

Q. 1 A. Mention the correct alternative number and rewrite the statement with correct alternative

[4]

- (a) Full form of the term LSB in Boolean algebra / binary arithmetic is _____.
(i) Last Significant Bit (ii) Least Significant Bit
(iii) Least Simple Binary (iv) Last Sign Bit
- (b) The Boolean expressions / equations $A + 0 = A$ and $A \cdot 1 = 1$ are together also referred as _____.
(i) Idempotent Law (ii) Identity Law
(iii) Involution Law (iv) Dissolution Law
- (c) In Hexadecimal Number System, $A + B + C + D =$ _____.
(i) E (ii) EF (iii) FE (iv) 2E
- (d) The Logic Gate which gives high output for Same input Signals is _____.
(i) Ex-NOR Gate (ii) NAND Gate (iii) NOR Gate (iv) AND Gate

B] Answer any two of the following.

[6]

- (a) What is 1's and 2's complement of a binary number? Give example of each.
(b) Name the universal logic gates. Why are they called as 'Universal' Logic Gates?
(c) Mention 3 distinct points to differentiate inclusive OR and Exclusive OR.

Q.2 A] Answer any two of the following.

[6]

- (a) Consider (A) = 5A H, (B) = C3 H, show with working, the result of following operations -
a) ANDing operation on A and B
b) ORing operation on A and B
c) Ex-ORing on A and B
- (b) Mention both statements of distributive law in Boolean algebra. Verify both statements taking input signal values as 1,0 and 0 respectively.
- (c) Explain Ex-OR gate with diagram, working and truth table.

B] Answer any one of the following.

[4]

- (a) Explain with working conversion of hexadecimal number ABBAA into Octal number.
(b) Using 2's complement of subtraction, carry out operation B6 H - 9F H. State proper results.

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

[6]

- (a) Draw logic diagram that derives Boolean output as: $A \cdot B + \overline{A} \cdot \overline{B} + \overline{C}$
- (b) In Boolean algebra, the equation $A + A \cdot B = A$ is called 'Absorption' Law. Draw truth table to prove this equation. Interpret why is this equation so called as 'Absorption' Law?
- (c) Consider 4-bit binary number 0110 and 0101. Perform addition, subtraction and multiplication on these two data. Show results after each operation.

B] Answer any one of the following.

[4]

- (a) State both the laws of De-Morgan's in Boolean algebra. Prove any one law using truth table.
- (b) Consider the decimal number 1000. Show step-wise conversion of this decimal number into hexadecimal and octal number. Mention the results separately.
Show with steps, conversion of the hexadecimal number 7F H and octal number 57 into decimal number respectively. Mention the results separately.

Q. 4. A] Answer any two of the following.**[6]**

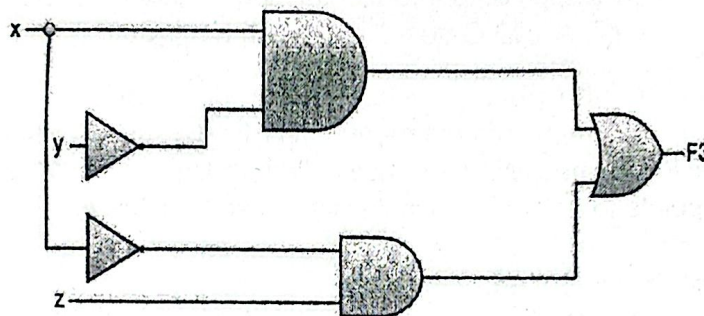
- (a) Write the string length, MSB and LSB in the following binary numbers
 (i) 00110100 (ii) 0100011001101101
- (b) (i) Explain the significance of final Carry bit. (ii) Which gate is known as 'Inverter'? Why?
- (c) Using Boolean Laws and Identities, determine what does the expression $y = (1 + x + \bar{x})$ evaluate to? Without drawing truth table, state the last column of truth table. Justify your answer.

B) Answer any one of the following.**[4]**

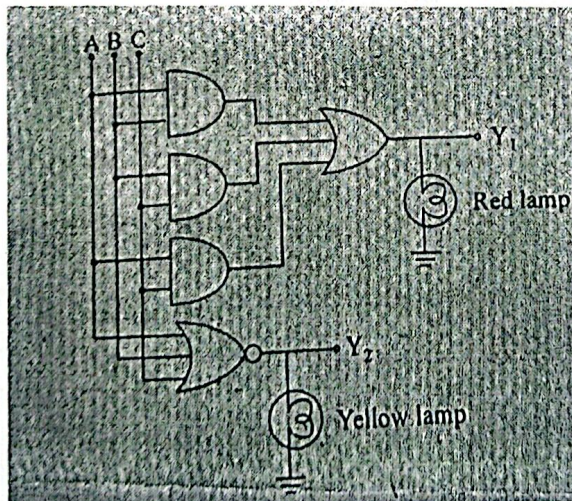
- (a) State the principle of duality. Write the dual of the Boolean statement; $A \cdot B + 1 = 1$. Prove this statement using truth table.
- (b) Define following terms and give example of each: (i) word (ii) string (iii) nibble (iv) byte

Q. 5 Answer any two of the following.**[10]**

- (a) Write gate by gate, output at each gate and hence the Boolean expression for final output of following logic diagram. Also draw the truth table of expression, thus derived.



- (b) Following logic circuit shows two output signals Y1 and Y2. Write the Boolean expression for both the output signals, draw their corresponding truth tables. Interpret your answer from the truth table.



- (c) Draw the logic circuit for Boolean expression $y = A \cdot B \cdot C + (\bar{A} + \bar{B} + \bar{C})$
 Also draw truth table for the same and extract inferences from the truth table / conclude your answer from the truth table.