NEUB CSE 222 LAB 1: Introduction to Gates

North East University Bangladesh

Department of CSE

Course no: CSE 222

Experiment no: 01

Experiment Name: Introduction to Gates

CAUTIONS:

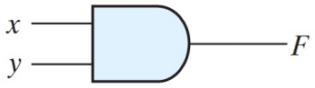
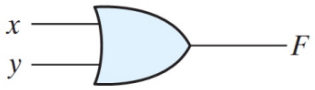
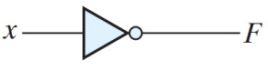
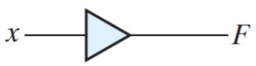
1. **Don't switch on the supply of the circuit until you have verified the circuit carefully**
2. **Take readings of apparatus carefully**
3. **Take care of any bare circuit elements in energized condition**
4. **Never try to touch bare live wires**

Objective

The objective of this experiment is to get familiar with the logic gate ICs and verify the truth table of the logic gates.

Theory

Logic Gates

Name	Graphic symbol	Algebraic function	Truth table
AND		$F = x \cdot y$	x y | F 0 0 | 0 0 1 | 0 1 0 | 0 1 1 | 1
OR		$F = x + y$	x y | F 0 0 | 0 0 1 | 1 1 0 | 1 1 1 | 1
Inverter		$F = x'$	x | F 0 | 1 1 | 0
Buffer		$F = x$	x | F 0 | 0 1 | 1

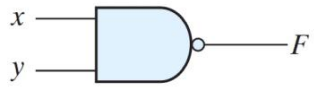
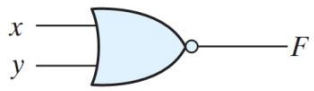
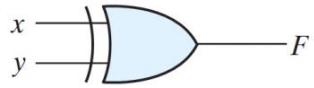
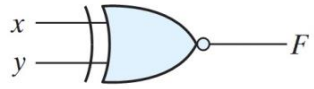
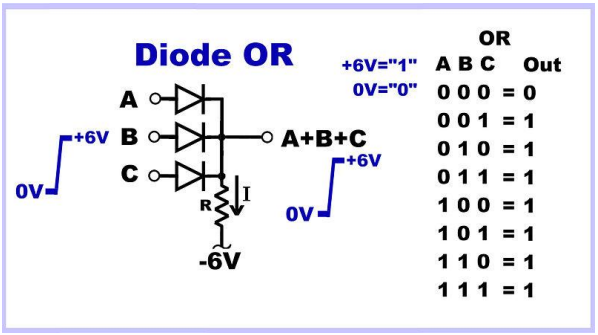
NAND		$F = (xy)'$	x	y	F
			0	0	1
			0	1	1
			1	0	1
			1	1	0
NOR		$F = (x + y)'$	x	y	F
			0	0	1
			0	1	0
			1	0	0
			1	1	0
Exclusive-OR (XOR)		$F = xy' + x'y$ $= x \oplus y$	x	y	F
			0	0	0
			0	1	1
			1	0	1
			1	1	0
Exclusive-NOR or equivalence		$F = xy + x'y'$ $= (x \oplus y)'$	x	y	F
			0	0	1
			0	1	0
			1	0	0
			1	1	1

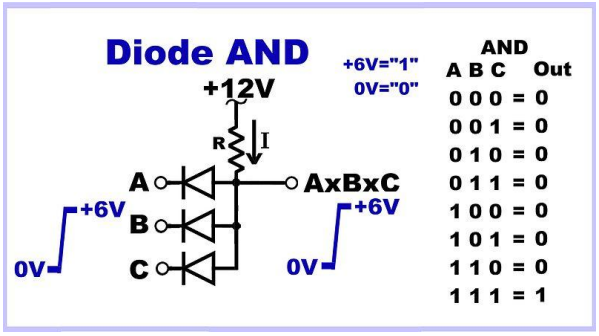
Figure 1 Gates summary[1]

Realization of logic gates using Diode Resistor Logic [2]

- OR Gate



- AND Gate



[1] Mano Chapter 2
[2] Boylestad chapter 2.5

NEUB CSE 222 LAB 1: Introduction to Gates

Apparatus Needed

- Trainer Board (Bread board)
- Logic Gate ICs (List in next section)
- Connecting wires
- LEDs
- Push Buttons / DIP switch

Logic Gate ICs

IC number	IC name
7404	Hex inverter
7407	Buffer
7408	Quad 2 input AND gate
7432	Quad 2 input OR gate
7400	Quad 2 input NAND gate
7402	Quad 2 input NOR gate
7486	Quad 2 input XOR gate
74266	Quad 2 input XNOR gate

Procedure

1. Place the IC in the in the breadboard
2. Connect V_{CC} and Ground to the respective pins of IC
3. Connect the inputs switches provided in the IC trainer kit
4. Connect the output of the ICs to LEDs
5. Apply various combinations of inputs according to the tables of result section
6. Observe and write the output of the LED in the corresponding table in result section.
7. Repeat for all the ICs

Result

1. 7404 Inverter

Input	Output
0	
1	

2. Buffer

Input	Output
0	
1	

3. 7408 AND

Input		Output
0	0	
0	1	
1	0	
1	1	

4. 7432 OR

Input		Output
0	0	
0	1	
1	0	
1	1	

5. 7400 NAND

Input		Output
0	0	
0	1	
1	0	
1	1	

6. 7402 NOR

Input		Output
0	0	
0	1	
1	0	
1	1	

7. 7486 XOR

Input		Output
0	0	
0	1	
1	0	
1	1	

8. 74266 XNOR

Input		Output
0	0	
0	1	
1	0	
1	1	

Report

1. Carefully Fill all the data for table 1 to 8.
2. Comment on the learnings from this LAB