Unit 4: Boolean Algebra

1. The boolean function AB + AC is equivalent to
   a) AB + AC + BC
   b) A'B'C' + A'BC + A'BC
   c) ABC + A'BC + B'C'
   d) ABC + ABC' + AB'C
2. Consider the Boolean function f = (a + bc)·(pq + r). Complement f' of function f is:
   a) (a' + b'c')· (p'q' + r')
   b) a'(b' + c') + (p' + q')r'
   c) (a' + b'c') + (p'q' + r')
   d) (a'b'c') + (p'q'r')
3. Boolean expression y.z + z is equal to which of the following?
   a) y + y.z
   b) y + z
   c) z
   d) y.z
4. A tautology is a Boolean formula that is always true. Which of the following is atautology?
   a) x
   b) $(x + \overline{x})y$
   c) $x + \overline{y} + \overline{x}$
   d) $(xy) + \overline{x}$
5. The Boolean function $a + (\overline{a}\, b)$ is equivalent to
   a) a.b
   b) a + b
   c) $a.\overline{b}$
   d) $\overline{a} + b$
6. Which of the following Boolean rules is correct?
   a) A + 0 = 0
   b) A + 1 = 1
   c) A * 1 = 0
   d) A * 0 = 1
7. Simplify the following expression: $Y = A\ \overline{B}\ C + A\ \overline{B}\ \overline{C}$
   a) Y = C
   b) Y = B
   c) Y = A
   d) $Y = A\overline{B}$
8. Which of the following is not a valid rule of Boolean Algebra?
   a) A + A' = A
   b) A.A = A
   c) A.A' = 0

d) A + A' = 1

9. In Boolean algebra, the OR operation is performed by which properties?
   a) Associativeproperties
   b) Commutative properties
   c) Distributive properties
   d) All of the Mentioned

10. 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

11. According to Boolean law: A +1 =?
   a) 1
   b) A
   c) 0
   d) A'

12. The involution of A is equal to -------
   a) A
   b) A'
   c) 1
   d) 0

13. A(A +B) = ?
   a) AB
   b) 1
   c) 1 +AB
   d) A

14. The De Morgan's law states that -------
   a) (AB)' = A' + B'
   b) (A + B)' = A' * B
   c) A' + B' = A'B'
   d) (AB)' = A' + B

15. (A + B)(A' * B') = ?
   a) 1
   b) 0
   c) AB
   d) AB'

16. 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')

17. 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

18. Let '*' be defined on the set N. Which of the following are both commutative and associative?
a) a*b = a+b
b) a*b = a-b
c) $a*b = ab^2$
d) $a*b = a^b$

19. Which of the following is not a type of binary operation?
a) Transitive
b) Commutative
c) Associative
d) Distributive

20. Determine the values of A, B, C and D that make the sum term $\bar{A}$+B+$\bar{C}$+D equal to zero.
a) A=1, B=0, C=0, D=0
b) A=1, B=0, C=1, D=0
c) A=0, B=1, C=0, D=0
d) A=1, B=0, C=1, D=1

21. Applying De Morgan's theorem to the expression $\overline{ABC}$, we get
a) $\overline{A} + \overline{B} + \overline{C}$
b) $\overline{A + B + C}$
c) $A + \overline{B} + C\overline{C}$
d) A(B +C)

22. The systematic reduction of logic circuits is accomplished by:
a) Using Boolean algebra
b) Symbolic reduction
c) TTL logic
d) Using a truth table

23. Boolean algebra is also called ---
a) Switching algebra
b) Arithmetic algebra
c) Linear algebra
d) Algebra

24. (a + b + c)' is equal to
a) a'b'c'
b) a'+b'+c'
c) abc
d) a+b+c

25. The complement of function (A+B+C)' using theorem and laws is
a) (A')+B+C

b) (A+B)'+c
c) A+B+C
d) A'B'C'