

LIB

2/12/13 FN

Reg. No. :

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Question Paper Code : 31298

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Third Semester

Computer Science and Engineering

CS 2202/CS 34/EC 1206 A/10144 CS 303/080230012 — DIGITAL PRINCIPLES
AND SYSTEM DESIGN

(Common to Information Technology)

(Regulation 2008/2010)

(Common to PTCS 2202 – Digital Principles and System Design for B.E.
(Part-Time) Second Semester – CSE – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Convert $(1001010.1101001)_2$ to base 16 and $(231.07)_8$ to base 10.
2. Realize XOR gate using only 4 NAND gates.
3. Implement $F = XY'Z + Y'Z' + X'Z$ using AOI logic.
4. Obtain the truth table for BCD to Excess-3 code converter.
5. Draw the truth table and circuit diagram of 4 to 2 encoder.
6. Distinguish EEPROM and flash memory.
7. Realize a JK flip-flop using D flip-flop and gates.
8. Write the HDL code for up-down counter using behavioral model.
9. Distinguish fundamental mode circuit and pulse mode circuit.
10. Define primitive flow table.

PART B — (5 × 16 = 80 marks)

11. (a) Simplify the following Boolean function using Quine-McClusky method $F = (A, B, C, D, E) = \Sigma m(0, 1, 3, 7, 13, 14, 21, 26, 28) + \Sigma d(2, 5, 9, 11, 17, 24)$. (16)

Or

- (b) (i) Simplify the given Boolean function in POS form using K-map and draw the logic diagram using only NOR gates.

$$F(A, B, C, D) = \pi M(0, 1, 4, 7, 8, 10, 12, 15) + d(2, 6, 11, 14). \quad (10)$$

- (ii) Convert 78.5_{10} into binary. (3)

- (iii) Find the dual and complement of the following Boolean expression. $xyz' + x'yz + z(xy + w)$. (3)

12. (a) Design a combinational circuit to perform BCD addition. (16)

Or

- (b) (i) Design a 4-bit magnitude comparator with three outputs: $A > B$, $A = B$ & $A < B$. (12)

- (ii) Construct a 4-bit odd parity generator circuit using gates. (4)

13. (a) (i) Realize 4×16 decoder using two 3×8 decoders with enable input. (4)

- (ii) Implement the two following Boolean functions using 8×2 PROM.

$$F1 = \Sigma m(3, 5, 6, 7) \text{ and } F2 = \Sigma m(1, 2, 3, 4). \quad (6)$$

- (iii) Implement the following function using a multiplexer.

$$F(W, X, Y, Z) = \Sigma m(0, 1, 3, 4, 8, 9, 15). \quad (6)$$

Or

- (b) Implement the following two Boolean functions using PLA with 3 inputs, 4 product terms and 2 outputs.

$$F1 = \Sigma m(3, 5, 6, 7) \text{ and } F2 = \Sigma m(1, 2, 3, 4). \quad (16)$$

14. (a) Design a synchronous counter with the following sequence: 0,1,3,7,6,4 and repeats. Use JK flip-flops. (16)

Or

- (b) Design the sequential circuit specified by the following state diagram Q.No. 14(b) using T flip-flops. (16)

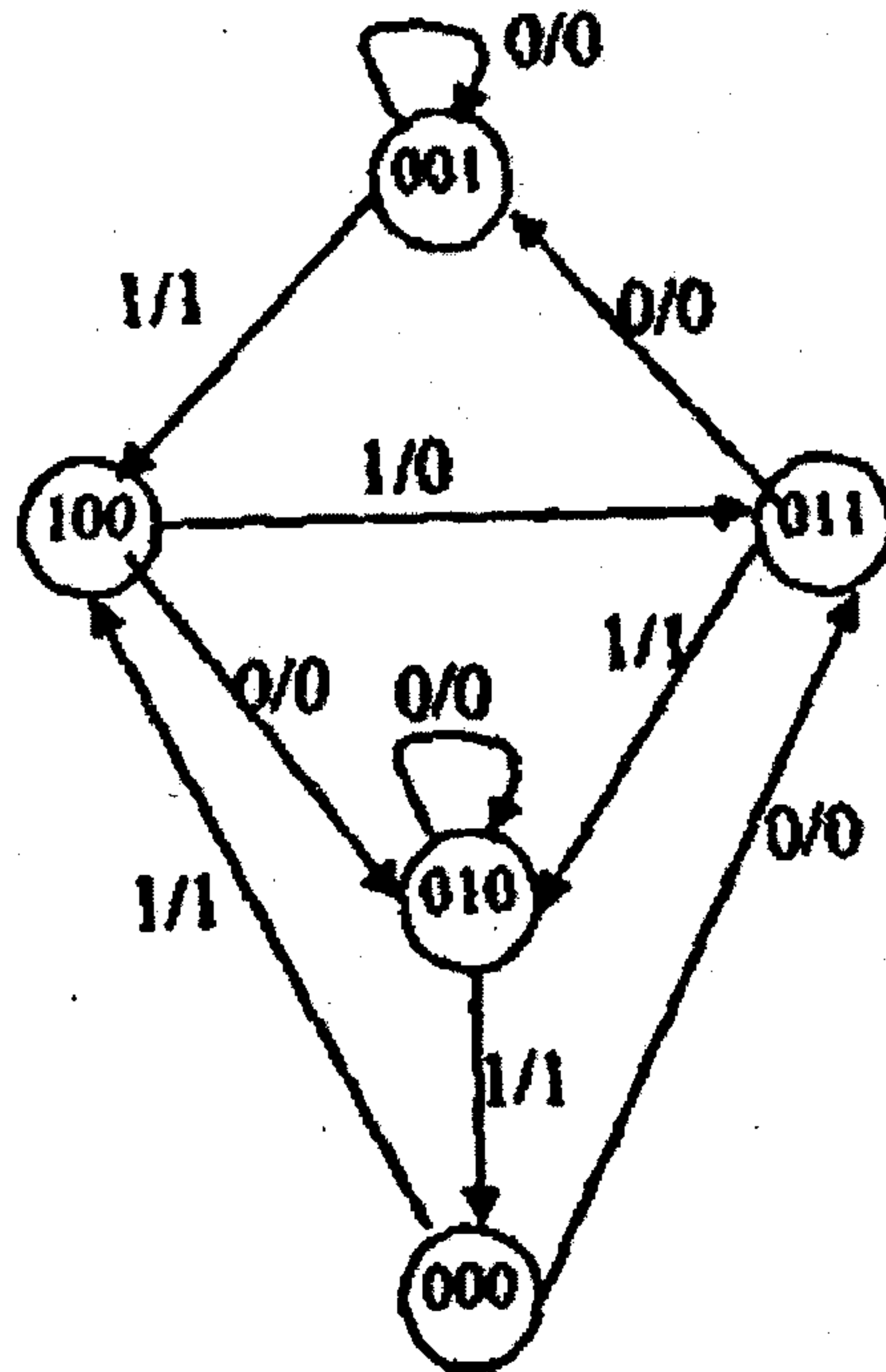


Fig. Q. 14(b)

15. (a) (i) What is the objective of state assignment in asynchronous circuit? Explain race-free state assignment with an example (8)
- (ii) Discuss about static, dynamic and essential hazards in asynchronous sequential circuits. (8)

Or

- (b) Design an asynchronous sequential circuit with inputs x_1 and x_2 and one output z . Initially and at any time if both the inputs are 0, output is equal to 0. When x_1 or x_2 becomes 1, z becomes 1. When second input also becomes 1, $z = 0$; The output stays at 0 until circuit goes back to initial state. (16)