1. Which number system is based on powers of 16?
a) Decimal
b) Binary
c) Octal
d) Hexadecimal

Answer: d) Hexadecimal
Explanation: Hexadecimal system uses 16 digits: 0-9 for values 0 to 9, and A-F for values 10 to 15.

2. What is the base of the binary number system?
a) 2
b) 8
c) 10
d) 16

Answer: a) 2
Explanation: Binary system uses two digits, 0 and 1, making its base 2.

3. Which code is used to represent decimal numbers in binary form?
a) BCD
b) Excess-3
c) Gray code
d) ASCII

Answer: a) BCD
Explanation: BCD (Binary Coded Decimal) is a binary representation of decimal numbers.

4. What is the logic gate that performs the AND operation?

a) AND

b) OR

c) NOT

d) NAND

Answer: a) AND

Explanation: The AND gate produces an output of 1 only if all inputs are 1.

5. Which logic gate implements the negation operation?

a) AND

b) OR

c) NOT

d) XOR

Answer: c) NOT

Explanation: The NOT gate (also called an inverter) produces the opposite of its input.

6. What is the result of NAND operation if both inputs are 1?

a) 0

b) 1

c) Depends on the input

d) Cannot be determined

Answer: a) 0

Explanation: NAND gate produces 0 output only when both inputs are 1.

7. Which theorem allows the conversion of a product of sums into a sum of products?

a) De-Morgan’s Theorem
b) Principle of Duality
c) Karnaugh map Minimization
d) Quine-McCluskey method

Answer: a) De-Morgan’s Theorem
Explanation: De-Morgan’s Theorem is used to transform expressions involving AND and OR operations.

8. What is the principle that states every algebraic expression in Boolean algebra remains unchanged if 0s are replaced by 1s and 1s are replaced by 0s?
a) De-Morgan’s Theorem
b) Principle of Duality
c) Complementarity
d) Commutative Law

Answer: b) Principle of Duality
Explanation: Principle of Duality allows switching AND with OR operations and 0s with 1s in Boolean expressions.

9. Which method is used for the minimization of Boolean functions by grouping adjacent squares in a Karnaugh map?
a) Combinatorial method
b) Quine-McCluskey method
c) Implicant chart method
d) K-map method

Answer: d) K-map method
Explanation: Karnaugh map (K-map) method is a graphical approach for simplifying Boolean functions.

10. Which condition indicates that the output of a function is not affected by certain combinations of input values?
a) Minimization
b) Don’t care condition
c) Maxterm
d) Canonical form

Answer: b) Don’t care condition
Explanation: Don’t care conditions are input combinations for which the function’s output value is irrelevant.

11. Which logic gate performs the Exclusive-OR operation?
a) XOR
b) NOR
c) NAND
d) NOT

Answer: a) XOR
Explanation: XOR gate produces 1 output when inputs differ.

12. Which number system uses 8 digits (0-7)?
a) Binary
b) Octal

c) Decimal
d) Hexadecimal

Answer: b) Octal
Explanation: Octal system is base-8 and uses digits from 0 to 7.

13. What is the base of the decimal number system?
a) 2
b) 8
c) 10
d) 16

Answer: c) 10
Explanation: Decimal system is base-10, using digits 0-9.

14. Which code is commonly used for character encoding in computers?
a) BCD
b) Excess-3
c) Gray code
d) ASCII

Answer: d) ASCII
Explanation: ASCII (American Standard Code for Information Interchange) is widely used for text encoding.

15. Which logic gate has the symbol resembling a triangle pointing to the right?
a) OR
b) NAND

c) XOR
d) NOR

Answer: a) OR
Explanation: OR gate’s symbol resembles a triangle pointing to the right.

16. Which operation in Boolean algebra represents logical addition?
a) AND
b) OR
c) NOT
d) XOR

Answer: b) OR
Explanation: OR operation in Boolean algebra performs logical addition.

17. What is the result of NOR operation if both inputs are 0?
a) 0
b) 1
c) Depends on the input
d) Cannot be determined

Answer: b) 1
Explanation: NOR gate produces 1 output only when both inputs are 0.

18. Which theorem states that the complement of a product of variables is equal to the sum of the complements of the variables?
a) De-Morgan’s Theorem
b) Principle of Duality

c) Involution Law
d) Complementarity Law

Answer: a) De-Morgan’s Theorem
Explanation: De-Morgan’s Theorem is fundamental in Boolean algebra, allowing the transformation of product terms into sum terms.

19. What is the standard form of expressing Boolean functions?
a) Minterm
b) Maxterm
c) Sum of Products (SOP)
d) Product of Sums (POS)

Answer: c) Sum of Products (SOP)
Explanation: SOP form involves summing products of literals (variables) for a Boolean function.

20. Which method is used for minimizing Boolean functions by systematically eliminating redundant terms?
a) Combinatorial method
b) Quine-McCluskey method
c) Implicant chart method
d) K-map method

Answer: b) Quine-McCluskey method
Explanation: Quine-McCluskey method is an algorithmic approach to minimize Boolean functions by systematically reducing terms.