S.E. IT Extx

Digital Design - I

20/5/06

Con. 1717-06. (REVISED COURSE) TV-7956

(3 Hours) [Total Marks : 100

P3/DUPQ/LO E-4-28 2

N. B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** out of remaining **six** questions.

1. (a) Find Hexadecimal Equivalent of – 6
   1) $(2338.122)_{10}$
   2) $(326)_7$
   3) $(761.514)_8$

   (b) Perform the following operations – 6
   1) $(F88)_{16} + (D89)_{16}$
   2) $(762)_{BCD} + (348)_{BCD}$
   3) $(246)_{10} - (435)_{10}$ using 2's complement method.

   (c) What are self complementing codes ? Explain with 2 examples. 4

   (d) Perform the following operations – 4
   1) $(1101.11)_2 \times (101.1001)_2$
   2) $(10000111)_2 \div (1101)_2$

2. (a) Simplify using Boolean Theorems and implement using AOI gates only –
   1) $\bar{A}BC + A\bar{B}C + AB\bar{C} + ABC$. 3
   2) $[(C + \bar{C}D)(C + \bar{C}\bar{D})][(AB + \bar{A}\bar{B}) + (A \oplus B)]$ 5

   (b) Given logic expression.
   $F = A\bar{B} + AC + \bar{C} + A\bar{B}C + ABC$.
   1) Express in Standard SOP form and simplify using boolean theorems. 6
   2) Draw K map and simplify 3
   3) Draw a logic diagram using NAND gates only. 3

3. (a) Implement BCD Adder using 7483, 4 bit binary adder IC. Explain its operation. 10

   (b) What is SR Flip Flop ? Explain its operation. Write truth table, characteristic equation and excitation table for the same. 10

4. (a) There are four adjacent parking slots in a company. Each slot is equipped with a special sensor whose output is asserted low when a car is occupying a slot, otherwise the sensor's output is high. Design and draw a schematic for a system, which will generate a low output if and only if there are two or more than two adjacent slots vacant. 10

   (b) Explain the working of IC 7485, 4 bit comparator and hence implement a 5 bit comparator using the same IC. 10

5. (a) Using Quine McClusky method of minimization 12
   solve,
   $F = \sum m\,(8,9,10,11,13,15,16,18,21,24,25,26,27,30,31)$

   (b) Write a VHDL program for decoder like 74LS138 (3:8 decoder) 8

6. (a) Explain what is tristate gate. Draw the symbol, truth table and circuit diagram of the same. 8

   (b) Draw a neat circuit diagram of 2 inputs TTL NAND gate and explain its operation. Draw transfer Characteristics and give specifications of the same. 12

7. (a) What is a multiplexer ? Implement, 8

$F = \pi M (0,1,4,5,7)$ using 4:1 multiplexer.

(b) Write short notes on (any **two**) :— 12

1) Master slave JK flip flop
2) Static hazards
3) 74180 Parity generator and Checker .