Boolean Algebra & Logic Gates

1. A logic is an electronic circuit which
   a) operates on binary algebra
   b) performs arithmetic and logic functions
   c) allows flow of electrons only in one direction
   d) alternates between 0 and 1 values

2. Positive logic in a logic circuit is one in which
   a) logic 0 and 1 are represented by 0 and positive voltage respectively
   b) logic 0 and 1 are represented by the negative and positive voltages respectively
   c) logic 0 voltage level is higher than logic 1 voltage level
   d) logic 0 voltage level is lower than logic 1 voltage level

[U.P.S.C. I.E.S. E.E.-II, 1992]

3. The logic is said to be positive if
   a) upper level is 0, lower is 1
   b) lower level is 0, upper is 1
   c) two levels overlap
   d) both a) and b) are true

4. The voltage levels of a negative logic system
   a) must necessarily be negative
   b) may be negative or positive
   c) must necessarily be positive
   d) must necessarily be 0 V and –5 V

[U.P.S.C. I.E.S. E.E.-II, 1999]

5. If L = low, H = high, a positive logic is
   a) L = 5V, H = 0V b) L = 5V, H = –5 V
   c) L = 5V, H = 1V d) L = –5V, H = –1V

6. Three Boolean operators are:
   a) NOT, OR, AND
   b) NOT, NAND, OR
   c) NOR, OR, NOT
   d) NOR, NAND, NOT

[U.P.T.U. Elec. Engg. Even Semester,2009-10]

7. The only function of a NOT gate is to
   a) invert an input signal
   b) act as a universal gate
   c) stop a signal
   d) none of the above

8. When an input electrical signal A = 101010 is applied to a NOT gate, the output signal will be
   a) 111010 b) 101010
   c) 010101 d) 101011

9. A three-input OR gate has output equal to 0 when
   a) all its inputs are high
   b) two of its inputs are high
   c) all are low
   d) one is high and the other two are low

10. The output of a 2-input OR gate is zero only when its
   a) either inputs is 0
   b) either input is 1
   c) both inputs are 1
   d) both inputs are 0

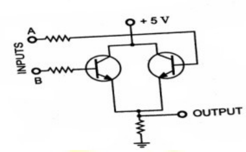
11. Indicate which of the following logic gates can be used to realize all possible combinational logic functions:
   a) OR gates only
   b) NAND gates only
   c) EX-OR gates only
   d) NOR gates only
   e) Both b) or d)

[GATE E.C.E.- 1989]

12. The complete set of only those Logic Gates designated as Universal Gates is
   a) NOT, OR and AND Gates
   b) XNOR, NOR and NAND Gates
   c) NOR, and NAND Gates
   d) XOR, NOR and NAND Gates

[GATE E.E.- 2009]

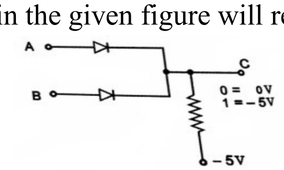
13. The circuit shown in the given figure is



   a) an AND gate b) an OR gate
   c) a XOR gate d) a NAND gate

[U.P.S.C. I.E.S. E.E.-II, 2000]

14. If negative logic is used, the diode gate shown in the given figure will represent



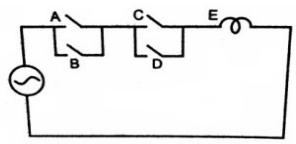
   a) OR gate b) AND gate
   c) NOR gate d) NAND gate

[U.P.S.C. I.E.S. E.E.-II, 1996]

15. The output Y of the circuit shown in figure is

a) $\bar{A}A$ b) A c) 1 d) $\bar{A}$

16. The switching circuit given in the figure can be expressed in binary logic notation as



a) L = (A + B) (C + D) E
b) L = AB + CD + E
c) L = E + (A + B) (C+D)
d) L = (AB + CD) E

[U.P.S.C. I.E.S. E.E.-II, 1995]

17. An AND gate
a) implements logic addition
b) gives high output only when all inputs are low
c) is equivalent to a series switching circuit
d) is equivalent to a parallel switching circuit

18. NAND operation with x and y inputs is
a) $\overline{x+y}$ b) $\bar{x}+\bar{y}$
c) $\bar{x}\times\bar{y}$ d) $(\bar{x}+\bar{y})(x+y)$

19. The output Y of a NOR gate for inputs A and B is
a) $\bar{A}+\bar{B}$ b) $\overline{A+B}$
c) $\overline{\bar{A}+\bar{B}}$ d) $\bar{A}\bar{B}$

20. The output of an EX-OR gate with A and B as inputs will be
a) $AB+\overline{AB}$ b) $(A+B)(\overline{A+B})$
c) $(A+B)(\overline{AB})$ d) $\overline{A+B}+AB$

[U.P.S.C. I.E.S. E.E.-II, 1998]

21. In exclusive OR gate, when output is zero the inputs are
a) 0,1 b) 1,0 c) 1,1 d) 1,x

22. An XOR gate can be converted into an inverter by
a) permanently connecting one input to 1
b) permanently connecting both inputs to 1
c) permanently connecting one inputs to 0
d) permanently connecting both inputs to 0

23. The output of a logic gate is '1' when all its inputs are at logic '0'. Then the gate is either
a) a NAND or an EX-OR gate
b) a NOR or an EX-NOR gate
c) an OR or an EX-NOR gate
d) an AND or an EX-OR gate

[U.P.S.C. I.E.S. E.T.E.-II, 2003]

24. The idempotent law of Boolean algebra says that
a) $x+y=1$ b) $x+x=x$
c) $x+xy=x$ d) $x(x+y)=x$

25. According to Boolean algebra, which one of the following is incorrect?
a) $A+1=1$ b) $A+0=A$
c) $A+\bar{A}=0$ d) $A+A=A$

26. Which one of the following Boolean algebra rule is correct?
a) $A\cdot\bar{A}=1$ b) $A+AB=A+B$
c) $A\cdot\bar{A}\cdot B=A+B$ d) $A(A+B)=B$

27. $A+A\cdot B$ is equal to
a) $A+B$ b) $\bar{A}+B$
c) A d) $A+1$

28. $A\cdot(A+B)=$
a) B b) A
c) $\bar{A}$ d) None of these

29. The logical expression $y = A + \overline{A}B$ is equivalent to

a) $y = AB$ b) $y = \overline{A}B$

c) $y = \overline{A} + B$ d) $y = A + B$

[GATE E.CE.-II, 1999]

30. The variable A can be written as

a) $(A + \overline{B}B)$ b) $(B + A)(B + \overline{A})$

c) $(AB + \overline{A}\overline{B})$ d) $(B + A\overline{A})$

31. The simplified logic expression for $y = \overline{A}B + A\overline{B} + AB$ is

a) AB b) $\overline{A + B}$

c) $A + B$ d) $\overline{A} + \overline{B}$

32. The simplified Boolean equation for $F = B[(A + \overline{B})(B + C)]$ is

a) $AB(1 + C)$ b) $AC(1 + B)$

c) AB d) 0

33. The simplified form of the Boolean expression $\overline{A} + A\overline{B}$ is

a) $A + B$ b) $A + \overline{B}$

c) $\overline{B} + A$ d) $\overline{A} + \overline{B}$

34. What is the Boolean expression $A \oplus B$ equivalent to?

a) $AB + \overline{A}\overline{B}$ b) $\overline{A}B + A\overline{B}$

c) B d) $\overline{A}$

[U.P.S.C. I.E.S. E.T.E -II, 2006]

35. If A and B are Boolean variables, then what is $(A + B) \cdot (A + \overline{B})$ equal to?

a) B b) A

c) $A + B$ d) AB

[U.P.S.C. I.E.S. E.T.E -II, 2006]

36. Which of the following Boolean algebra rules is correct?

a) $A \cdot \overline{A} = 1$ b) $A + AB = A + B$

c) $A + \overline{A}B = A + B$ d) $A(A + B) = B$

[U.P.S.C. I.E.S. E.T.E -II, 2009]

37. The Boolean expression $Y = AB + (A + B)(\overline{A} + B)$ may be simplified as

a) $Y = A$ b) $Y = \overline{A}$

c) $Y = B$ d) $Y = \overline{B}$

[U.P. Technical Univ. 2008-9]

38. Which one of the following statements is not correct?

a) $X + \overline{X}Y = X$ b) $X(\overline{X} + Y) = XY$

c) $XY + X\overline{Y} = X$

d) $ZX + Z\overline{X}Y = ZX + ZY$

[U.P.S.C. I.E.S. E.T.E. II, 2008]

39. d' Morgan law is

a) $\overline{ABC} = \overline{A}\overline{B}\overline{C}$

b) $\overline{ABC} = \overline{A} + \overline{B} + \overline{C}$

c) $\overline{A + B} = \overline{A} + \overline{B}$

d) $\overline{A+B+C} = \overline{A}+\overline{B}+\overline{C}$

40. $\overline{(A+\overline{B})(C+\overline{D})} =$, when demorganised, give

a) $A\cdot\overline{B}+C\cdot\overline{D}$ b) $A\cdot\overline{B}+\overline{C}\cdot D$

c) $\overline{A}\cdot B+\overline{C}\cdot D$ d) $\overline{A}\cdot B+C\cdot\overline{D}$

41. The Boolean expression

$\overline{A+\overline{B}+C}+\overline{\overline{A}+\overline{B}+C}+\overline{A+\overline{B}+\overline{C}}+ABC$

are reduces to

a) A b) B c) C

d) $A+B+C$

[U.P.S.C. I.E.S. E.T.E. II, 2010]

42. $\overline{\overline{A}+\overline{BC}}$ is

a) $A+B+C$ b) ABC

c) $A+\overline{B}\overline{C}$ d) $(A\cdot\overline{B}+\overline{C})$

43. The logic function $f=\overline{x\cdot\overline{y}+\overline{x}\cdot y}$ is the same as

a) $f=(x+y)(\overline{x}+\overline{y})$

b) $f=\overline{(\overline{x}+\overline{y})(x+y)}$

c) $f=\overline{(x\cdot y)}(\overline{x}\cdot\overline{y})$

d) None of these

[U.P.S.C. I.E.S. E.T.E -II, 2011]

44. Use of De Morgan's theorem on

$Z=\overline{A}C(\overline{\overline{A}BD})$

a) $\overline{A}C(A+\overline{B}+\overline{D})$ b) $AC(A+\overline{B}+\overline{D})$

c) $A\overline{C}(A+\overline{B}+\overline{D})$ d) $\overline{A}C(\overline{A}+B+D)$

45. The expression $(X+Y)(X+\overline{Y})(\overline{X}+Y)$ is equivalent to

a) $\overline{X}\overline{Y}$ b) $\overline{X}Y$

c) $X\overline{Y}$ d) XY

[U.P.S.C. I.E.S. E.E -II, 1998]

46. The Boolean expression

$X=B+A\cdot\overline{B}+A\cdot B$

is equivalent to

a) $A+B$ b) $\overline{A}\cdot B$

c) $\overline{A+B}$ d) $A\cdot B$

[U.P.S.C. I.E.S. E.E -II, 2005]

47. The Boolean expression $\overline{Y}\overline{Z}+\overline{X}\overline{Z}+\overline{XY}$ is logically equivalent to

a) $YZ+\overline{X}$ b) $YZX+\overline{X}\overline{Y}\overline{Z}$

c) $YZ+XZ+XY$

d) $X\overline{Y}\overline{Z}+\overline{X}\overline{Y}\overline{Z}+\overline{XY}\overline{Z}+\overline{X}\overline{Y}Z$

[U.P.S.C. I.E.S. E.E -II, 2005]

48. The Boolean expression

$ABCD+A\overline{B}CD+ABC\overline{D}+A\overline{B}C\overline{D}$

is equivalent to

a) A b) AC c) ABC d) 1

[U.P.S.C. I.E.S. E.E -II, 2008]

49. $\overline{A}\overline{B}C+\overline{A}BC+A\overline{B}C+ABC$ is equal to

a) A b) B

c) C d) None of these

50. The simplified form of the Boolean expression

$Y=(\overline{A}\cdot BC+D)(\overline{A}\cdot D+\overline{B}\cdot\overline{C})$

can be written as

a) $\bar{A}\cdot D + \bar{B}\cdot\bar{C}\cdot D$

b) $AD + B\cdot\bar{C}\cdot D$

c) $(\bar{A}+D)(\bar{B}\cdot C+\bar{D})$

d) $A\cdot\bar{D} + B\cdot C\cdot\bar{D}$

[GATE E.E , 2004]

51. In Boolean algebra, if $F = (A+B)(A+C)$ then

a) $F = AB + \bar{A}C$ b) $F = AB + \bar{A}\bar{B}$

c) $F = AC + \bar{A}B$ d) $F = A\bar{A} + \bar{A}B$

[U.P.S.C. I.E.S. E.E -II, 2001]

52. The simplified form of a logic function $Y = \overline{(\overline{A\bar{\bar{B}}})\cdot(\overline{\bar{\bar{A}}B})}$ is

a) $A+B$ b) AB

c) $\bar{A}+\bar{B}$ d) $\bar{A}B + A\bar{B}$

[U.P.S.C. I.E.S. E.E -II, 2003]

53. Which one of the following is equivalent to the Boolean expression $Y = \bar{A}\bar{B} + \bar{B}\bar{C} + \bar{C}\bar{A} = ?$

a) $\overline{AB+BC+CA}$

b) $(\bar{A}+\bar{B})(\bar{B}+\bar{C})(\bar{A}+\bar{C})$

c) $\overline{(A+B)(B+C)(C+A)}$

d) $\overline{(A+B)}\,\overline{(B+C)}\,\overline{(C+A)}$

[U.P.S.C. I.E.S. E.E -II, 2001]

54. The AND function can be realized by using only n number of NOR gates. What is n equal to?

a) 2 b) 3 c) 4 d) 5

[U.P.S.C. I.E.S. E.E -II, 2008]

Boolean Algebraic Logic Gates Answers Key	
1. b	51. c
2. d	52. d
3. b	53. c
4. b	54. b
5. d	
6. a	
7. a	
8. c	
9. c	
10. d	
11. e	
12. c	
13. b	
14. a	
15. d	
16. a	
17. c	
18. b	
19. b	
20. c	
21. c	
22. a	
23. b	
24. b	
25. c	
26. c	
27. c	
28. b	
29. d	
30. a	
31. c	
32. c	
33. d	
34. b	
35. b	
36. c	
37. c	
38. a	
39. b	
40. c	
41. b	

42. b 43. b 44. a 45. d 46. a 47. d	

48. b 49. c 50. a	