

## Assignment 2- Boolean Algebra and Logic Gates

1. Show a block diagram of a system using AND, OR, and NOT gates. Then draw the circuit using the simulator, to implement the following function:

$$F(A,B,C,D,E) = (A (B + C)' + B D E) (A' + C E)$$

2. Given the Boolean function

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

- Obtain the truth table of the function.
- Draw the logic diagram using the original Boolean expression using the simulator.
- Simplify the function to a minimum number of literals using simulator, Boolean algebra.
- Obtain the truth table of the function from the simplified expression and show that it is the same as the one in part (a)
- Draw the logic diagram, using simulator from the simplified expression and compare the total number of gates with the diagram of part (b).

3. Rewrite the following expressions:

i)  $F(X,Y,Z) = X' Z' + Y' Z' + Y Z' + X Y$

ii)  $F(A,B,C,D) = A C' + B' D' + A' C D + A B C D$

- a) in Sum of Product b) in Product of Sum c) in Sum of MInterms  
d) in Product of Maxterms

4.

- a) Design the following functions using only NAND gates:

i)  $F(X,Y,Z) = X Y' + Y Z + X' Y' Z'$

ii)  $F(X,Y,Z) = X' Y + (X + Z') (Y + Z)$

- b) Redesign the functions above using only NOR gates.