Total No. of Questions : 10] [Total No. of Printed Pages : 3

Roll No. .....

EX–404(O)

B. E. (Fourth Semester) EXAMINATION, Dec., 2009

(Old Scheme)

(Electrical & Electronics Engg. Branch)

DIGITAL ELECTRONICS AND LOGIC DESIGN – I

[EX – 404(O)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt *one* question from each Unit. Total *five* questions are to be attempted. All questions carry equal marks.

Unit – I

1. (a) Convert the following :

(i) $(362)_8 = (\ )_2$

(ii) $(B4E0)_{16} = (\ )_{10}$

(iii) $(101100110)_2 = (\ )_8$

(iv) $(D4A5)_{16} = (\ )_2$

(v) $(4853)_{10} = (\ )_{BCD}$

(b) Minimize the following expression using K map and realize with NAND gates :

$$f(A, B, C, D) = \Sigma m\,(0, 1, 2, 3, 11, 12, 14, 15)$$

Or

2. (a) (i) Using 10's complement subtract :

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(ii) Using 2's complement subtract :

$$(11101000 \cdot 11)_2 - (0110101 \cdot 1)_2$$

(b) Simplify $Y = (B + \overline{A})(A + B + D)\overline{D}$ and implement using only NAND gates..

Unit – II

3. (a) Design a full adder circuit. Draw the truth table and derive the equation for the output (sum and carry).

(b) Design a BCD adder. Explain its working with the help of logic diagram.

Or

4. (a) Implement a full adder with two half adders and an OR gate.

(b) Implement the given boolean function with 8×1 multiplexer :

$$F(ABCD) = \Sigma m\,(0, 3, 5, 6, 8, 9, 10, 12, 15)$$

Unit – III

5. (a) Describe with the help of suitable logic diagrams and tables RS flip-flop. What is race around condition and how it can be overcome ?

(b) Define and explain the following :

(i) State table

(ii) State diagram

(iii) State reduction

(iv) State equations

Or

6. (a) Explain the operation of a J-K flip-flop. What is master-slave J-K flip-flop ? Compare the two.

(b) Discuss and explain design procedures for sequential circuits.

Unit – IV

7. (a) Design a synchronous up/down counter.

(b) Design a 4-bit serial input serial ouput shift register. Explain how serial transfer of information from register A to register B is done.

Or

8. (a) Design a 4-bit ripple counter and explain its working. Also draw wave forms.

(b) What are the shift registers ? Name all the shift registers and explain any *one* with suitable logic diagram.

Unit – V

9. (a) Draw the block diagram of successive approximation A to D converter and explain its operation.

(b) What is meant by PLA ? Draw a block diagram and explain its working.

Or

10. (a) Draw the logic diagram of a 4 × 4 RAM and describe the operation.

(b) Explain the operation of R-2 R ladder type Digital to Analog converter.