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B.E/B.TECH (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2013

4

COMPUTER TECHNOLOGY DEPARTMENT

II SEMESTER

CS 9152 / DIGITAL PRINCIPLES AND SYSTEM DESIGN

(REGULATION – 2008)

Time: 3 hr

Max. Mark: 100

Answer ALL Questions

**Part-A (10 X 2 = 20 Marks)**

- 1) What is a Gate?
- 2) Determine the logical function F for the given truth table when positive logic and negative logic is used

Input		Output
L	L	L
L	H	L
H	L	L
H	H	H

- 3) Determine the POS for the function  $F1 = (WX+Y)(X+Y'Z)$
- 4) Design a full adder using two 2 to 4 line Decoders?
- 5) List out the types of Programmable Logic devices?
- 6) Implement the logic function  $F1 = \sum (0,1,5,7)$  and  $F2 = \sum (0,1,2,6)$  using ROM
- 7) Derive the excitation table for JK flip flop.
- 8) Construct a D flip-flop using T Flip-flop.
- 9) What do you mean by cycles in asynchronous circuit?
- 10) Write the guidelines for state assignment?

**Part-B (5X 16 = 80 Marks)**

11. Consider the following problem (16)
 

Four chairs A, B, C, and D are placed in a row. Each chair may be occupied ("1") or empty ("0"). A Boolean function F is "1" if and only if there are two or more adjacent chairs that are empty.

  - i. Give the truth table defining the Boolean function F
  - ii. Express F as a minterm expansion
  - iii. Express F as a maxterm expansion

12. a Find the essential prime implicants of the following function using Quine-McCluskey method (16)  
 $F(A, B, C, D) = \sum m(0, 2, 5, 6, 7, 8, 10, 12, 13, 14, 15)$   
 (Or)
12. b (i) Convert the given representation to the specified representation (8)  
 a)  $(0.4)_{10} = (?)_2$   
 b)  $(301.12)_{10} = (?)_8$   
 c)  $(4D.5C)_{16} = (?)_{10}$   
 d)  $(231.3)_4 = (?)_7$
12. b (ii) Perform the following operations in 1's and 2's complement (8)  
 (a)  $(-12)_{10} - (+8)_{10}$  (b)  $(+18)_{10} - (-6)_{10}$
13. a (i) Design a combinational circuit with three inputs( x, y, z) and three outputs( a, b, c).  
 a)When the binary input is 0, 1, 2, or 3, the binary output is one greater than the input. b)When the binary input is 4, 5, 6, or 7, the binary output is one less than the input. (10)
13. a (ii) Write a behavioral HDL for 8:1 Multiplexer (6)  
 (Or)
13. b (i) Design a four-bit adder-subtractor that detects carry and an overflow (12)
13. b(ii) What is programmable logic array? How it differs from ROM? (4)
14. a. Design a sequential circuit with two D-flip flops A and B and one input x\_in (16)  
 (i)When x\_in=0, the state of the circuit remains the same. When x\_in =1 the circuit goes through the state transitions from 00 to 01, to 10, to 11, back to 00, and repeats.  
 (ii)When x\_in =0, the state of the circuit remains the same. When x\_in=1, the circuit goes through the state transitions from 00 to 11, to 01, to 10, back to 00, and repeats.  
 (Or)
- 14.b Design and write a structural HDL code for universal shift register ? (16)
- 15.a An Asynchronous sequential circuit is described by the excitation function (16)  
 $Y = x_1x_2' + (x_1+x_2')y$  and the output function  $z=y$   
 a)Draw the logic diagram of the circuit  
 b)Derive the transition table and output map  
 c)Describe in words the behavior of the circuit  
 (Or)
- 15.b Design a hazard free circuit to implement the following Boolean function (16)  
 $F(A,B,C,D) = (3,4,5,7,9,13,14,15)$