Department of Computer Science and Engineering
BRAC University
CSE 260: Digital Logic Design

Experiment # 2

Applications of Boolean algebra

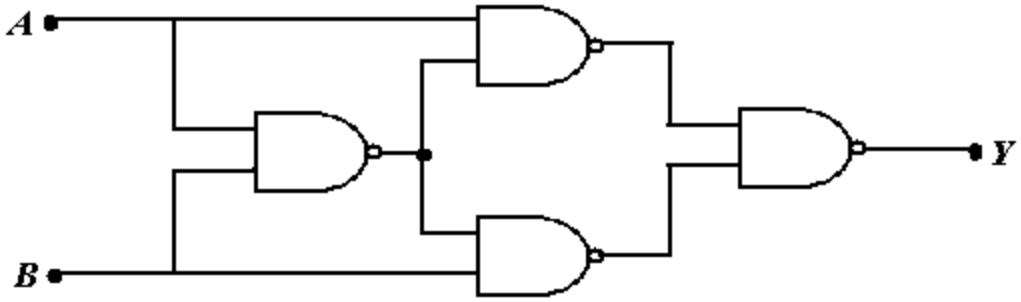
Objective:

- To investigate the rules of Boolean algebra.
- To gain experience working with practical circuits
- To simplify a complex function using Boolean algebra

Required Components and Equipments

1. AT-700 Portable Analog/Digital Laboratory
2. 7400×1

Diagram of Circuit:



Procedure:

- Construct the Circuit of Figure 1, on the breadboard of AT-700.
- Remember each IC's pin 14 connected to "+5V" position of DC Power Supply of AT-700, and pin 7 connected to "GND" position.
- Connect the inputs to Data switches and outputs to any position of LED Display.
- Find out the outputs for all possible combinations of input states.
- Write down the input-output in tabular form.

Report:

The report should cover the followings

1. Name of the Experiment
2. Objective
3. Required Components and Equipments
4. Experimental Setup (You must draw the IC configurations)
5. Results (Truth Table) and Discussions .The discussions part must include the answers of the following questions:
    - What is the Boolean Equation for the output?
    - Simplify the Boolean equation.
    - The circuit's function is identical to a single gate. Write down the name of that gate.

BOOLEAN THEOREMS

1. x.0=0
2. x.1=x
3. x.x=x
4. $x.\bar{x}$ =0
5. x+0=x
6. x+1=1
7. x+x=x
8. $x+\bar{x}$ =1
9. x+y=y+x (Commutative laws)
10. x.y=y.x (Commutative laws)
11. x+(y+z)=(x+y)+z=x+y+z (Associative laws)
12. x(yz)=(xy)z=xyx (Associative laws)
13. (w+x)(y+z)=wy+xy+wz+xz
14. x+xy=x
15. $x+\bar{x}y=x+y$
16. $\bar{x}+xy=\bar{x}+y$
17. $\overline{x+y}=\bar{x}.\bar{y}$ (DeMorgan's Theorem)
18. $\overline{x.y}=\bar{x}+\bar{y}$ (DeMorgan's Theorem)