Reg. No. :

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) = Σ(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) = Σ(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) = Σ(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.

2   T 3166

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

$X = (Y_1 Z_1'W_2) X + (Y_1'Z_1W_2')$

$S = X'$

(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)

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

T 3166