD})(\overline{AC})}$
 - $\overline{(ABC) + (\overline{ABC})}$. (06 Marks)
- b. Simplify the following using K-map technique:
- $f(A, B, C) = \overline{ABC} + \overline{AB} + \overline{ABC} + \overline{AC}$
 - $f(A, B, C, D) = \Sigma m(5, 6, 7, 12, 13) + d(4, 9, 14, 15)$. (06 Marks)
- c. Explain full subtractor with neat sketch. (08 Marks)
- 3 a. Explain Booth's algorithm to multiply two signed numbers using example $(+13) \times (-6)$. (10 Marks)
- b. What are counters? Explain Ripple counter in detail with proper diagram. (06 Marks)
- c. What is flip flop? Mention different types of flip flops. (04 Marks)
- 4 a. With neat diagram, explain basic operational concepts of a system. (10 Marks)
- b. Explain the basic performance equation and tell how pipelining and superscalar operations improve the performance of a computer. (10 Marks)
- 5 a. What are the addressing modes? Explain the different addressing modes with syntax and addressing function with examples. (10 Marks)
- b. Registers R_1 and R_2 of computer contain the decimal value 1200 and 4600. What is EA of the memory operand in each of the following instructions?
- Load $20(R_1), R_5$
 - Move #2000, R_5
 - Store $R_5, 30(R_1, R_2)$
 - Add $-(R_2), R_5$
 - Subtract $(R_1) +, R_5$. (10 Marks)
- 6 a. Why bus arbitration is required? Illustrate the two approaches of bus arbitration. (10 Marks)
- b. What is DMA? Explain the hardware registers that are required in DMA controller chip. (06 Marks)
- c. Illustrate the hardware required to connect an input and output device to the bus. (04 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.

- 7 a. How read and write operation takes place in $1K \times 1$ memory chip? Explain its configuration in detail. (10 Marks)
b. Discuss synchronous DRAM with its block diagram. (10 Marks)

- 8 Write short notes on:
a. Virtual memories.
b. Shift registers.
c. Multiplexers.
d. BYTE addressability in big-Indian and little Indian assignment. (20 Marks)
