This set of Digital Electronics/Circuits Multiple Choice Questions & Answers (MCQs) focuses on “Number System – 1”.

1. Any signed negative binary number is recognised by its _____

a) MSB

b) LSB

c) Byte

d) Nibble

View Answer A

Answer: a

Explanation: Any negative number is recognized by its MSB (Most Significant Bit).

If it’s 1, then ít’s negative, else if it’s 0, then positive.

This set of Digital Electronics/Circuits Multiple Choice Questions & Answers (MCQs) focuses on “Sum of Products and Products of Sum”.

1. The logical sum of two or more logical product terms is called _____

a) SOP

b) POS

c) OR operation

d) NAND operation

View Answer

Answer: a

Explanation: The logical sum of two or more logical product terms, is called SOP (i.e. sum of product). The logical product of two or more logical sum terms, is called POS (i.e. product of sums).

2. The expression Y=AB+BC+AC shows the _____ operation.

a) EX-OR

b) SOP

c) POS

d) NOR

View Answer

Answer: b

Explanation: The given expression has the operation product as well as the sum of that. So, it shows SOP operation. POS will be the product of sum terms.

3. The expression Y=(A+B)(B+C)(C+A) shows the _____ operation.

a) AND

b) POS

c) SOP

d) NAND

View Answer

Answer: b

Explanation: The given expression has the operation sum as well as the product of that. So, it shows POS(product of sum) operation. SOP will be the sum of product terms.

4. A product term containing all K variables of the function in either complemented or uncomplemented form is called a _____

a) Minterm

b) Maxterm

c) Midterm

d) $\sum$ term

View Answer

Answer: a

Explanation: A product term containing all K variables of the function in either complemented or uncomplemented form is called a minterm. A sum term containing all K variables of the function in either complemented or uncomplemented form is called a maxterm.

5. According to the property of minterm, how many combination will have value equal to 1 for K input variables?

a) 0

b) 1

c) 2

d) 3

View Answer

Answer: b

Explanation: The main property of a minterm is that it possesses the value 1 for only one combination of K input variables and the remaining will have the value 0.

6. The canonical sum of product form of the function y(A,B) = A + B is _____

a) AB + BB + A'A

b) AB + AB' + A'B

c) BA + BA' + A'B'

d) AB' + A'B + A'B'

View Answer

Answer: b

Explanation: A + B = A.1 + B.1 = A(B + B') + B(A + A') = AB + AB' + BA +BA' = AB + AB' + A'B = AB + AB' + A'B.

7. A variable on its own or in its complemented form is known as a _____

a) Product Term

b) Literal

c) Sum Term

d) Word

View Answer

Answer: b

Explanation: A literal is a single logic variable or its complement. For example — X, Y, A', Z, X' etc.

8. Maxterm is the sum of _____ of the corresponding Minterm with its literal complemented.

a) Terms

b) Words

c) Numbers

d) Nibble

View Answer

Answer: a

Explanation: Maxterm is the sum of terms of the corresponding Minterm with its literal complemented.

9. Canonical form is a unique way of representing _____

a) SOP

b) Minterm

c) Boolean Expressions

d) POS

View Answer

Answer: c

Explanation: Boolean Expressions are represented through canonical form. An example of canonical form is A’B’C’ + AB’C + ABC’.

10. There are _____ Minterms for 3 variables (a, b, c).

a) 0

b) 2

c) 8

d) 1

View Answer

Answer: c

Explanation: Minterm is given by 2n. So, 23 = 8 minterms are required.

This set of Digital Electronics/Circuits Multiple Choice Questions & Answers (MCQs) focuses on “Karnaugh Map”.

1. A Karnaugh map (K-map) is an abstract form of _____ diagram organized as a matrix of squares.

a) Venn Diagram

b) Cycle Diagram

c) Block diagram

d) Triangular Diagram

View Answer

Answer: a

Explanation: A Karnaugh map (K-map) is an abstract form of Venn diagram organized as a matrix of squares, where each square represents a Maxterm or a Minterm.

2. There are _____ cells in a 4-variable K-map.

a) 12

b) 16

c) 18

d) 8

View Answer

Answer: b

Explanation: There are $16 = (24)$ cells in a 4-variable K-map.

3. The K-map based Boolean reduction is based on the following Unifying Theorem: $A + A' = 1$.

a) Impact

b) Non Impact

c) Force

d) Complementarity

View Answer

Answer: b

Explanation: The given expression $A + A' = 1$ is based on non-impact unifying theorem.

4. Each product term of a group, w'.x.y' and w.y, represents the _____in that group.

a) Input

b) POS

c) Sum-of-Minterms

d) Sum of Maxterms

View Answer

Answer: c

Explanation: In a minterm, each variable w, x or y appears once either as the variable itself or as the inverse. So, the given expression satisfies the property of Sum of Minterm.

5. The prime implicant which has at least one element that is not present in any other implicant is known as _____

a) Essential Prime Implicant

b) Implicant

c) Complement

d) Prime Complement

View Answer

Answer: a

Explanation: Essential prime implicants are prime implicants that cover an output of the function that no combination of other prime implicants is able to cover.

6. Product-of-Sums expressions can be implemented using _____

a) 2-level OR-AND logic circuits

b) 2-level NOR logic circuits

c) 2-level XOR logic circuits

d) Both 2-level OR-AND and NOR logic circuits

View Answer

Answer: d

Explanation: Product-of-Sums expressions can be implemented using 2-level OR-AND & NOR logic circuits.

7. Each group of adjacent Minterms (group size in powers of twos) corresponds to a possible product term of the given _____

a) Function

b) Value

c) Set

d) Word

View Answer

Answer: a

Explanation: Each group of adjacent Minterms (group size in powers of twos) corresponds to a possible product term of the given function.

8. Don’t care conditions can be used for simplifying Boolean expressions in _____

a) Registers

b) Terms

c) K-maps

d) Latches

View Answer

Answer: c

Explanation: Don’t care conditions can be used for simplifying Boolean expressions in K-maps which helps in pairing with 1/0.

9. It should be kept in mind that don’t care terms should be used along with the terms that are present in _____

a) Minterms

b) Expressions

c) K-Map

d) Latches

View Answer

Answer: a

Explanation: It should be kept in mind that don't care terms should be used along with the terms that are present in minterms as well as maxterms which reduces the complexity of the boolean expression.

10. Using the transformation method you can realize any POS realization of OR-AND with only.

a) XOR

b) NAND

c) AND

d) NOR

View Answer

Answer: d

Explanation: Using the transformation method we can realize any POS realization of OR-AND with only NOR.

This set of Digital Electronics/Circuits Multiple Choice Questions & Answers (MCQs) focuses on "Boolean Logic Operations".

1. In boolean algebra, the OR operation is performed by which properties?

a) Associative properties

b) Commutative properties

c) Distributive properties

d) All of the Mentioned

View Answer

Answer: d

Explanation: The expression for Associative property is given by A+(B+C) = (A+B)+C & A*(B*C) = (A*B)*C.

The expression for Commutative property is given by A+B = B+A & A*B = B*A.

The expression for Distributive property is given by A+BC=(A+B)(A+C) & A(B+C) = AB+AC.

2. The expression for Absorption law is given by _____

a) A + AB = A

b) A + AB = B

c) AB + AA' = A

d) A + B = B + A

View Answer

Answer: a

Explanation: The expression for Absorption Law is given by: A+AB = A.

Proof: A + AB = A(1+B) = A (Since 1 + B = 1 as per 1's Property).

3. According to boolean law: A + 1 = ?

a) 1

b) A

c) 0

d) A'

View Answer

Answer: a

Explanation: A + 1 = 1, as per 1's Property.

4. The involution of A is equal to _____

a) A

b) A'

c) 1

d) 0

View Answer

Answer: a

Explanation: The involution of A means double inversion of A (i.e. A") and is equal to A.

Proof: $((A)')' = A$

5. $A(A + B) = ?$

a) AB

b) 1

c) $(1 + AB)$

d) A

View Answer

Answer: d

Explanation: $A(A + B) = AA + AB$ (By Distributive Property) $= A + AB$ (A.A = A By Commutative Property) $= A(1 + B) = A*1$ ($1 + B = 1$ by 1's Property) $= A$.

6. DeMorgan's theorem states that _____

a) $(AB)' = A' + B'$

b) $(A + B)' = A' * B$

c) $A' + B' = A'B'$

d) $(AB)' = A' + B$

View Answer

Answer: a

Explanation: The DeMorgan's law states that $(AB)' = A' + B'$ & $(A + B)' = A' * B'$, as per the Dual Property.

7. $(A + B)(A' * B') = ?$

a) 1

b) 0

c) AB

d) AB’

View Answer

Answer: b

Explanation: The DeMorgan’s law states that $(AB)' = A' + B'$ & $(A + B)' = A' * B'$, as per the Dual Property.

8. Complement of the expression $A'B + CD'$ is _____

a) $(A' + B)(C' + D)$

b) $(A + B')(C' + D)$

c) $(A' + B)(C' + D)$

d) $(A + B')(C + D')$

View Answer

Answer: b

Explanation: $(A'B + CD')' = (A'B)'(CD')'$ (By DeMorgan’s Theorem) $= (A'' + B')(C' + D'')$ (By DeMorgan’s Theorem) $= (A + B')(C' + D)$.

9. Simplify $Y = AB' + (A' + B)C$.

a) $AB' + C$

b) $AB + AC$

c) $A'B + AC'$

d) $AB + A$

View Answer

Answer: a

Explanation: Y = AB’ + (A’ + B)C = AB’ + (AB’)’C = (AB’ + C)(AB’ + AB’) = (AB’ + C).1 = (AB’ + C).

10. The boolean function A + BC is a reduced form of _____

a) AB + BC

b) (A + B)(A + C)

c) A’B + AB’C

d) (A + C)B

View Answer

Answer: b

Explanation: (A + B)(A + C) = AA + AC + AB + BC = A + AC + AB + BC (By Commutative Property) = A(1 + C + B) + BC = A + BC (1 + B + C =1 By 1’s Property).

This set of Digital Electronics/Circuits Multiple Choice Questions & Answers (MCQs) focuses on “Logic Gates and Networks – 1”.

1. The output of a logic gate is 1 when all the input are at logic 0 as shown below:

INPUT OUTPUT

A B C

0 0 1

0 1 0

1 0 0

1 1 0

INPUT OUTPUT

A B C

0 0 1

0 1 0

1 0 0

1 1 1

The gate is either _____

a) A NAND or an EX-OR

b) An OR or an EX-NOR

c) An AND or an EX-OR

d) A NOR or an EX-NOR

View Answer

Answer: d

Explanation: The output of a logic gate is 1 when all inputs are at logic 0. The gate is NOR. The output of a logic gate is 1 when all inputs are at logic 0 or all inputs are at logic 1, then it is EX-NOR. (The truth tables for NOR and EX-NOR Gates are shown in above table).

2. The code where all successive numbers differ from their preceding number by single bit is _____

a) Alphanumeric Code

b) BCD

c) Excess 3

d) Gray

View Answer

Answer: d

Explanation: The code where all successive numbers differ from their preceding number by single bit is gray code. It is an unweighted code. The most important characteristic of this code is that only a single bit change occurs when going from one code number to next. BCD Code is one in which decimal digits are represented by a group of 4-bits each, whereas, in Excess-3 Code, the decimal numbers are incremented by 3 and then written in their BCD format.

3. The following switching functions are to be implemented using a decoder:

f1 = ∑m(1, 2, 4, 8, 10, 14) f2 = ∑m(2, 5, 9, 11) f3 = ∑m(2, 4, 5, 6, 7)

The minimum configuration of decoder will be _____

a) 2 to 4 line

b) 3 to 8 line

c) 4 to 16 line

d) 5 to 32 line

View Answer

Answer: c

Explanation: 4 to 16 line decoder as the minterms are ranging from 1 to 14.

4. How many AND gates are required to realize Y = CD + EF + G?

a) 4

b) 5

c) 3

d) 2

View Answer

5. The NOR gate output will be high if the two inputs are _____

a) 00

b) 01

c) 10

d) 11

View Answer

6. How many two-input AND and OR gates are required to realize Y = CD+EF+G?

a) 2, 2

b) 2, 3

c) 3, 3

d) 3, 2

View Answer

7. A universal logic gate is one which can be used to generate any logic function. Which of the following is a universal logic gate?

a) OR

b) AND

c) XOR

d) NAND

View Answer

Answer: d

Explanation: An Universal Logic Gate is one which can generate any logic function and also the three basic gates: AND, OR and NOT. Thus, NOR and NAND can generate any logic function and are thus Universal Logic Gates.

What is the minimal form of the Karnaugh map shown below? Assume that X denotes a don’t care term.

gatecs2012Kmap

A

b'd'

B

b'd' + b'c'

C

b'd' + a'b'c'd'

D

b'd' + b'c' + c'd'

Answer B