UG Odd Semester (CBCS) Exam., December—2019

COMPUTER SCIENCE

(1st Semester)

Course No. : MCSCC-103

(Digital Logic and Switching Theory)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

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

UNIT—I

1. *(a)* Convert the following : 1×3=3

(i) $(101011)_2$ to octal

(ii) $(B0B)_{16}$ to binary

(iii) $(724)_8$ to decimal

(b) Find out $(n-1)$'s and n's complements of the following numbers : 2×3=6

$(1001)_2$, $(234)_8$, $(ABCD)_{16}$

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(c) Add and subtract the following numbers : 2

$A = 1100$

$B = 1000$

(d) Represent "I am 0" in ASCII code. 3

2. (a) What do you mean by 0-logic and 1-logic? 2

(b) Convert $(FACED)_{16}$ to binary, octal and decimal numbers. 3

(c) Add 11001100 and 11000011 and verify the answer by subtracting any one number from the sum. 3

(d) Represent $(12 \cdot 5)_{10}$ in IEEE–32 bit floating-point number. 3

(e) Perform X-Y using 2's complement method if $X = 1010100$ and $Y = 10001$. 3

UNIT—II

3. (a) Prove De Morgan's theorems using truth table. 3

(b) Convert POS to SOP

$F = (x + y)(y + z)(z + x)$ 4

(c) Define don't care condition. 1

(d) Using K-map, simplify the Boolean expression : 4

$F(x, y, z) = \Sigma(0, 1, 2, 3, 6, 7)$

(e) Write the basic identities of Boolean algebra which involves 0's and 1's. 2

4. (a) Prove distributive theorem using truth table. 4

(b) Express the Boolean function $F = xy + x'z$ as a product of maxterm form. 4

(c) Express the following expression in NAND implementation and draw the NAND diagram : 4

$F = xyz + xyz' + x'y'z$

(d) Simplify using Boolean postulates and identities : 2

$F = ABC + A'B + ABC'$

UNIT—III

5. (a) What is half-adder? Design a half-adder. 4

(b) Compare combinational circuit and sequential circuit. 2

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(c) Draw the diagram of a (1×8) demultiplexer and explain it. 3

(d) Design a BCD-to-Excess-3 code converter. 5

6. (a) Design full subtractor. 5

(b) What is encoder? How does it work? 4

(c) Draw the diagram of 4×1 MUX. 2

(d) Explain various types of ROMs. 3

UNIT—IV

7. (a) "Sequential circuit is the basis of storage device." Justify. 2

(b) Design a JK flipflop. 5

(c) Design and implement a binary counter. 7

8. (a) What is sequence detector? 2

(b) Design a master-slave flipflop. 5

(c) What is excitation table? How is it used? 2

(d) Design and implement serial binary adder. 5

UNIT—V

9. Write short notes on the following : 5+5+4=14

(a) PLA

(b) PLD

(c) Multigate synthesis

10. (a) Draw the logic diagram of 4×3 RAM. 5

(b) Explain threshold functions. 4

(c) Explain ripple counter. 5

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