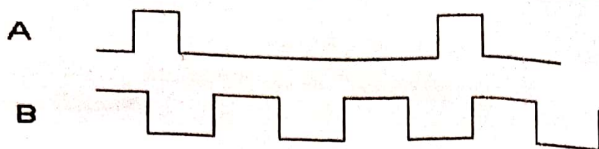


1. Draw the result of all the gates operation between A and B signals.



2. Demonstrate by means of truth table the validity of the following identities:

- De-Morgan's theorem for three variables: $(xyz)' = x' + y' + z'$
- The second distributive law: $x + yz = (x + y)(x + z)$

3. Solve using Boolean Algebra:

- $A + A'B = A + B$
- $AB + AC + B'C = AB + B'C$
- $A'C + BC + CA' = C(A' + B)$
- $x'y' + xy + x'y$
- $(x+y)(x+y')$
- $x'y + xy' + xy + x'y'$
- $x' + xy + xz' + xyz'$
- $ABC + A'B + ABC'$
- $(x'y' + z)' + z + xy + wz$
- $(A' + C)(A' + C')(A + B + C'D)$
- $(BC' + A'D)(AB' + CD')$

4. Obtain the truth table of the following functions

- $(xy + z)(y + xz)$
- $y'z + wxy' + wxy' + w'x'z$

5. Draw the logic diagram by NAND and NOR gates.

- $(AB' + CD')E + BC(A + B)$
- $w(x + y + z) + xyz$

6. Express the following functions in sum of min terms and product of max terms

- $F(A,B,C,D) = B'D + A'D + BD$
- $F(A,B,C,D) = \Pi(0,1,2,3,4,6,12)$
- $F(A,B,C,D) = \Sigma(0,1,2,6,11,13,14)$
- $F(x,y,z) = \Pi(0,3,6,7)$

7. Simplify the following Boolean functions using K-map

- $F(x,y,z) = \Sigma(1,2,3,6,7)$
- $F(x,y,z) = xy + x'y'z' + x'yz'$
- $F(w,x,y,z) = \Sigma(0,1,2,4,5,7,11,15)$
- $F(A,B,C,D) = \Sigma(0,2,4,5,6,7,8,10,13,15)$
- $F = AB'C + B'C'D' + BCD + ACD' + A'B'C + A'BC'D$

8. Simplify the following Boolean function F together with the don't care conditions d

- $F(x,y,z) = \Sigma(0,1,2,4,5)$; $d = \Sigma(3,6,7)$
- $F(A,B,C,D) = \Sigma(0,6,8,13,14)$; $d = \Sigma(2,4,10)$
- $F(w,x,y,z) = \Sigma(3,4,13,15)$; $d = \Sigma(1,2,5,6,8,10,12,14)$

9. Simplify the Boolean expression:

$$F(w,x,y,z) = wxy + yz + xy'z + x'y$$

- Laws and identities of Boolean algebra.
- K-map.

10. Why K-Map and Boolean algebra are used?

Solve the following

$$F(w,x,y,z) = (w+x+\bar{z})(x+y+\bar{z})(\bar{w}+y+z)(w+x+y)$$

Reduce it using K-Map and Draw the suitable logic diagram and realize it with NAND gate

11. Solve the following

$$F(w,x,y,z) = \prod (1,2,4,6,8,11,13,14) \text{ With don't care condition as}$$

$$D(w,x,y,z) = \sum (0,5,10,15)$$

Reduce it using K-Map and Draw the suitable logic diagram and realize it with NAND gate.

12. Draw simplified logic circuit by using K-map:

$$F(A,B,C,D) = \sum m(0,2,5,7,8,9,10,11,13,15)$$

a. By using AND – OR Gate

b. By using NAND gate.

Use NOT gate wherever necessary.

13. Solve the following

$$F(w,x,y,z) = \prod (4,6,14) \text{ With don't care condition as}$$

$$D(w,x,y,z) = (1,2,7,10,12,13,15)$$

Reduce it using K-Map and Draw the suitable logic diagram and realize it with NAND gate.

14. Draw simplified logic circuit by using K-map: $F(A,B,C,D) = \sum m(5,10,11,12)$

And Don't care condition as $D(A,B,C,D) = (1,4,7,13)$

a. By using AND – OR Gate

b. By using NOR gate.