

For the exercises below you should always try to make sure you create the truth tables following the arrangement below

<b>X</b>	<b>Y</b>
0	0
0	1
1	0
1	1

Although any other arrangement is not incorrect this will prevent any mistakes in allocation of values and above all it is the preferred method in the exam.

When using Atomic Sentences symbology please maintain consistency, if you start with Lowercase maintain Lowercase if you start with Uppercase maintain Uppercase!

Use the correct symbols for the Logic gates. You may of course overlap lines although it is somehow inelegant to do so, you will not be marked down for it.

1.

**Draw a logic circuit diagram using NAND or NOR only to implement the Boolean function  $F(a,b) = a'b' + ab$**

2.

**In the Boolean Algebra, verify using truth table that  $X + XY = X$  for each  $X, Y$  in  $\{0, 1\}$ .**

3.

**In the Boolean Algebra, verify using truth table that  $(X + Y)' = X'Y'$  for each  $X, Y$  in  $\{0, 1\}$ .**

4.

**Give truth table for the Boolean Expression  $(X + Y)'$ .**

5.

**Draw the truth table for the following equations :**

**(a)  $M = N(P + R)$**

**(b)  $M = N + P + NP'$**

6.

**Using truth table, prove that  $AB + BC + CA' = AB + CA'$ .**

7.

**Give the truth table proof for distributive law of Boolean algebra.**

Distributive law state that (a)  $X(Y + Z) = XY + XZ$  (b)  $X + YZ = (X + Y)(X + Z)$

8.

Prove the following :

(i)  $A(B + B'C + B'C') = A$

(ii)  $A + A'B' = A + B'$

(iii)  $(x + y + z).(x' + y + z) = y + z$

(iv)  $A'B'C + A'BC + AB'C = A'C + B'C$

9.

Draw logic circuit diagrams for the following :

(i)  $xy + xy' + x'z$

(ii)  $(A + B)(B + C)(C' + A')$

(iii)  $A'B + BC$

(iv)  $xyz + x'yz'$

10.

Design a circuit (3 input) which gives a high input, when there is even number of low inputs.

11.

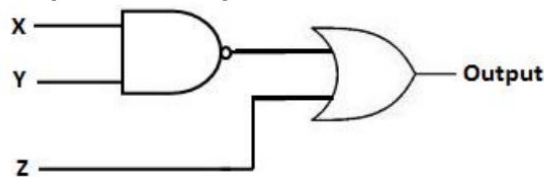
Design a circuit (3 input) which gives a high input only when there is even number of low or high inputs.

12.

Draw the logic circuit for this Boolean equation :  $y = A'B'C'D + AB'C'D + ABC'D + ABCD'$

13.

What function is implemented by the circuit shown



(a)  $x'y' + z$

(b)  $(x' + y')z$

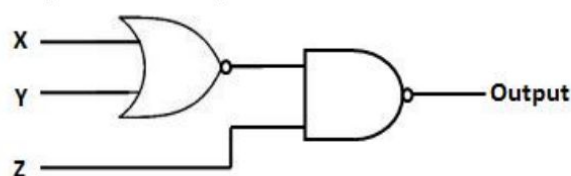
(c)  $x'y'z$

(d)  $x' + y' + z$

(e) none of these

14.

What function is implemented by the circuit shown



(a)  $x + y + z$

(b)  $x + y + z'$

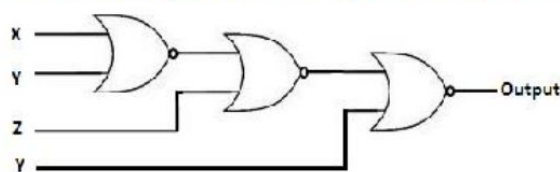
(c)  $x'y'z$

(d)  $x' + y' + z'$

(e) none of these

15.

What function is implemented by the circuit shown



(a)  $xz' + y$

(b)  $xz + y$

(c)  $x'z + y'$

(d)  $x'y' + y'z'$

(e)  $x'y' + y'z$