

Note:1. Label your answers very properly, as per question number. Unlabeled or wrongly labeled answers are not credited marks.

2. Label the diagrams wherever you draw them. Draw them neat.

3. All questions are compulsory and numeric figures to the right are max marks for the question.

Q. 1] A] Select the most appropriate answer from the given alternatives and rewrite the sentence with option number. [4]

(a) Complement of OR Gate is _____

(i) XOR Gate (ii) X-NOR Gate (iii) NOR Gate (iv) None of these

(b) The algebra statement on 3 input signals A, B and C : $A + (B \cdot C) = (A + B) \cdot (A + C)$ speaks of _____ Law.

(i) Associative (ii) Distributive (iii) De-Morgan's (iv) None of these

(c) A new number system has digits 0,1, 2, 3,4, 5. Then base of this number system is _____

(i) 4 (ii) 5 (iii) 6 (iv) 7

(d) In Boolean Algebra, $1 + 1 =$ _____

(i) 2 (ii) 11 (iii) 10 (iv) 1

B] Convert following decimal numbers into specified number system.

Answer any three of the following.

[6]

(a) $(1112000)_{10} = (?)_{16}$

(b) $(100000)_{10} = (?)_8$

(c) $(201000)_{10} = (?)_2$

(d) $(987654)_{10} = (?)_{16}$

Q. 2] A] Convert following numbers from specified system into decimal number system.

Answer any three of the following.

[6]

(a) $(175751)_8 = (?)_{10}$

(b) $(40512)_{16} = (?)_{10}$

(c) $(110110)_2 = (?)_{10}$

(d) $(ABCA)_{16} = (?)_{10}$

B] Differentiate between following terms with minimum 2 points in each. (Any Two)

[4]

(a) Inclusive OR and Exclusive OR

(b) Octal and Hexadecimal Number System

(c) Commutative Law and Associative Law

(d) LSB and MSB of any data.

Q. 3] A] Answer any two of the following.

[6]

(a) State both statements of De - Morgan's Laws and prove anyone using truth table.

(b) Perform (i) $(1010111000)_2 - (010110011)_2$ (ii) $(11010001010)_2 + (110111011)_2 + (111001101)_2$

(c) Consider (A) = 5A H, (B) = C3 H, show with working, the result of following operations -

(i) ANDing operation on A and B (ii) ORing operation on A and B (iii) Ex-ORing on A and B

B] Answer any one of the following.

[4]

- (a) Explain NAND gate giving its definition, working, Diagram and Truth Table,
 (b) Identify the error in following Boolean Statement, that has to follow Distributive Law:

$$A \cdot (B + C) = (A + B) + (A \cdot C)$$

Make correction and rewrite the law correctly. Prove the LAW using truth table.

Q. 4] A] Answer any two of the following.

[6]

- (a) Consider A = 2-digit largest number in hexadecimal system. Consider B = 3 - digit largest even number in Octal system. Find 2's complement of number (A + B) in binary.
 (b) Define the terms : Bit, Byte and Nibble.
 (c) Simplify the Boolean expression : $y = A \cdot B + A + A' + B \cdot B'$ using Boolean Laws to find final output signal y.

B] Answer any FOUR of the following.

[4]

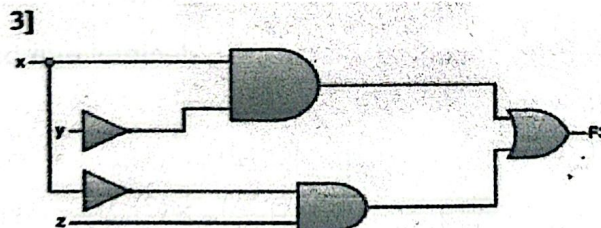
Do as directed ... converting from given number system into desired number system.

- (i) (F7 H) into Binary (ii) $(756)_8$ into binary (iii) $(3B7A9D4F)_{16}$ into Octal
 (iv) $(71370767)_8$ into Hexadecimal
 (v) $(11011100111100011011111)_2$ into Hexadecimal
 (vi) $(101011101100011110)_2$ into Octal

Q. 5] Answer any two of the following.

[10]

- (a) Realize (draw) the Boolean Expression $y = \overline{B \cdot C} + A + (A + C)$ using logic gates. Make an interpretation (observation) about output of this logic circuit by simplifying the expression.
 (b) Derive a Boolean expression by labeling output signals Gate by Gate in the following Logic Circuit Diagram. Also, draw Truth Table for the same.



- (c) Derive a Boolean expression by labeling output signals Gate by Gate in the following Logic Circuit Diagram. Also, draw Truth Table for the same.

