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T 3166

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Third Semester

(Regulation 2004)

Computer Science and Engineering

CS 1202 — DIGITAL PRINCIPLES AND SYSTEMS DESIGN

(Common to Information Technology)

(Common to B.E. (Part-Time) Second Semester Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are minterms?
2. Convert the following function into sum of product form
 $(AB + C)(B + C'D)$
3. Convert the following number from one base to other
 $(65.342)_8 = ()_7$
4. What is a priority encoder?
5. What is a demultiplexer?
6. Draw the logic diagram for T FlipFlop.
7. What is the maximum range of a memory that can be accessed using 10 address lines?
8. What is modulo — N counter?
9. What is a hazard in combinational circuits?
10. What are the assumptions that must be made for fundamental mode circuit?

PART B — (5 × 16 = 80 marks)

11. (a) Using Tabulation method simplify the Boolean function
 $F(V, W, X, Y, Z) = \Sigma(0, 1, 8, 11, 12, 15, 20, 21, 22, 24, 29, 31)$ which has
the don't care conditions $d(9, 18, 30)$. (16)

Or

- (b) (i) Simplify the Boolean function using map method :
 $F(w, x, y, z) = \Sigma(0, 2, 4, 6, 8, 10, 12, 14)$ (10)
- (ii) Perform subtraction on the following numbers using the 9's
complement of the subtrahend
- (1) 5763-3145
(2) 59-9876
(3) 5200-561. (6)
12. (a) (i) Design a combinational circuit to convert gray code to BCD. (12)
- (ii) What are the design procedures of combinational circuit? (4)

Or

- (b) (i) Design a combinational circuit to convert BCD code to Excess-3
code. (12)
- (ii) Design a 3 bit Adder. (4)
13. (a) (i) Implement the Boolean function using 4 : 1 multiplexer
 $F(W, X, Y, Z) = \Sigma(1, 2, 3, 6, 7, 8, 11, 12, 14)$ (8)
- (ii) A combinational circuit is defined by the functions
 $F_1 = \Sigma(1, 3, 5)$
 $F_2 = \Sigma(5, 6, 7)$
- Implement the circuit with a PLA having 3 inputs, 3 product terms
and two outputs. (8)

Or

- (b) Construct a BCD adder circuit and write a HDL program module for the
same. (16)
14. (a) Explain the different types of shift registers with neat diagram. (16)

Or

- (b) Design a sequence detector to detect the sequence 101011.

15. (a) An asynchronous sequential circuit is described by the following excitation and output function

$$X = (Y_1 Z_1' W_2) X + (Y_1' Z_1 W_2)$$

$$S = X'$$

- (i) Draw the logic diagram of the circuit
- (ii) Derive the transition table and output map
- (iii) Describe the behavior of the circuit. (16)

Or

- (b) Explain essential, static and dynamic hazards in digital circuit. Give hazard-free realization for the following Boolean function. (16)

$$F(I, J, K, L) = \Sigma m(1, 3, 4, 5, 6, 7, 9, 11, 15)$$

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