UG Odd Semester (CBCS) Exam., December—2016

COMPUTER SCIENCE

(1st Semester)

Course No. : MCS–103 (C)

(Digital Logic and Switching Theory)

Full Marks : 75
Pass Marks : 30

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* Find out the $(n \quad 1)$'s complement of the following : 2×3=6

(i) $(10101011)_2$

(ii) $(432)_8$

(iii) $(1023)_{10}$

(b) Convert the following : 2+2=4

(i) $(218)_{10}$ to binary and octal

(ii) $(1001)_2$ to hexadecimal and octal

(c) Using 2's complement, subtract

1100–101 3

(d) Add the following : 2

10011001+00011010

2. *(a)* Convert the following : 2×4=8

(i) $(101011\ 11)_2$ to octal

(ii) $(EEEA)_{16}$ to decimal

(iii) $(258)_8$ to binary

(iv) $(624)_{10}$ to hexadecimal

(b) Add the following : 2+2=4

(i) $(23)_8 \quad (32)_8$

(ii) $(101010)_2 \quad (11010)_2$

(c) Using 1's complement, subtract

101 1100 3

UNIT—II

3. *(a)* Prove de Morgan's theorem. 6

(b) Simplify the following : 2+2=4

(i) $F \quad ABC \quad A\ B \quad ABC$

(ii) $F \quad xy\ z \quad xyz \quad xyz$

(c) Convert the following SOP to POS : 5

$F \quad x\,yz \quad xy\,z \quad xyz \quad xyz$

4. (a) Simplify the following : 3+2=5

(i) $F \quad x\,yz \quad x\,y\,z \quad x\,y\,z \quad xy\,z$

(ii) $F \quad xy \quad x$

(b) Using K-map, simplify

$F(x, y, z) \quad (0, 1, 3, 7)$ 3

(c) Draw the circuit diagram of the following : 3

$F \quad x \quad y \quad z$

(d) Convert the following POS to SOP : 4

$F \quad (x \quad y)(y \quad z)$

UNIT—III

5. (a) Design a half-adder. 4

(b) Design a binary parallel adder to add 1001 0010. 4

(c) What is encoder? Design an octal to binary encoder. 5

(d) What is MUX? 2

6. (a) Design a full subtractor. 5

(b) Explain an adder-subtractor circuit and draw its diagram. 5

(c) Design 4×1 multiplexer. 5

UNIT—IV

7. (a) Write short notes on the following : 5+5=10

(i) *R-S* flip-flop

(ii) Master-slave flip-flop

(b) What is binary counter? Explain it with its state transition diagram. 5

8. (a) Write short notes on the following : 5+5=10

(i) *J-K* flip-flop

(ii) *D* flip-flop

(b) Compare between *D*-type and *T*-type flip-flop. 5

UNIT—V

9. (a) Explain ROM. 7

(b) Explain shift registers. 8

10. (a) Derive the PLA program table for a combinational circuit that squares a 3-bit number. 8

(b) Explain RAM. 7

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