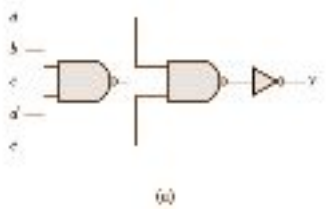
ASSIGNMENT 2

1. Simplify the following Boolean expressions to number of literals specified and draw logic diagrams of the circuits that implement the original and simplified expressions.
   a. (x'y' + z)' + z + xy + wz to three literals
   b. A'B(D' + C'D) + B(A + A'CD) to one literal
2. Simplify the following Boolean functions T_1 and T_2 to a minimum number of literals:

A	B	C	T_1	T_2
0	0	0	1	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	0	1
1	0	1	0	1
1	1	0	0	1
1	1	1	0	1

3. Obtain the truth table of the following functions, and express each function in sum-of-min-terms and product-of-maxterms form (b + cd)(c + bd)
4. Express the following function as a sum of minterms and as a product of maxterms:
   a. F(A, B, C, D) = B'D + A'D + BD
   b. F(u, v, w, x) = (u + xw)(x + u'v)
   c. F(x, y, z) = x' + x(x + y')(y + z')
5. Express the complement of the following functions in sum-of-minterms form:
   a. F(A,B ,C, D) = Σ(3, 5, 9, 11, 15)
   b. F (x, y, z) = Π(2, 4, 5, 7)
6. Show that the exclusive-OR operation is commutative and associative.Also show that it's dual is equal to its complement.
7. Write Boolean expressions and construct the truth tables describing the output of the circuits described by the logic diagrams in Fig below:



(a)

8. Given the Boolean functions F1 and F2 , show that
   a. The Boolean function E = F1 + F2 contains the sum of minterms of F1 and F2.
   b. The Boolean function G = F1F2 contains only the minterms that are common to F1 and F2
9. Implement the Boolean function F = xy + x'y' + y'z using OR and inverter gates.
10. The logical sum of all minterms of a Boolean function of n variables is 1.
    a. Prove the previous statement for n = 3.
    b. Suggest a procedure for a general proof.