Digital System Design Lab

Lab 1
Breadboard Techniques and Logic Function Demonstration

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1. Objectives

- To become familiar with the Digital Tool Kit
- To learn how to build and test digital circuits using the Breadboard
- To learn about basic logic functions such as AND, NAND, XOR, and NOR

2. Theorem

(1) Circuits

a. *Beadboard*

Breadboard is a bread-like circuit, and it can help us test and make temporary circuits and prototyping without soldering.

b. *Network Resistor*

A circuit contains a row of resistor.

c. *DIP Switch*

A circuit can be installed on breadboard and can be customized to perform certain electrical behaviors by users.

d. *NOT GATE*

A circuit contains 6 NOT gates, and each of them can turn 0 into 1 and 1 into 0.

e. *AND GATE*

A circuit contains 4 AND gates, and each of them can output 1 when both signals are 1 and output 0 when either or both signals are 0.

f. *NAND GATE*

A circuit contains 4 NAND gates, and each of them can output 1 when either or both signals are 0 and output 0 when both signals are 1.

g. *NOR GATE*

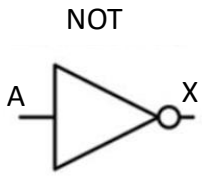
A circuit contains 4 NOR gates, and each of them can output 1 when both signals are 0 and output 0 when either or both signals are 1.

h. *XOR GATE*

A circuit contains 4 XOR gates, and each of them can output 1 when both signals are the same and output 0 when both signals are different from each other.

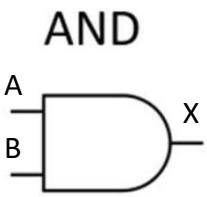
(2) Logic Gate

a. *NOT GATE*



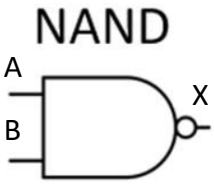
A	X
0	1
1	0

b. *AND GATE*



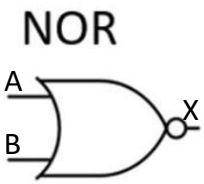
A	B	X
0	0	0
1	0	0
0	1	0
1	1	1

c. *NAND GATE*



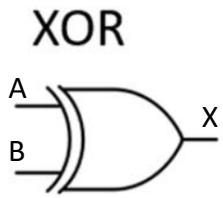
A	B	X
0	0	1
1	0	1
0	1	1
1	1	0

d. *NOR GATE*



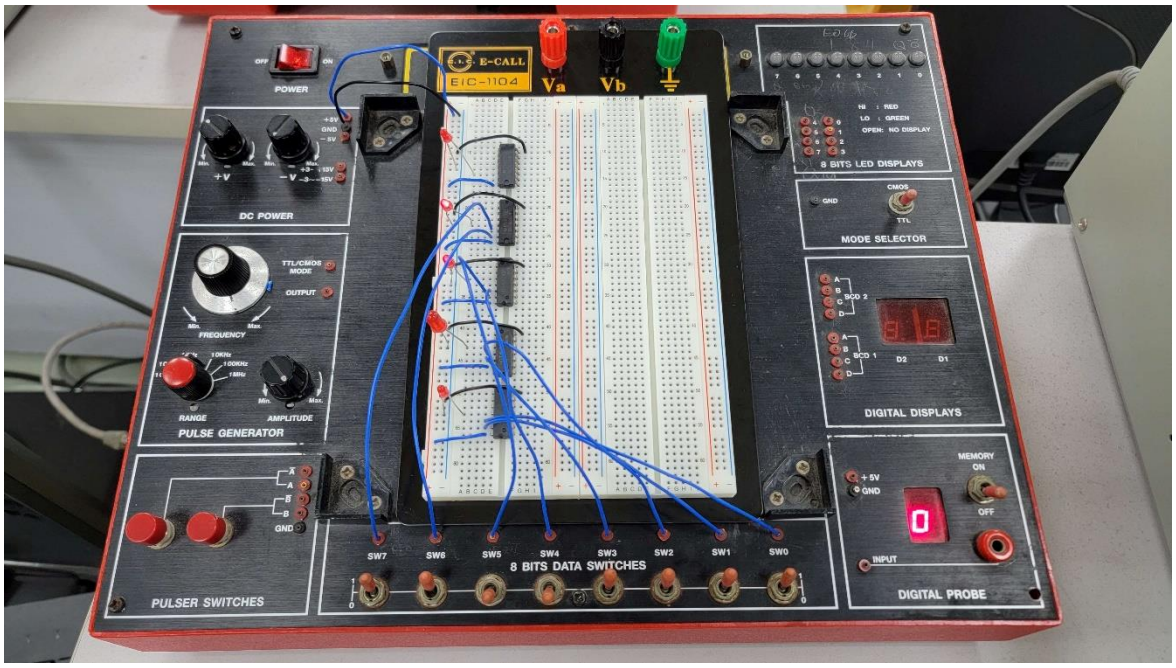
A	B	X
0	0	1
1	0	0
0	1	0
1	1	0

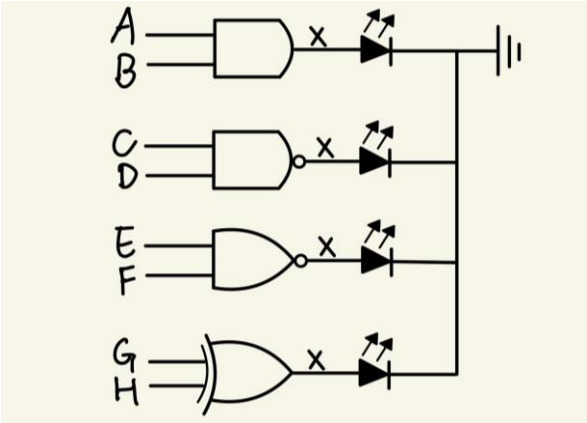
e. *XOR GATE*



A	B	X
0	0	0
1	0	1
0	1	1
1	1	0

3. Experimental Results





Inputs X Y	74 00 NAND	74 02 NOR	74 08 AND	74 86 XOR
0 0	1	1	0	0
0 1	1	0	0	1
1 0	1	0	0	1
1 1	0	0	1	0

4. Comments

5. Problems & Solutions

(1) Sometimes, I confused the direction of the circuits, and it makes the circuit broken or the whole model cannot work. Therefore, I determine to let all the U-sign on the circuits upwards and will watch carefully afterwards.

6. Feedback

There is high chance to get broken circuits, maybe consider changing or test all of them is great to use or not.