Total No. of printed pages = 3

BCA 171203

03107123

Roll No. of candidate

2023

B.C.A. 2nd Semester End-Term Examination

DIGITAL LOGIC

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Question No. 1 compulsory, answer any *four* from rest.

1. Answer the following questions by choosing the correct option : $(10 \times 1 = 10)$

(i) Given the numbers $A = 15_{10}$, $B = F_{16}$, $C = 17_8$, $D = 1111_2$. Find the Correct statement

(a) $A > B > C > D$ (b) $A < B < C < D$

(c) $A = B = C = D$ (d) None of these

(ii) Which is not an Universal gate?

(a) NAND (b) EOR

(c) NOR (d) All the above

(iii) Complement of $(x + y)$ is

(a) $x'y'$ (b) $x'+y'$

(c) xy (d) None of the above

(iv) Full adder has

(a) 3 inputs and 3 outputs (b) 3 inputs and 2 outputs

(c) 2 inputs and 2 outputs (d) None of the above

[Turn over

(v) The Odd parity bit for 1111111 is

(a) 1 (b) 0

(c) −1 (d) None of the above

(vi) Which is used as alphanumeric code?

(a) ASCII (b) Binary

(c) 8421 (d) Hex

(vii) Which is not a reduction method of Boolean algebra?

(a) De-Morgans Theorem (b) Karnaugh's Map

(c) Quine- McClusky method (d) All the above

(viii) To address 1000 memory locations minimum no of bits required in address lines

(a) 8 (b) 9

(c) 10 (d) 11

(ix) Hamming code is

(a) SEC-DED code (b) Only Error correction code

(c) Only Error detection code (d) None of the above

(x) 111.11_2 equal to

(a) $(11111)_2 \times 2^{-2}$ (b) $(11111)_2 \times 2^{-3}$

(c) $(11111)_2 \times 2^{-1}$ (d) None of the above

2. (a) Represent the largest and the smallest number represented using 8 bit signed binary number representation. (4)

(b) Convert –128 into 32 bit IEEE floating point representation. (4)

(c) Simplify using 2's complement (4)

(–32)+(–20)

(d) Convert the hexadecimal number $ABCD_{16}$ into binary and Octal. (3)

3. (a) Define Boolean algebra and the prove that for a Boolean variable X, $X + X = X$. (5)

(b) Design a four bit binary parallel adder using Full Adders. (5)

(c) Represent the boolean function $F(ABC) = A'B'C' + ABC$ using NAND gates. (5)

4. (a) Represent the following Boolean function using a Decoder and OR gates. (6)

$F(A, B, C) = \Sigma (0, 1, 2, 3)$

$F(A, B, C) = AB + A'B'$.

(b) Draw the circuit diagram for Clocked SR flip flop and describe its working principle. (9)

5. (a) Reduce the Boolean function using Karnaugh's map and represent the Boolean function using AND-OR Gates. (9)

$F(W X Y Z) = \Sigma (0, 2, 5, 6, 12, 14, 15)$

(b) Represent the following Boolean function using Multiplexer taking C as input and AB as Select lines. (6)

$F(A, B, C, D) = \Sigma (1, 2, 3, 4, 9, 10, 10, 11, 12)$

6. (a) What is the difference between combinational circuit and a sequential circuit? Draw block diagrams for each. (6)

(b) Design a Counter which gives following sequence 0, 1, 3, 5, 7. (9)

7. Write short notes on (any *three*) : $(3 \times 5 = 15)$

(a) Binary Cell

(b) BCD Adder

(c) Characteristics table of JK flip flop

(d) Character codes.