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EXPERIMENT 1 (Identification Of Gates)

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Objective:

The objective of this experiment is to gain a fundamental understanding of logic gates, their behavior, and how they can be used to perform basic logical operations. Logic gates are the building blocks of digital circuits and play a crucial role in digital electronics. In this experiment, we explore the behavior of common logic gates: AND, OR, NOT, NAND, NOR and XOR.

Electronic components used:

AND GATE 7408 ; OR GATE 7432 ; NOR GATE 7402; XOR GATE 7486 ; NAND GATE 7400
Connecting wires
Power Supply
LED’s
Input switches
Bread board

The reference circuit:

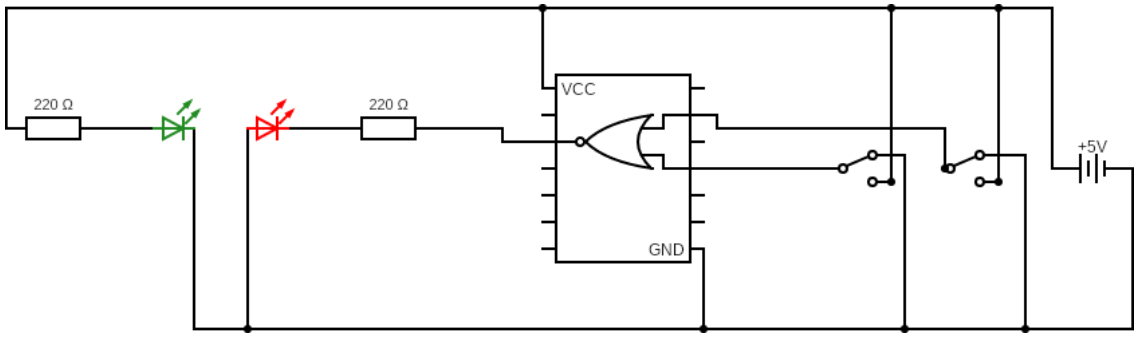


Fig 1: Circuit diagram for NOR gate

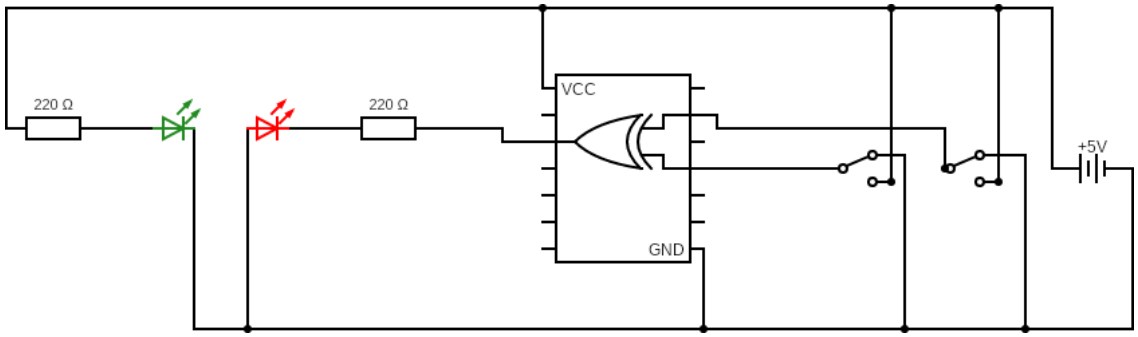


Fig 2: Circuit diagram for XOR gate

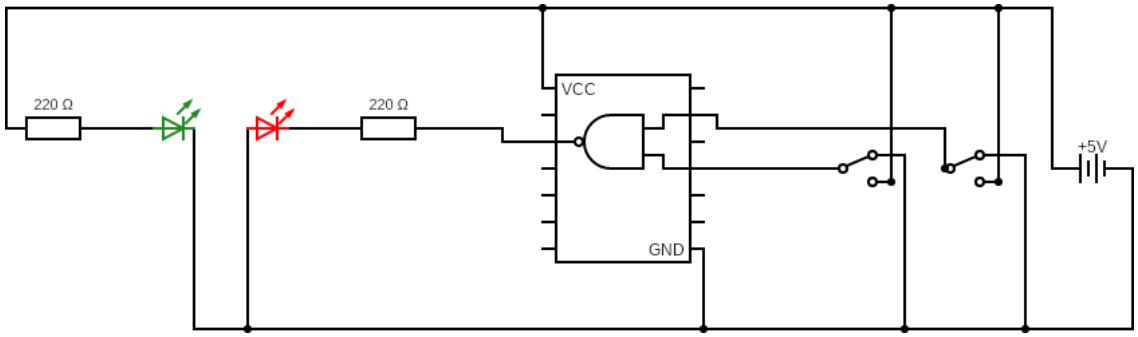


Fig 3: Circuit diagram for NAND gate

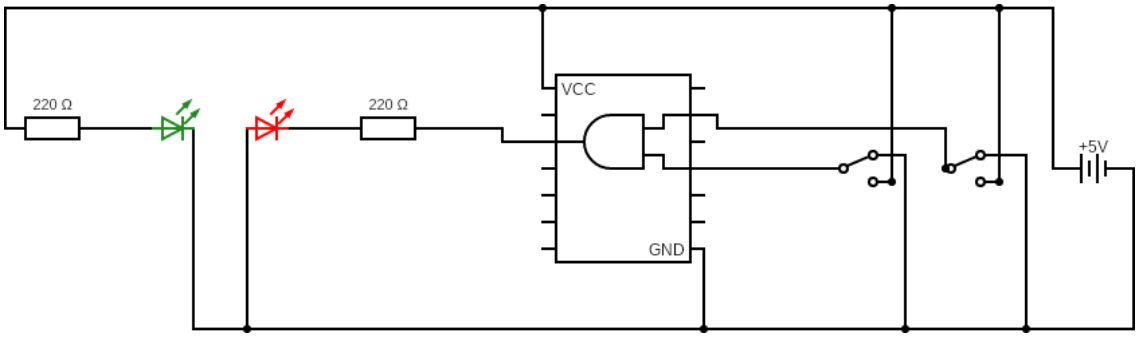


Fig 4: Circuit diagram for AND gate

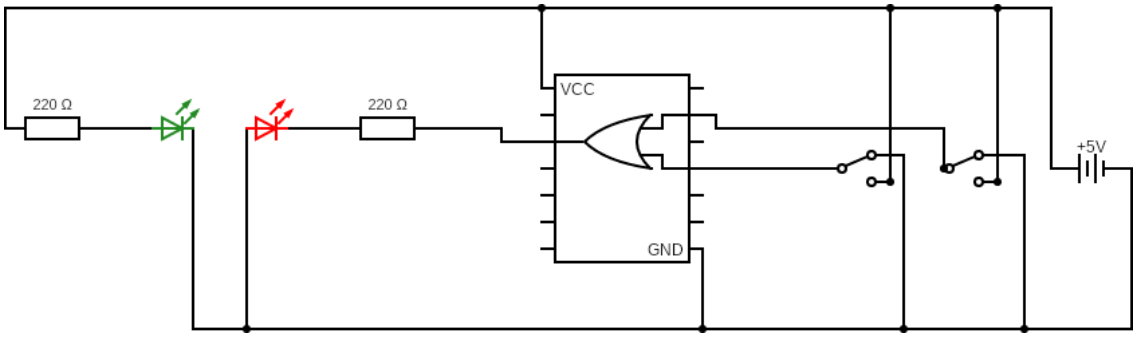


Fig 5: Circuit diagram for OR gate

Procedure :

1. Connect Testing Kit to power supply , Join 5V VCC & GCC to breadboard to provide power to the circuits.
2. Using wires and logic gate ICs, we constructed individual circuits for each logic gate: AND, OR, NOT, and XOR.
3. Each circuit had two input terminals (A and B) and one output terminal (Y). We connected these terminals as per the pin configuration of the specific IC.
4. LEDs were connected to the output terminals Y of each gate to visually indicate the output state (1 or 0).
5. We set up input switches for A and B, allowing us to manually control the input values (0 or 1) for each gate.
6. Now record the observation in the Truth tables.

AND Gate (7408 IC)

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

OR Gate (7432 IC)

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

XOR Gate (7486 IC)

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

NAND Gate (7400 IC)

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

NOR Gate (7402 IC)

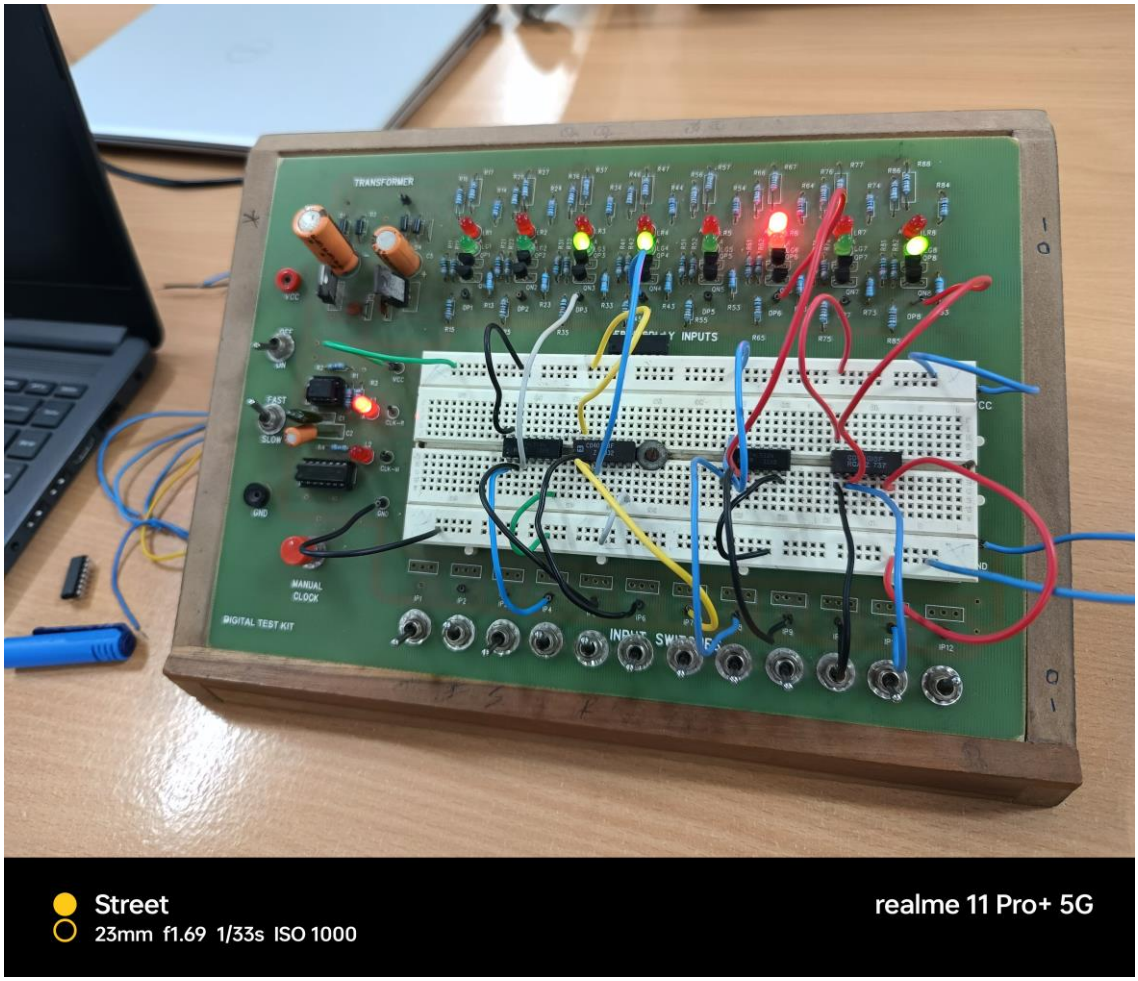
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

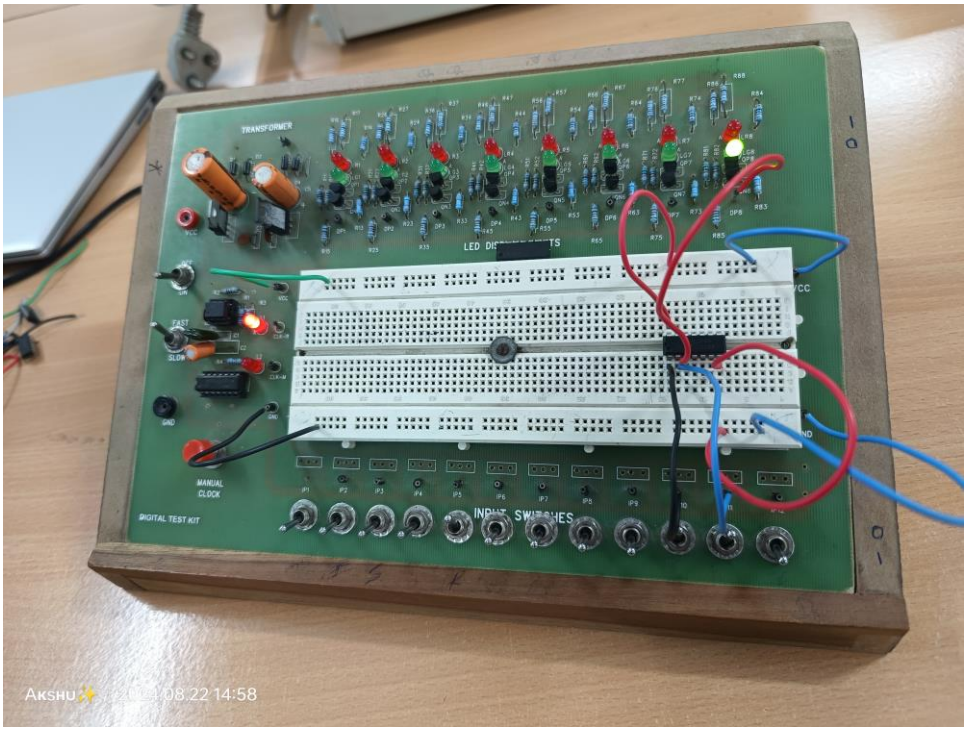
Conclusion :

In this experiment, we gained valuable insights into the operation of basic logic gates. We learned how these gates process binary inputs and produce binary outputs based on predefined logic rules. The experimental results confirmed the accuracy of the truth tables for each gate, demonstrating their reliability and utility in digital electronics. This foundational knowledge will be essential for future studies in digital circuit design and electronics.

Link for the Tinkercad simulation:

The inputs in tinkercad is given 0,0. To check remaining cases change the inputs.





1stpic NOR OR NAND AND , 2ndpic XOR

Lab Report: 2
EXPERIMENT 2 (De Morgan's Theorems)

Objective :

This experiment makes you aware of logic gates better and the DeMorgans laws. DeMorgans laws are very useful while solving complex circuit functions. They make the circuit formula much simpler. In this experiment we will check the DeMorgans laws and verify them by using truth table.

Electronic components used :

- Bread board
- Connecting Wires
- Power supply
- Input Switches
- Resistors
- ICs of NAND, NOR, AND and NOT
- LED bulbs for checking output

Reference circuits :

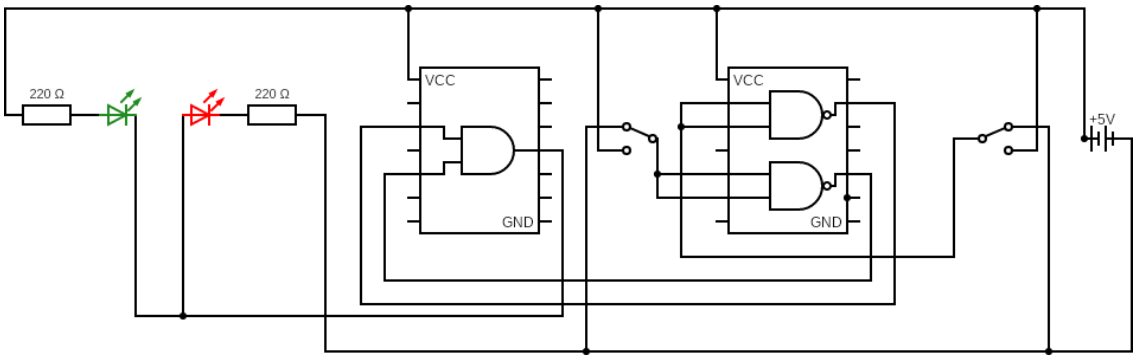


Fig 1: A'.B'=(A+B)'

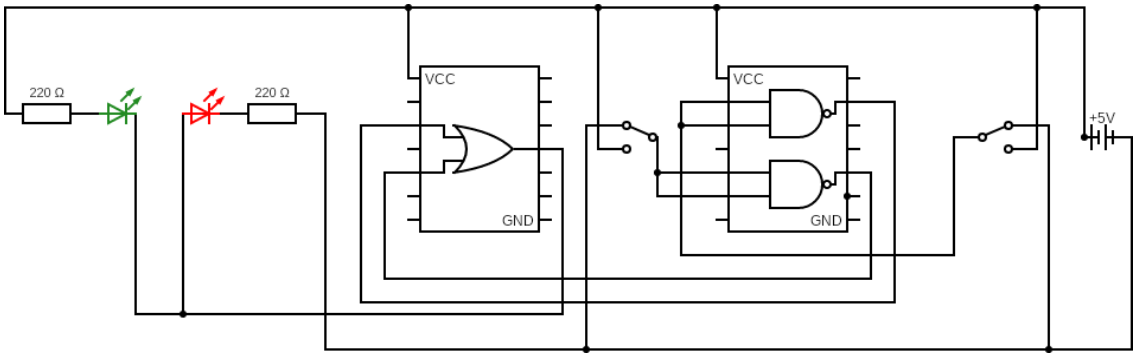


Fig 2: A'+B'=(A.B)'

Procedure :

1. We set up the breadboard and connected the 5V power supply to provide power to the circuit.
2. We used logic gate ICs (7400 for NAND, 7408 for AND, and 7432 for OR) to construct simple logic circuits.
3. Now connect the circuits as shown in fig 1,2.
4. Each circuit had two input terminals (A and B) and one output terminal (Y). We connected these terminals as per the pin configuration of the specific IC.
5. LEDs were connected to the output terminals Y of each gate to visually indicate the output state (1 or 0).

OBSERVATION :

A	B	A'+B'	(A.B)'	A'.B'	(A+B)'
0	0	1	1	1	1
0	1	1	1	0	0
1	0	1	1	0	0
1	1	0	0	0	0

Conclusion:

By this experiment we can conclude that DeMorgans laws are true
for each input of A and B. when we take AND gate then we were able to get the truth table of NOR gate and when we take OR gate then we were able to get the truth table of NAND gate. This proves that
DeMorgans laws are true.

$$A' + B' = (A \cdot B)'$$

$$A' \cdot B' = (A + B)'$$

Link for the tinkercad simulation:

The inputs in tinkercad is given 0,0. To check remaining cases change the inputs.