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DIGITAL ELECTRONICS LAB WORKSHEET

Student Name: UID:	**Branch: CSE**
Date Of Performance:	**Section/Group:**
	Subject Name: D.E.

Aim:

Validate truth table for:

- NAND gates HD74LS00
- NOR gates HD74LS02
- NOT gates HD74LS04
- AND gates HD74LS08
- OR gate HD74LS32
- XOR gates HD74LS86

Task to be done:

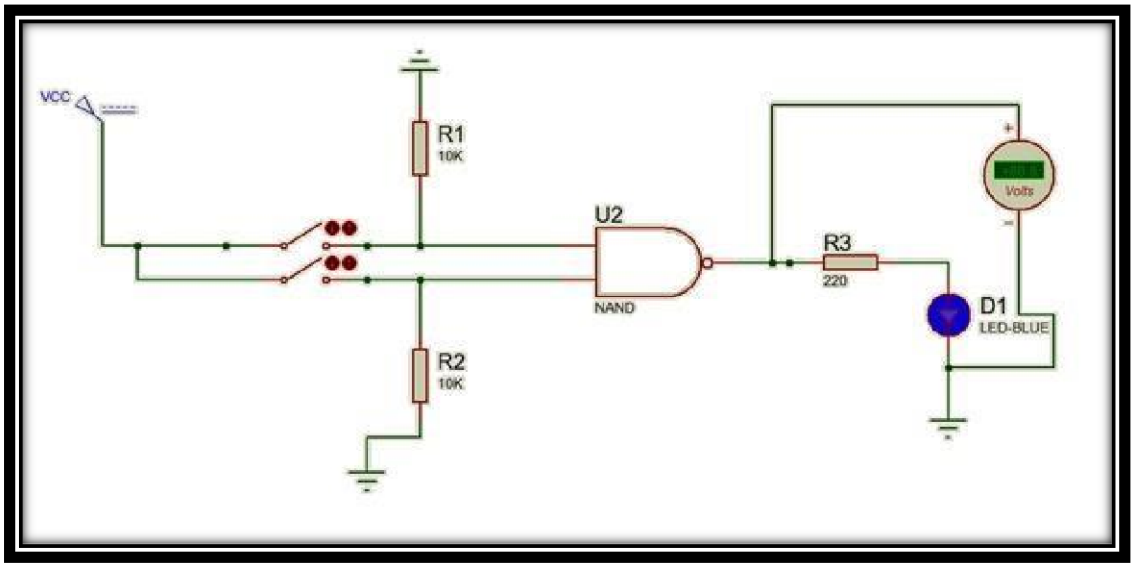
- To verify the truth table of a logic gate, we have to take suitable IC and the connections are given using the circuit diagram.
- For all the ICs, suitable power supply is applied to the pin 14 while the pin 7 is connected to the ground.
- The logical inputs of the truth table are applied and the corresponding output is noted.
- Similarly, the output is noted for all other combinations of inputs.
- In this way, the truth table of a logic gate is verified.

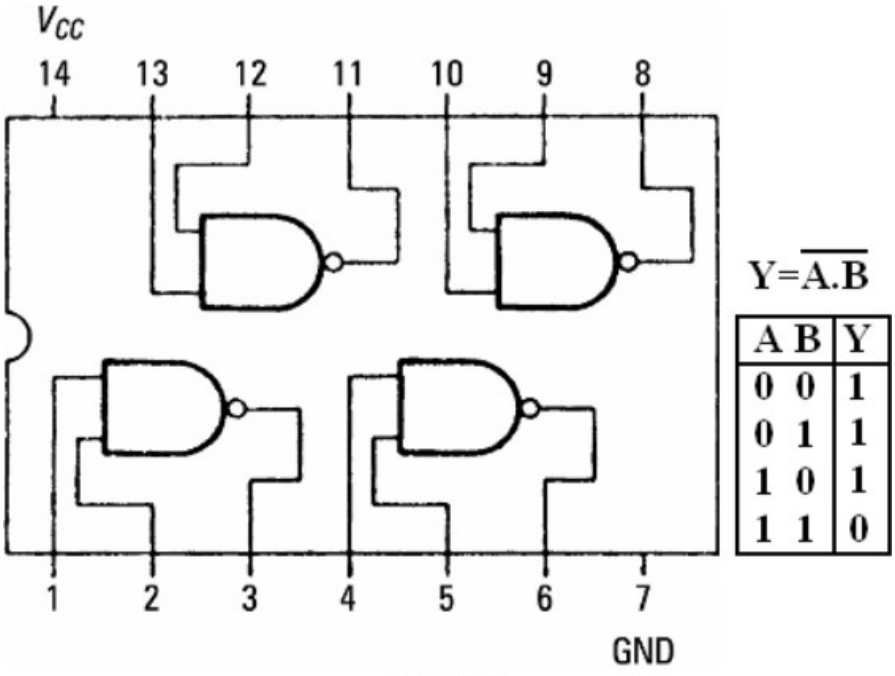
Requirements:

S.NO	EQUIPMENT	QUANTITY
1.	Power supply	1
2.	Slide switch	2
3.	LED	1
4.	NAND gate ,NOR gate, NOT gate,AND gate, OR gate, XOR gate, XNOR gate	1
5.	1 K-ohm Resistor	1
6.	Connecting wire	-
7.	Breadboard	1

Circuit diagram/ Block diagram:

1. Logic NAND Gate



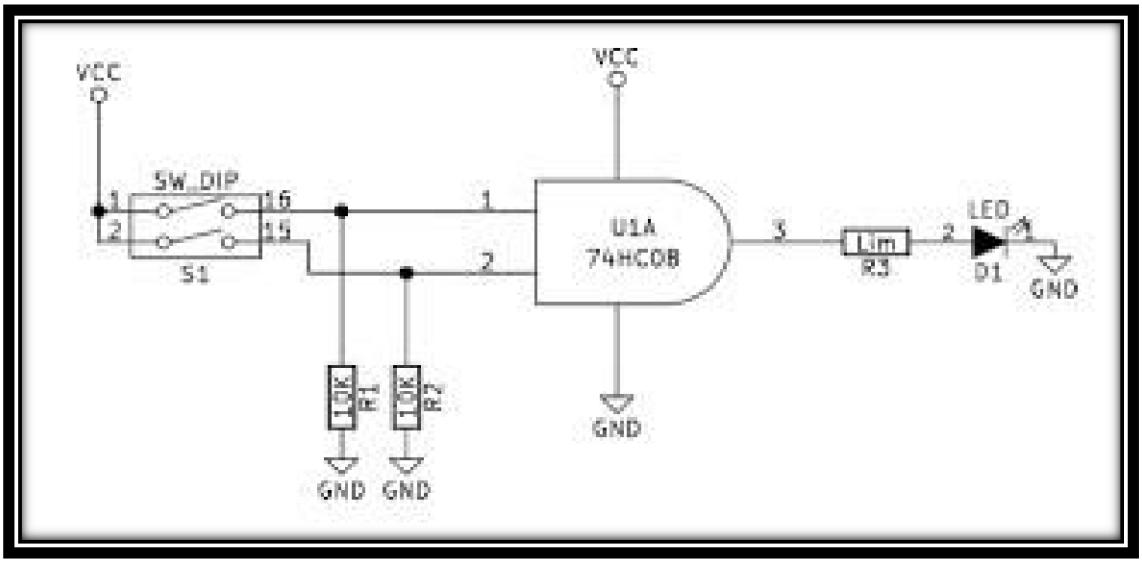


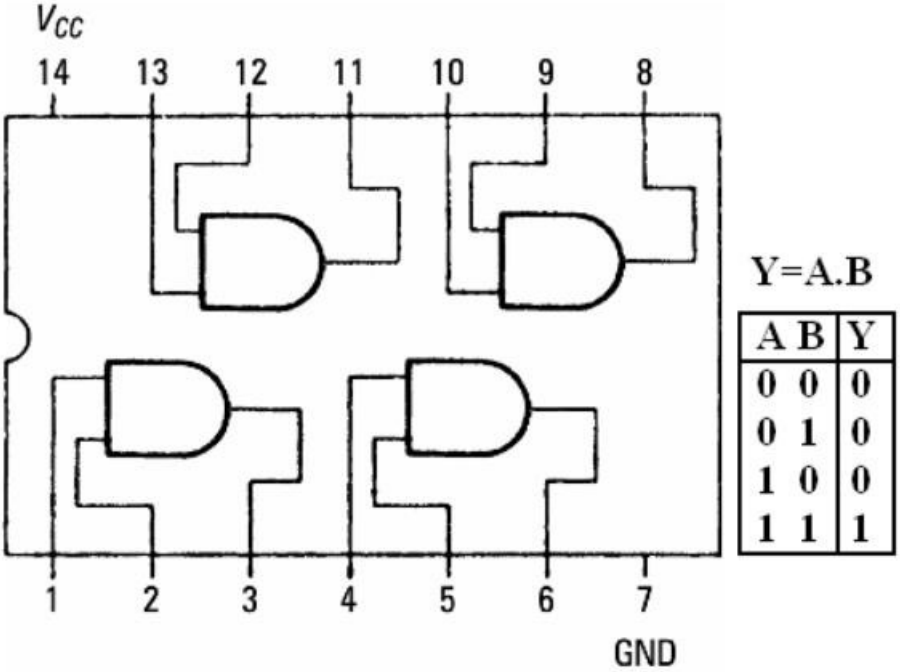
$Y=\overline{A.B}$

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

IC 7400

2. Logic AND Gate:



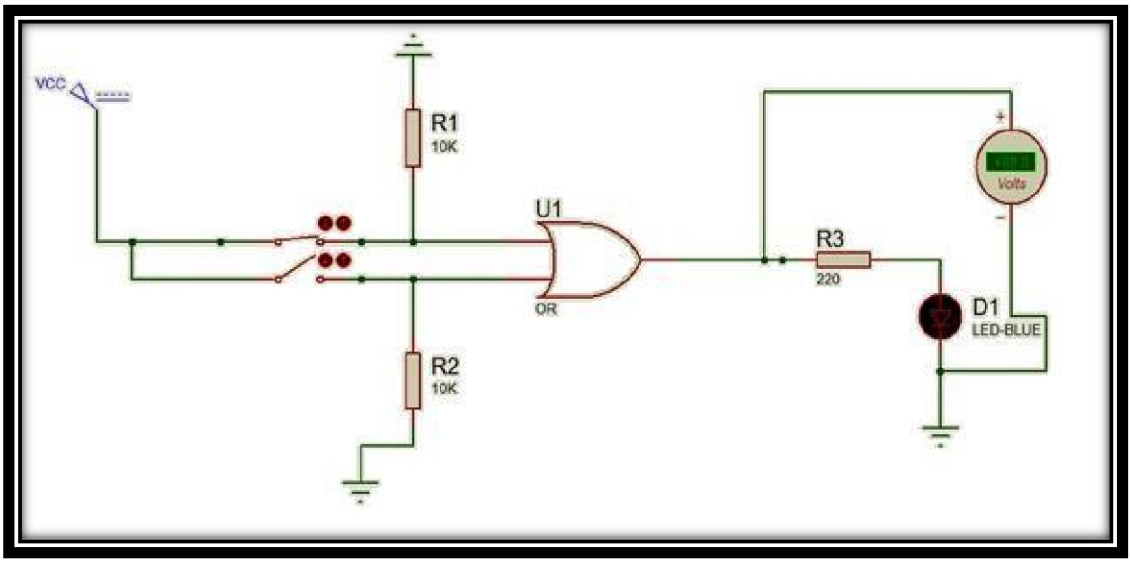


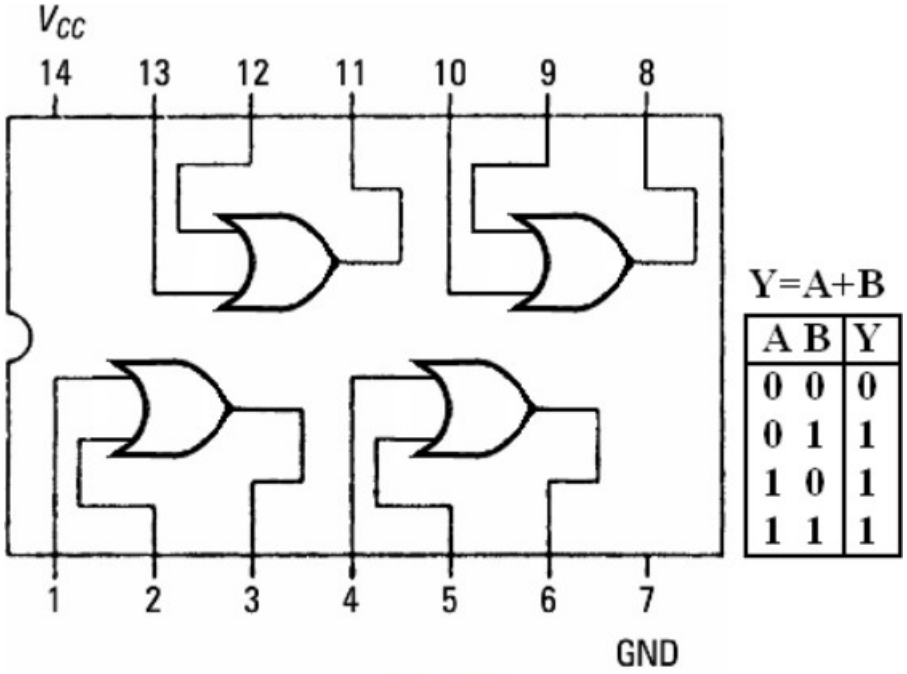
Y=A.B

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

IC 7408

3. Logic OR Gate:



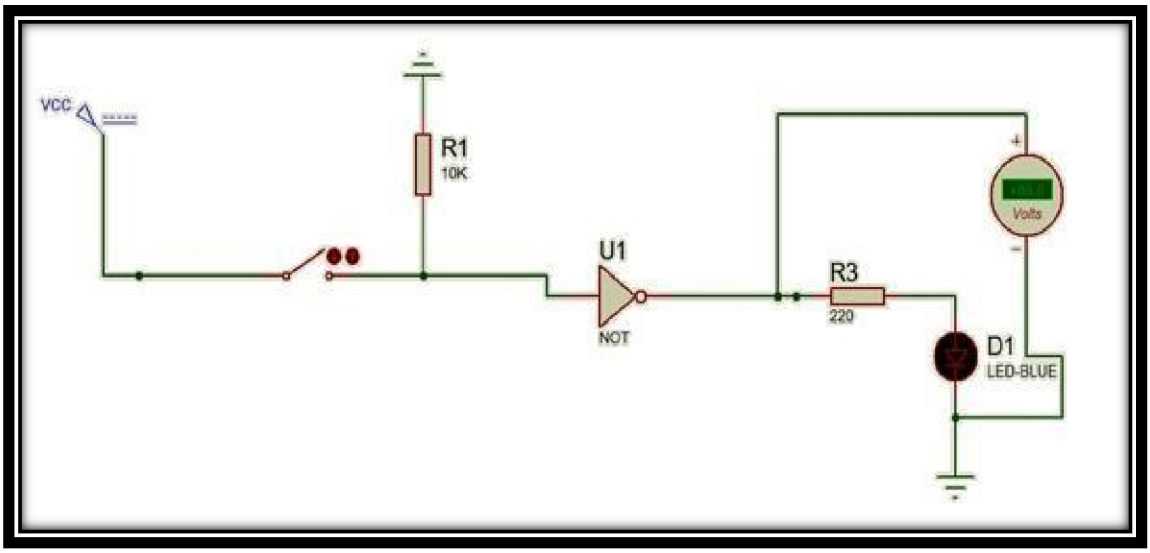


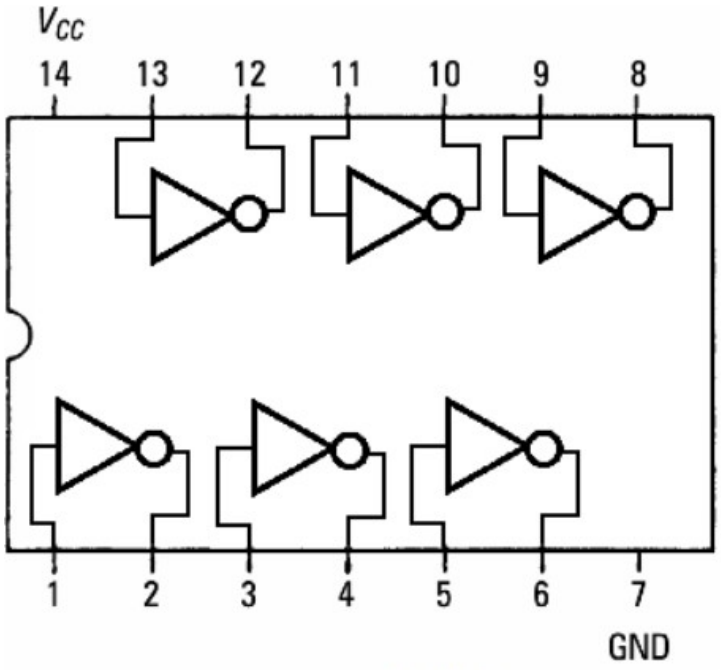
Y=A+B

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

IC 7432

4. Logic NOT Gate:



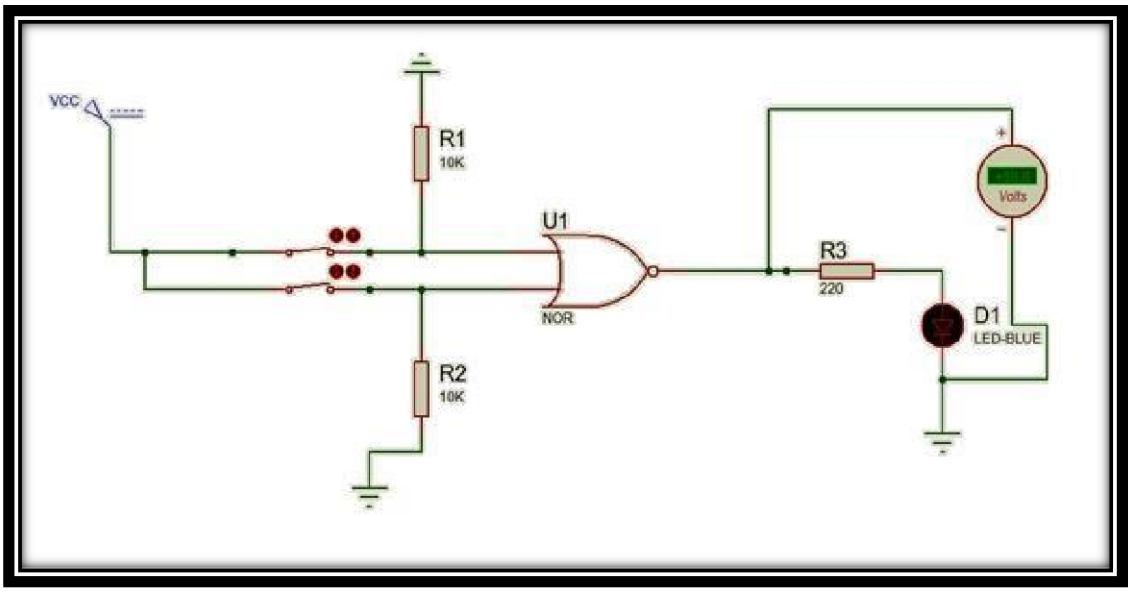


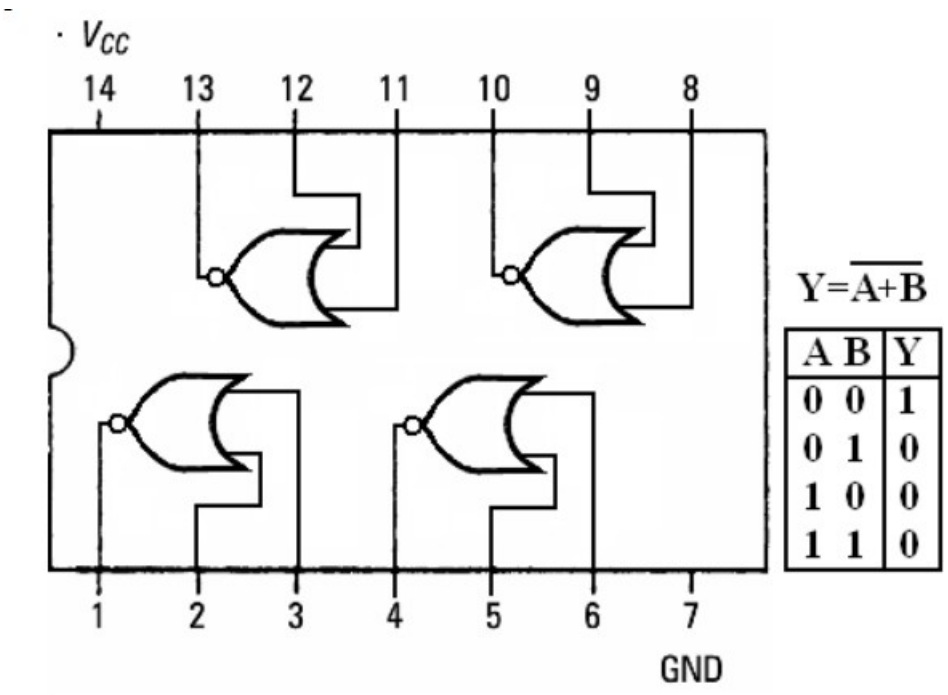
$Y=\overline{A}$

A	Y
0	1
1	0

IC 7404

5. Logic NOR Gate:



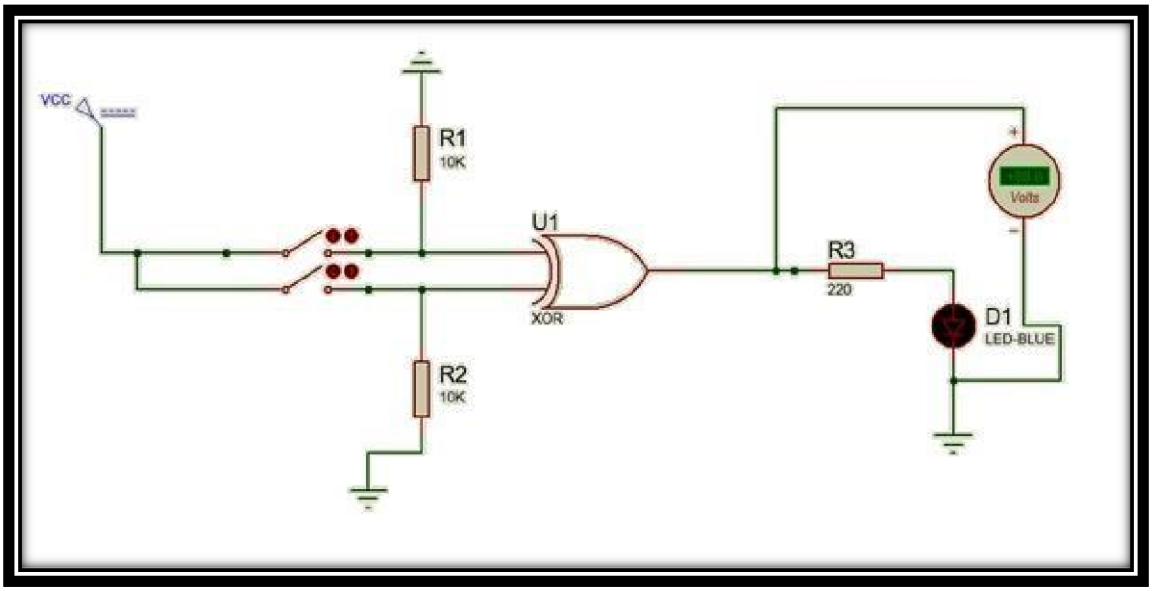


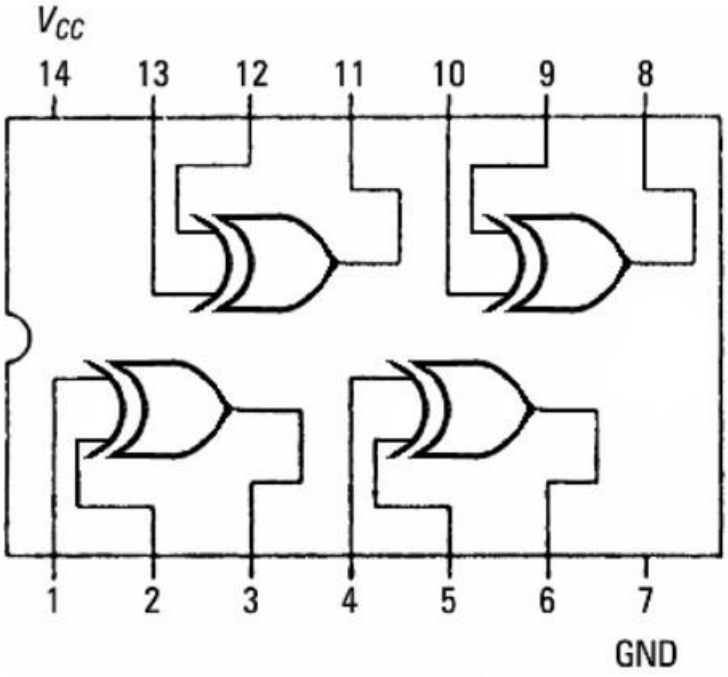
$Y=\overline{A+B}$

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

IC 7402

6. Logic XOR Gate:





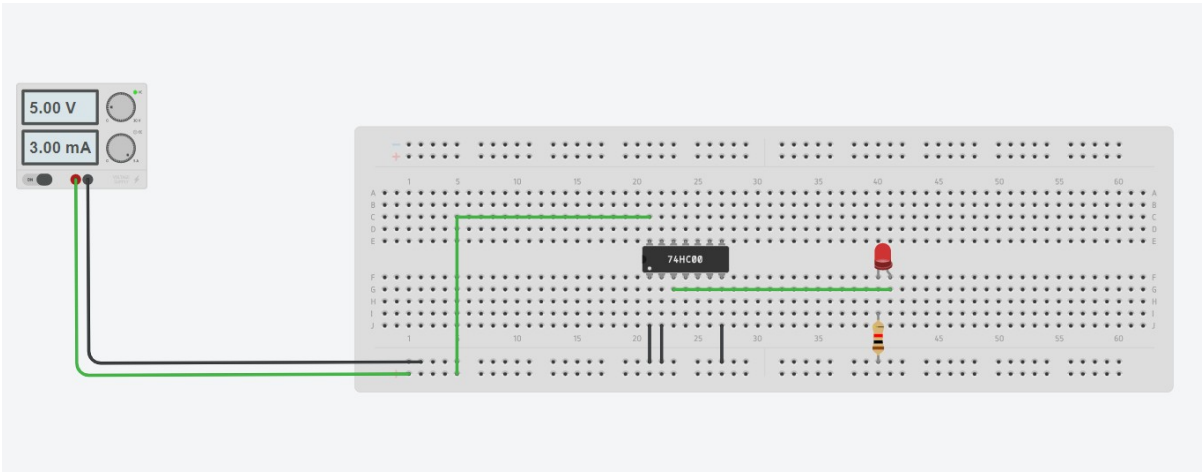
Y=AΘB

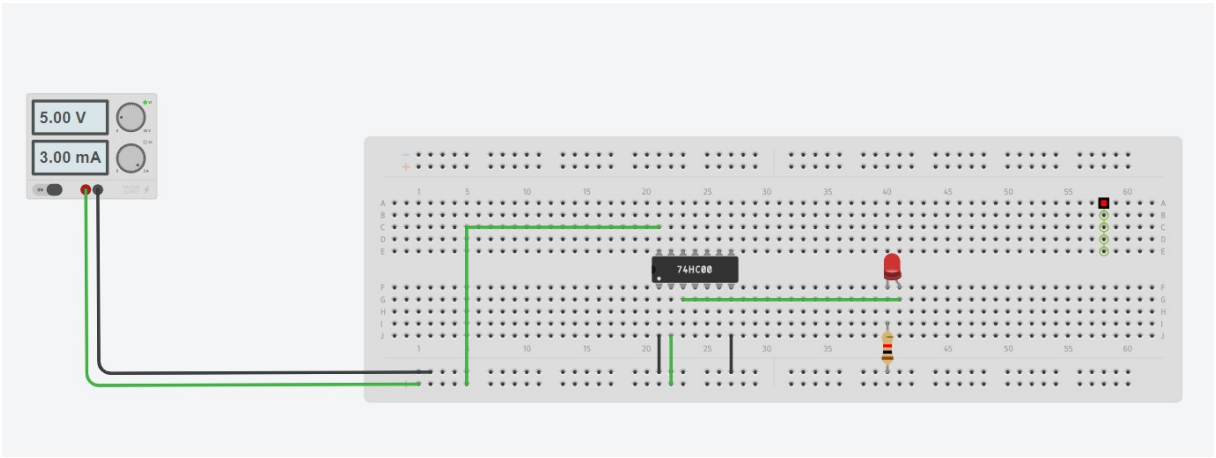
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

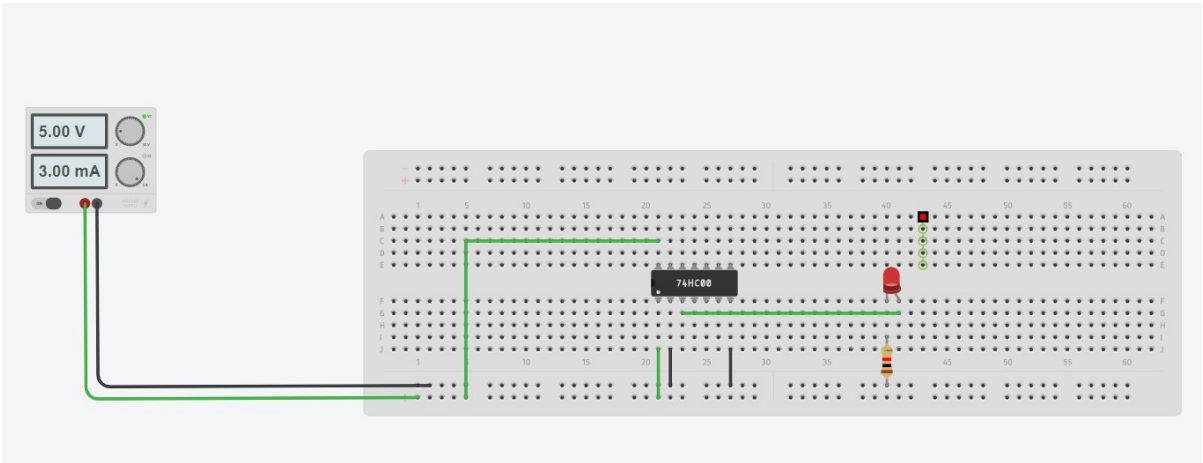
IC 7486

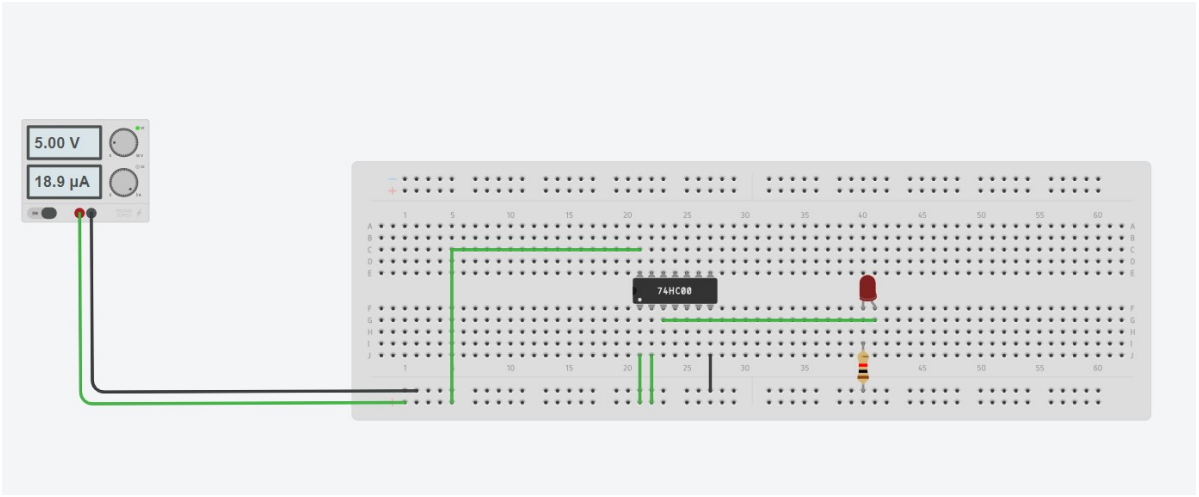
Simulation Results:

1. Logic NAND Gate:

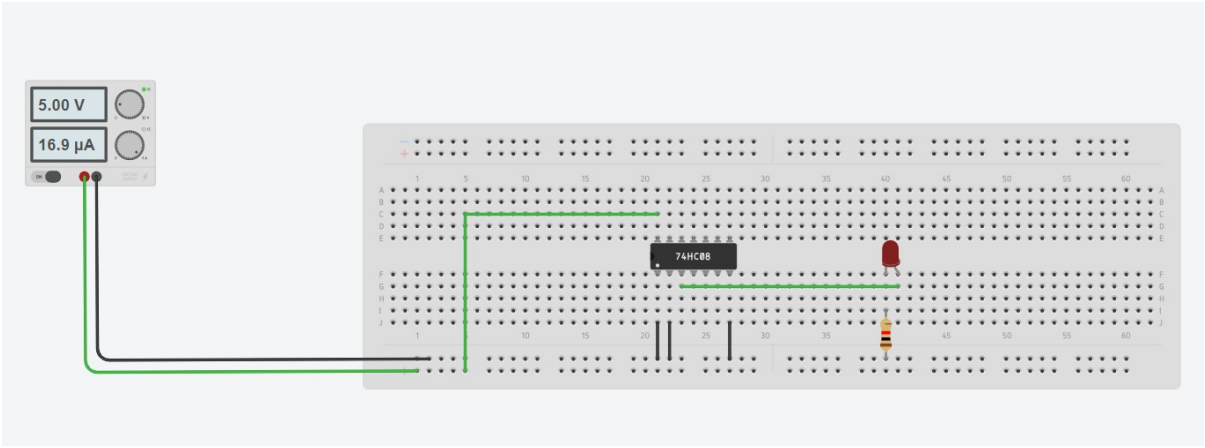


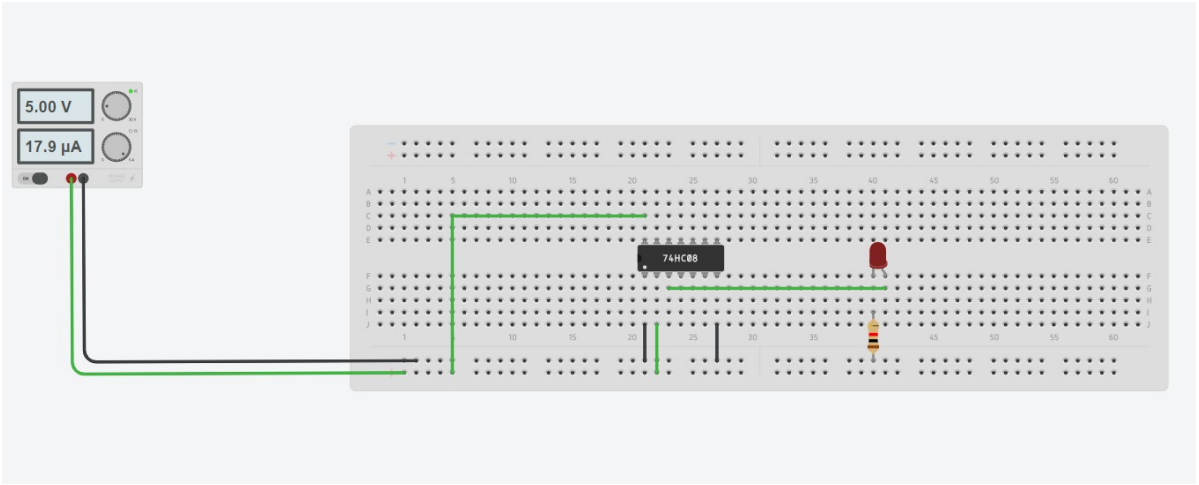


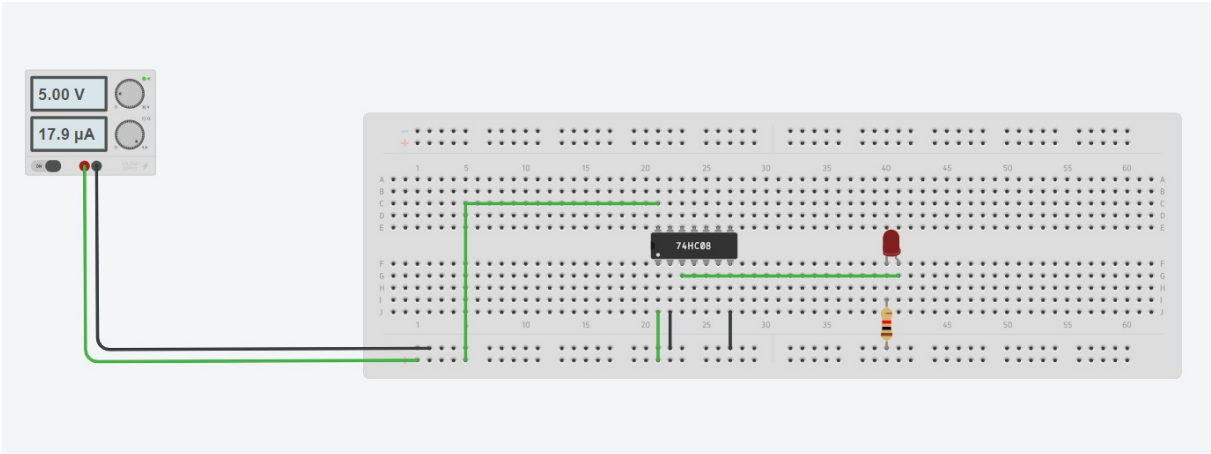


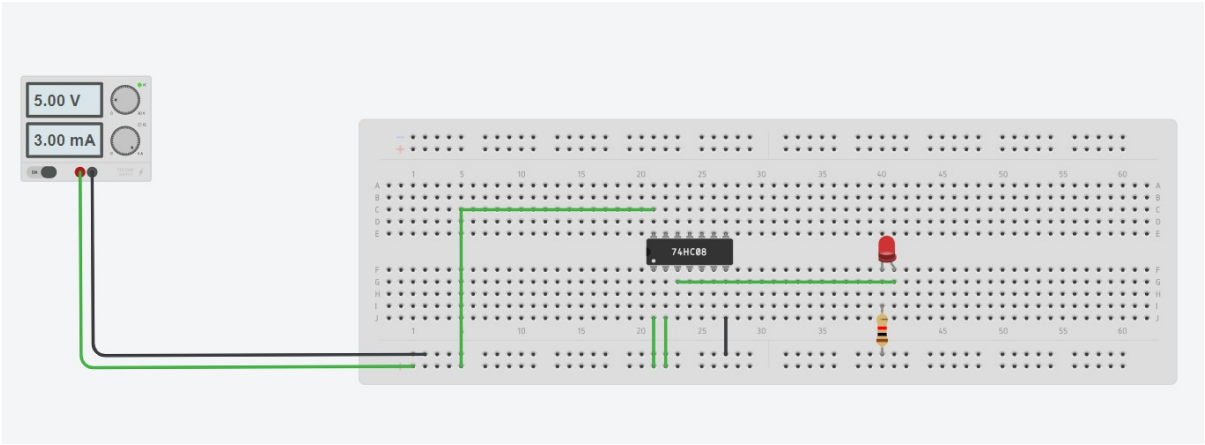


2. Logic AND Gate:

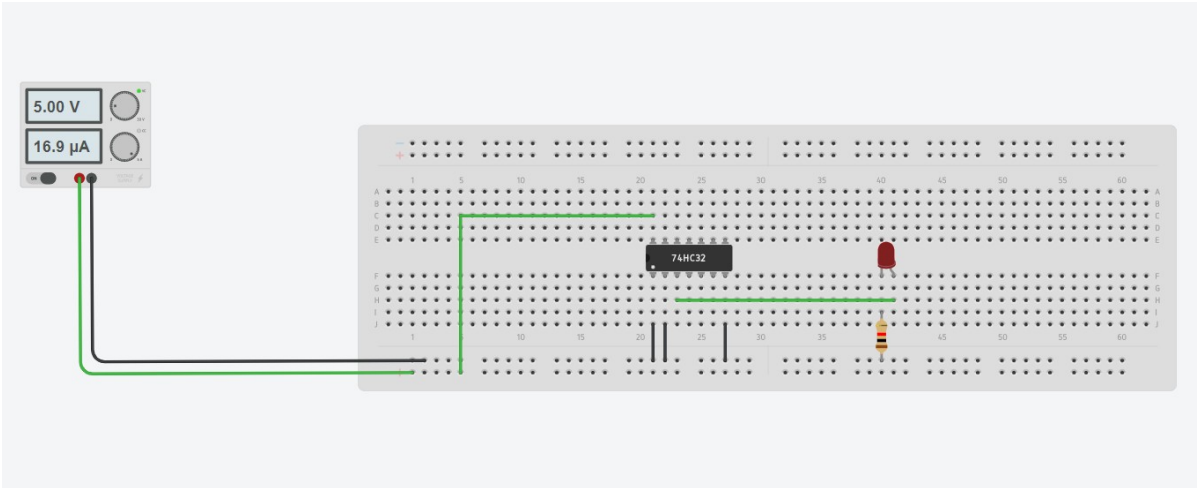








3. Logic OR Gate:



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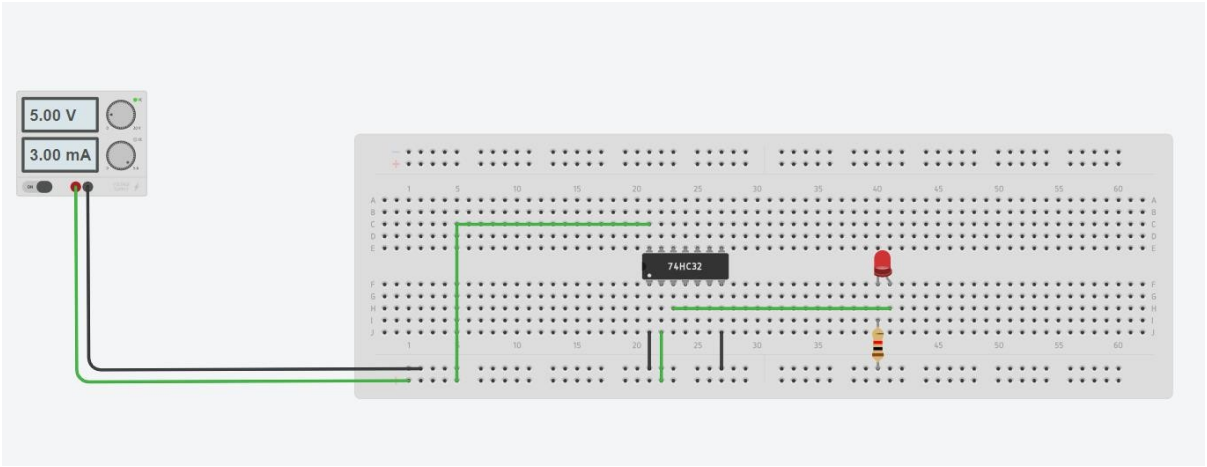
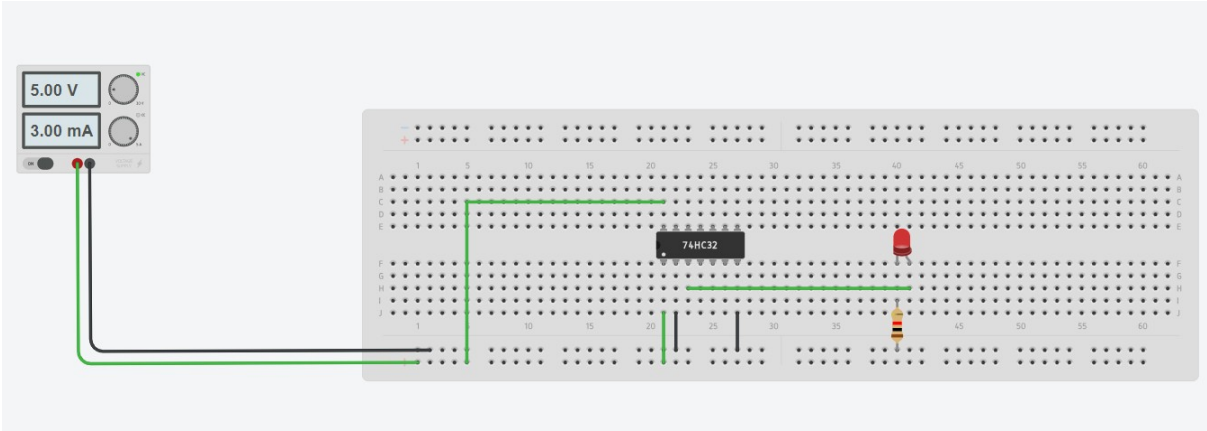
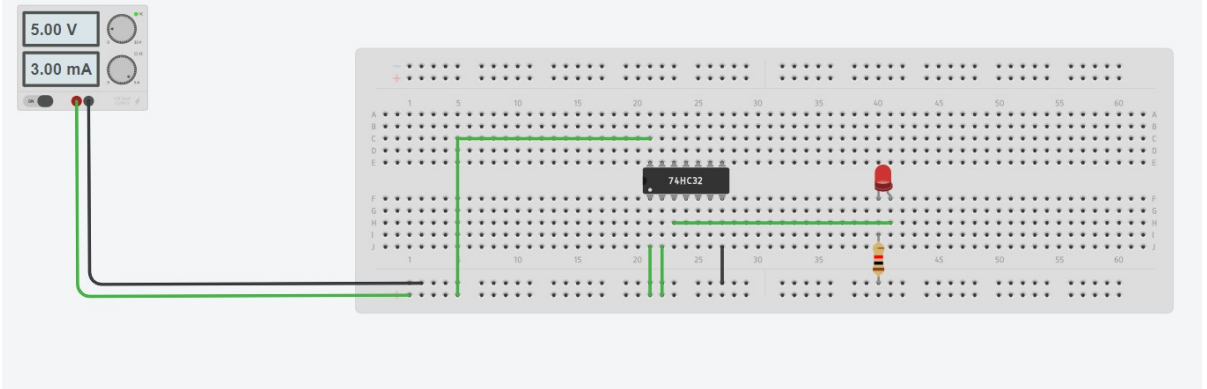
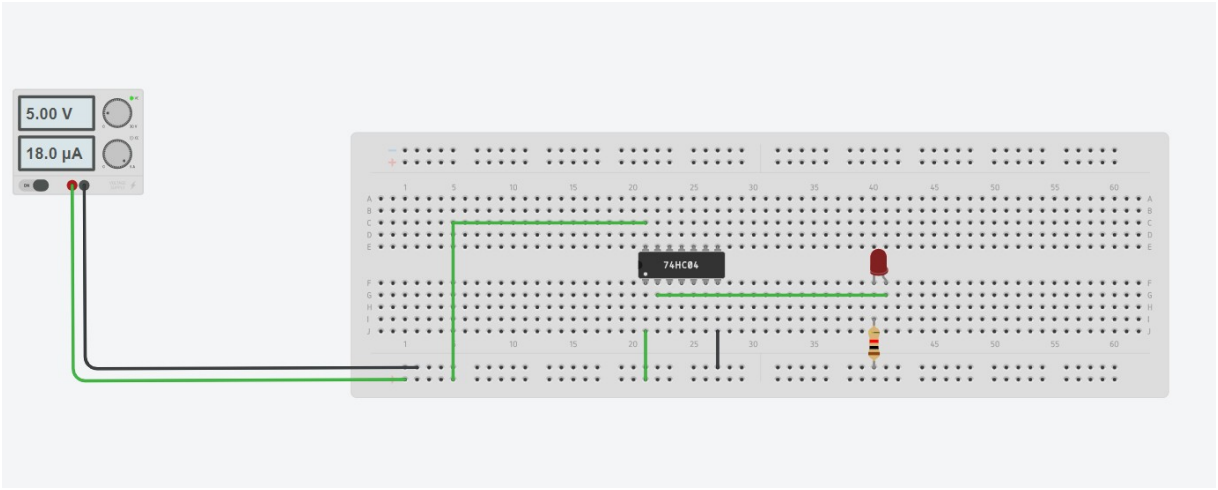
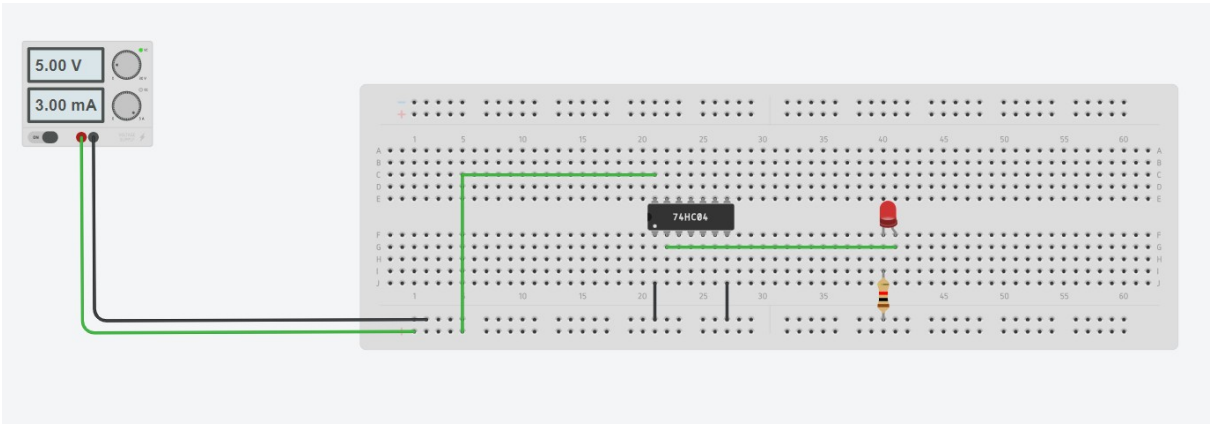




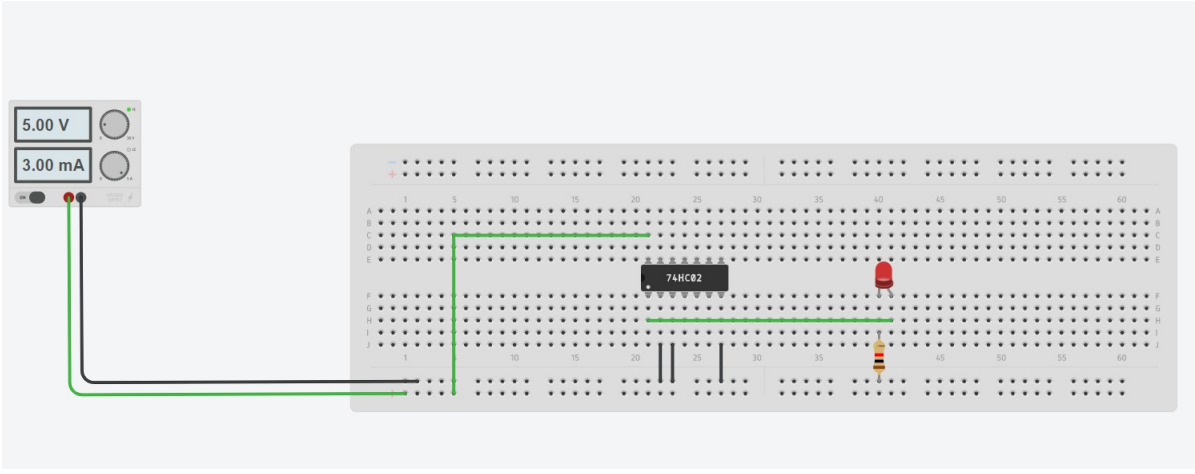


4. Logic NOT Gate:





5. Logic NOR Gate:



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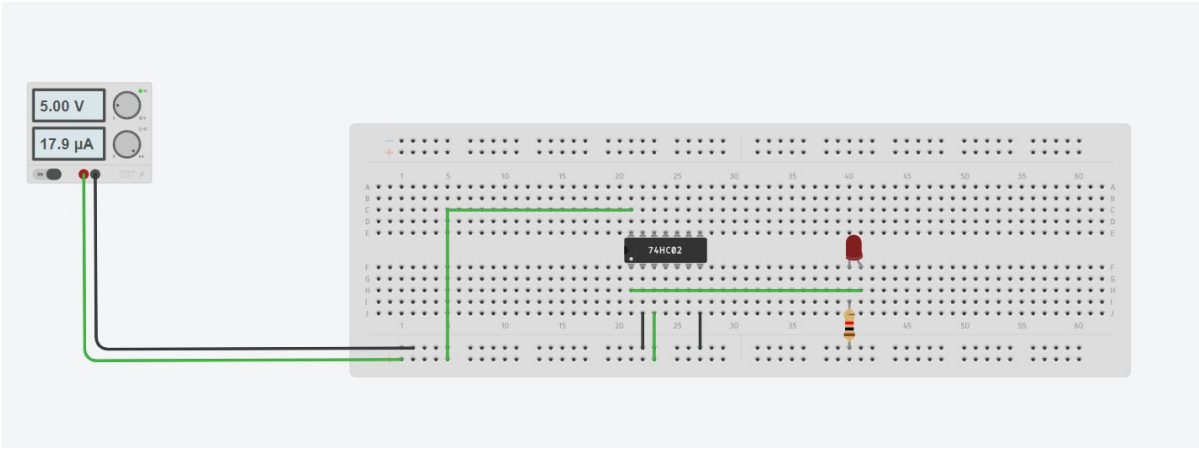
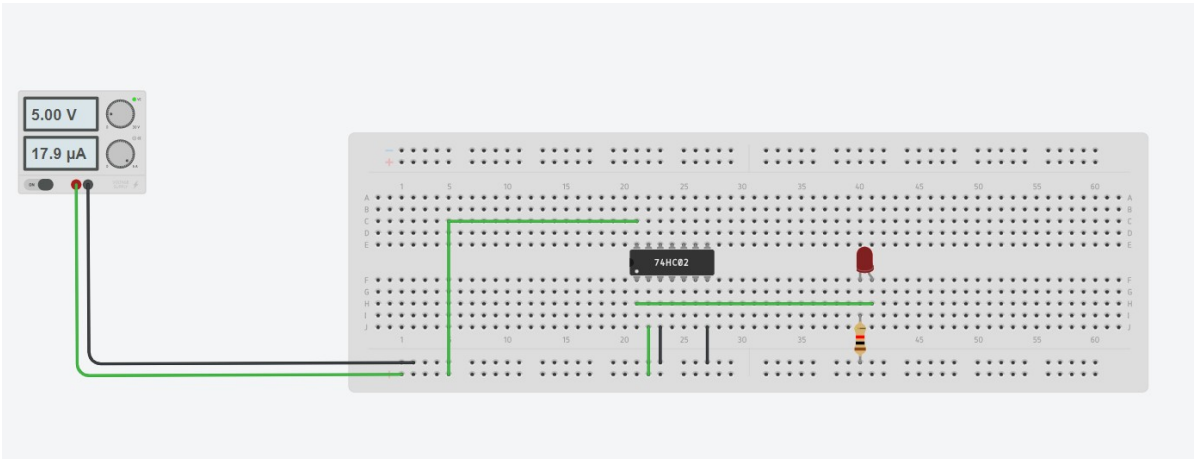
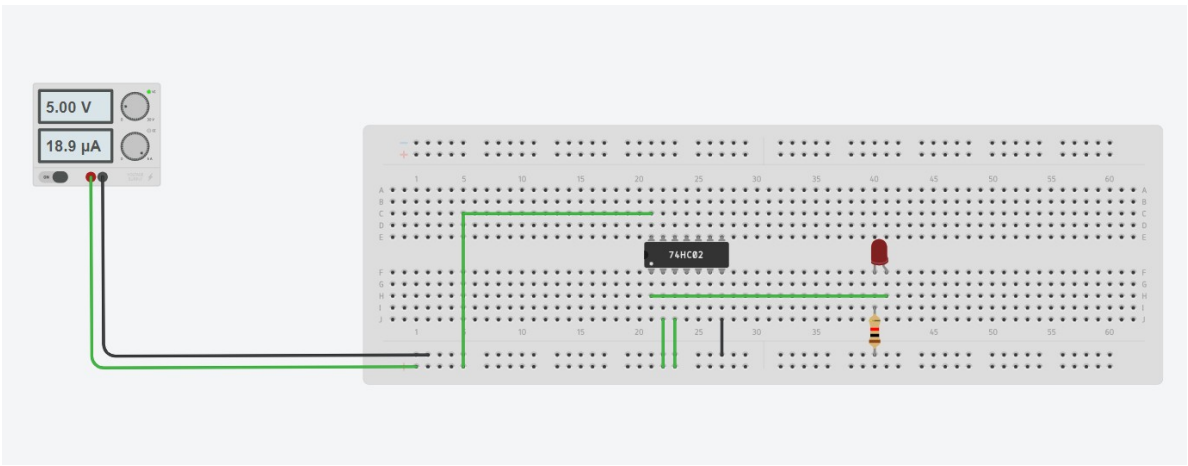
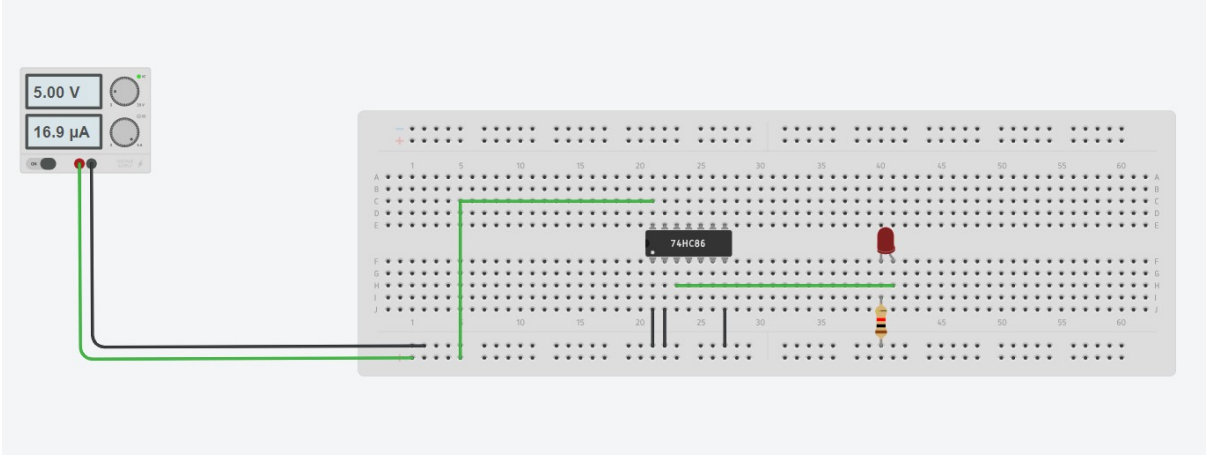
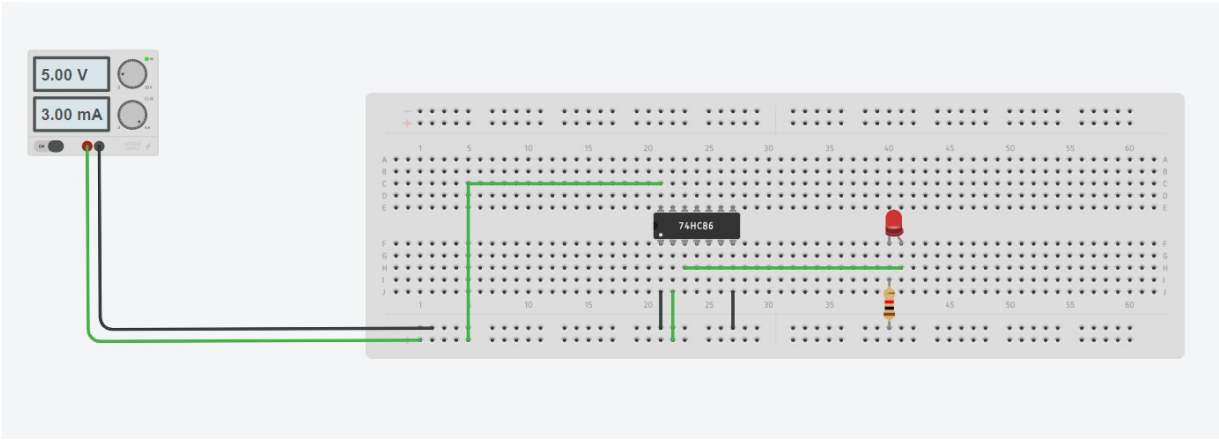


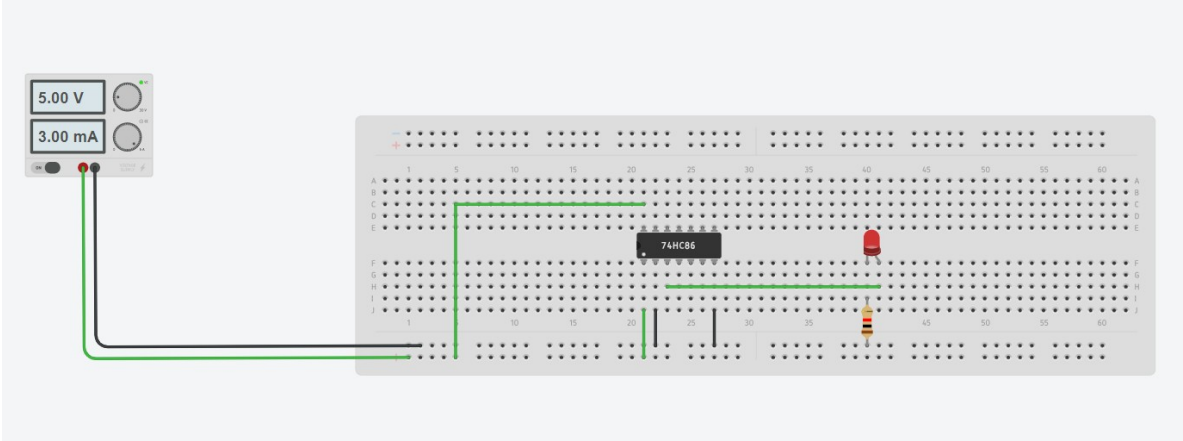


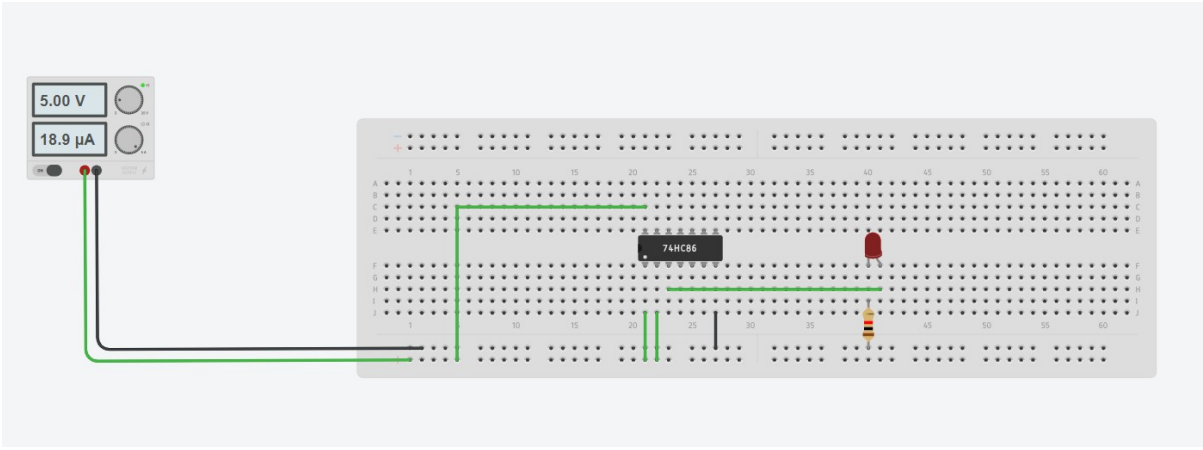


6. Logic XOR Gate:









Concept used:

Binary information is represented in digital computers by physical quantities called *signals*. Electrical signals such as voltages exist throughout the computer in either one of the two recognizable states. The two states represent a binary variable that can be equal to 1 or 0. For example, a particular digital computer may employ a signal of 3 volts to represent binary 1 and 0.5 volts to represent binary 0. Now the input terminals of digital circuits will accept binary signals of only 3 and 0.5 volts to represent binary input and output corresponding to 1 and 0, respectively. So now we know, that at a core level, the computer communicates in the form of 0 and 1, which is nothing but low and high voltage signals.

Binary logic deals with binary variables and with operations that assume a logical meaning. It is used to describe, in algebraic or tabular form, the manipulation is done by logic circuits called ***gates***. Gates are blocks of hardware that produce graphic symbol and its operation can be described by means of an algebraic expression. The input-output relationship of the binary variables for each gate can be represented in tabular form by a ***truth-table***. Digital logic gates may have more than one input, (A, B, C, etc.) but generally only have one digital output, (Q). Individual logic gates can be connected together to form combinational or sequential circuits or larger logic gate functions.

Learning/ observation:

- **NOT Gate**: When logic 1 is applied to one of NOT gate of 7404 IC, then output becomes 0.
- **OR Gate**: The output of an OR gate is a 1 if one or the other or both of the inputs are 1, but a 0 if both inputs are 0.
- **AND Gate**: The output of an AND gate is only 1 if both its inputs are 1. For all other possible inputs, the output is 0.
- **NOR Gate**: The output of the NOR gate is a 1 if both inputs are 0 but a 0 if one or the other or both the inputs are 1.
- **NAND Gate**: The output of the NAND gate is a 0 if both inputs are 1 but a 1 if one or the other or both the inputs are 0.
- **XNOR gate:** the output of the XNOR gate is a 1 if both inputs are either low or high and 0 if any of the input is low and high.

Troubleshooting:

- Sometimes wires are connected in wrong manner so our ICs is breaking down when we closed the circuit due to more current supply. Then we have to check all the wirings of circuit again and has to fix this issue.
- Sometimes we use wrong IC so our observation are getting wrong and our LED may not glow so we have to cross check every IC's code and pin diagram of every IC before use.