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13MCA13

First Semester MCA Degree Examination, June/July 2016
Fundamentals of Computer Organization

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Perform the following Number Base Conversion
   i) $(623.77)_8 = (\ )_2$
   ii) $(FAFA)_{16} = (\ )_8$
   iii) $111110101110.11_2 = (\ )_{16}$
   iv) $(1101011)_2 = (\ )_{10}$
   v) $(8971)_{10} = (\ )_{16}$ **(10 Marks)**

b. Perform the following subtraction
$(1001)_2 - (110101)_2$ using
   i) 1's complement
   ii) 2's complement. **(05 Marks)**

c. What is a Binary code? Explain the Error-Detection codes with example. **(05 Marks)**

2 a. State and prove any four theorems in Boolean Algebra. **(08 Marks)**

b. Simplify the following Boolean function using Karnaugh map. **(06 Marks)**
F (A, B, C, D) = Σ(3, 7, 11, 13, 14, 15)

c. Draw Logic diagram to implement the Boolean expression given below :
$F = x\bar{y}z + \bar{x}\bar{y}z + \bar{w}xy$ **(06 Marks)**

3 a. Why NAND and NOR are called universal gates? Implement the three Basic gates using NAND. **(08 Marks)**

b. Design a full substractor with truth table and Logical expressions. **(12 Marks)**

4 a. What is Flip-Flop? Describe the working of a Basic Flip-Flop circuit with a Diagram. **(08 Marks)**

b. Define a Register. What is it made of? **(02 Marks)**

c. What is a shift Register? Give an account on the serial transfer in a shift register. **(10 Marks)**

5 a. Discuss in detail the functional units of digital computers. **(10 Marks)**

b. What are the four types of operations performed by a digital computer? Describe each operation with suitable Assembly level instructions. **(10 Marks)**

6 a. What is an addressing mode? Discuss any four types of addressing modes with examples. **(10 Marks)**

b. Explain Big and little endian assignments. **(06 Marks)**

c. Write and explain any four Assembler directives. **(04 Marks)**

7 a. What is an interrupt? Describe the implementation of interrupt priority with a suitable diagram. **(10 Marks)**

b. Give an account on Direct Memory Access (DMA) controller with a diagram. **(10 Marks)**

8 a. What is a ROM? **(02 Marks)**

b. Discuss in detail the different types of ROM. **(06 Marks)**

c. What is a flash memory? To which type of ROM a flash memory belong to? **(02 Marks)**

d. Describe the set associative mapping in a cache memory. **(10 Marks)**

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