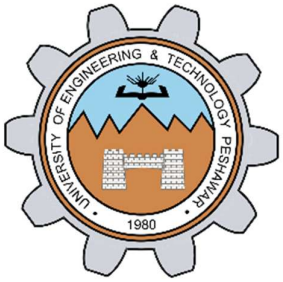
STUDY OF BASIC GATES

LAB # 02



Fall 2023

CSE-202L: Digital Logic Design Lab

Group Members:

AHSAN RAZA (22PWCSE2099)

Hassan Zaib Jadoon (22PWCSE2144)

Mutahhar Fayyaz (22PWCSE2176)

Class Section: **A**

Submitted to:

Dr. Rehmat Ullah Khattak

October 20, 2023

Department of Computer Systems Engineering

University of Engineering and Technology, Peshawar

Lab 2

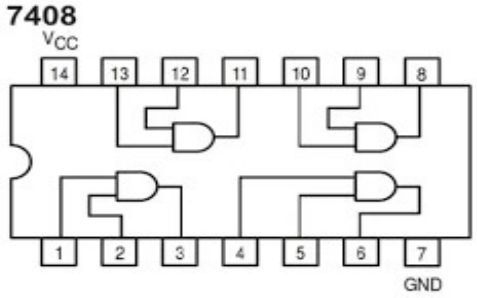
STUDY OF BASIC GATES

Logic gates:

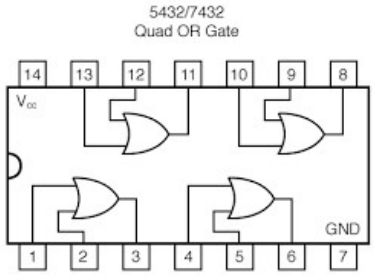
A logic gate is a fundamental building block of digital electronic circuits. It's an electronic device that operates on one or more input signals to produce an output signal based on a specific logic function. Logic gates perform basic logical operations and are used to process information in digital computers and other digital systems.

Logic gates are combined in various ways to create complex circuits that perform arithmetic operations, store and manipulate data, and control the overall functioning of digital devices. The most common types of logic gates include AND, OR, NOT, NAND, NOR, XOR, and XNOR gates, each with its specific truth table and logical function. These gates serve as the foundation for the design and construction of digital systems, enabling the processing and manipulation of binary information used in modern technology.

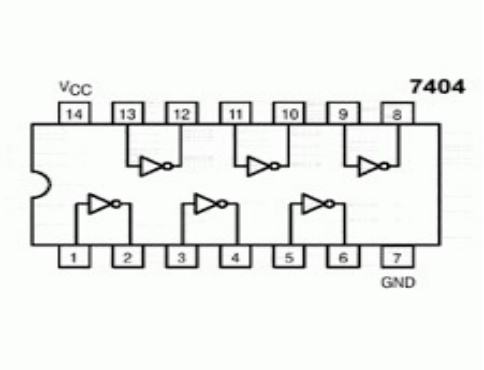
1. **AND Gate:** An AND gate produces a high output (usually represented by 1) only when all its inputs are high. In other words, it outputs 1 if and only if all the inputs are 1. The IC number for AND Gate is 7408.



2. **OR Gate:** An OR gate produces a high output (1) when at least one of its inputs is high. It outputs 0 only if all its inputs are low. The IC number for OR Gate is 7432.

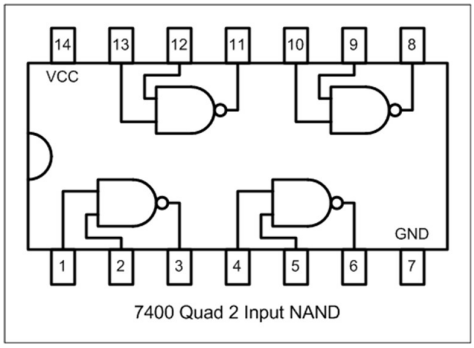


3. **NOT Gate:** A NOT gate (also called an inverter) produces an output that is the opposite or complementary value to its input. If the input is high, the output is low, and vice versa. The IC number for NOT Gate is 7404.

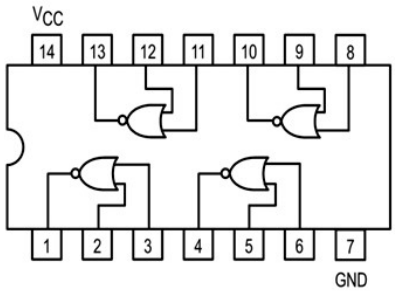


Certainly! In addition to the basic logic gates (AND, OR, and NOT), there are also other fundamental logic gates that are widely used in digital electronics:

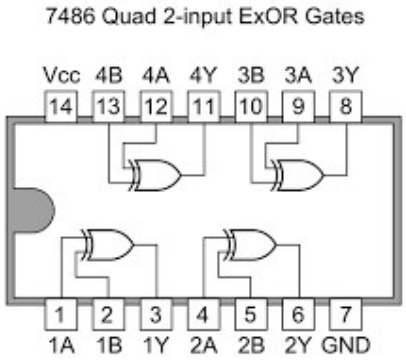
4. **NAND Gate:** A NAND gate is a combination of an AND gate followed by a NOT gate. It produces the opposite output of an AND gate. That is, it produces a low output only when all its inputs are high. The IC number for NAND Gate is 7400.



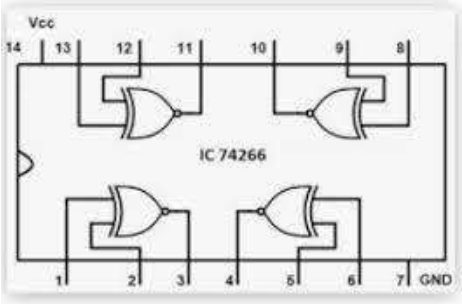
5**. NOR Gate:** A NOR gate is a combination of an OR gate followed by a NOT gate. It produces the opposite output of an OR gate. It produces a low output only when at least one of its inputs is high. The IC number for XNOR Gate is 7402.



6. **XOR Gate** (Exclusive OR): An XOR gate produces a high output when the number of high inputs is odd. In other words, it outputs 1 when the inputs are different and 0 when the inputs are the same. The IC number for XOR Gate is 7486.



7. **XNOR Gate** (Exclusive NOR): An XNOR gate produces a high output when the number of high inputs is even. It outputs 1 when the inputs are the same and 0 when the inputs are different. The IC number for XNOR Gate is 74266.

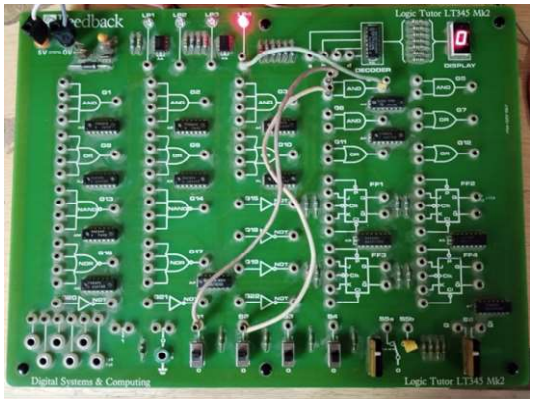


Exclusive NOR or XNOR gate – From ...

These logic gates are the building blocks of digital circuits and are used to perform various logical operations in electronic devices, including computers, calculators, and digital sensors. By combining these basic gates, complex circuits and operations can be achieved, enabling the functioning of modern digital systems.

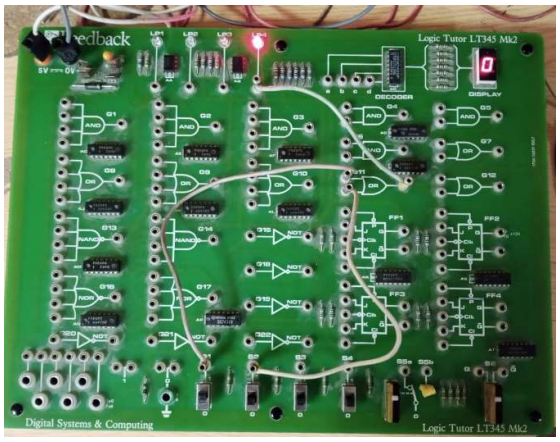
Experiment:

AND:



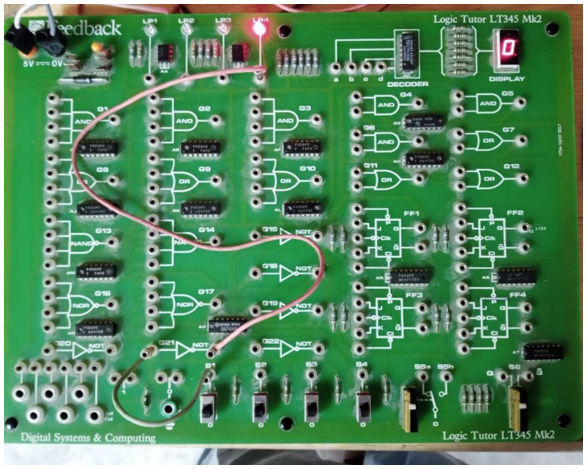
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

OR:



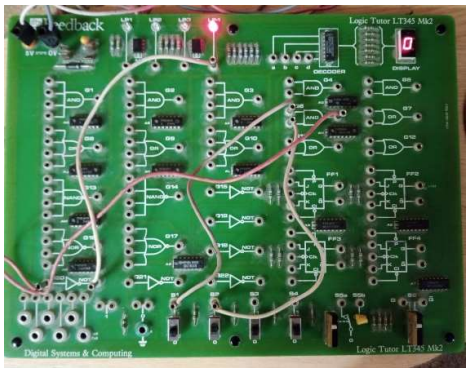
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

NOT:



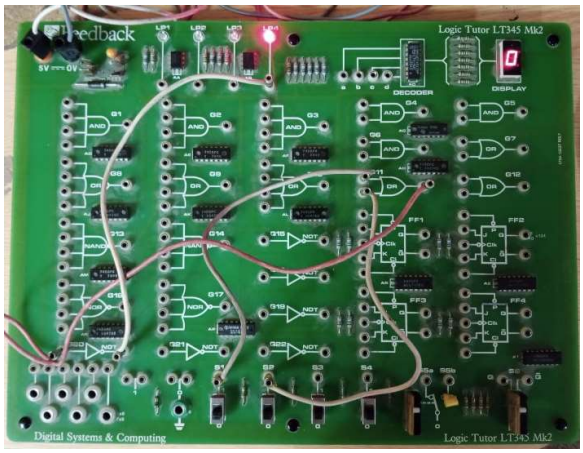
A	Y
0	1
1	0

NAND:



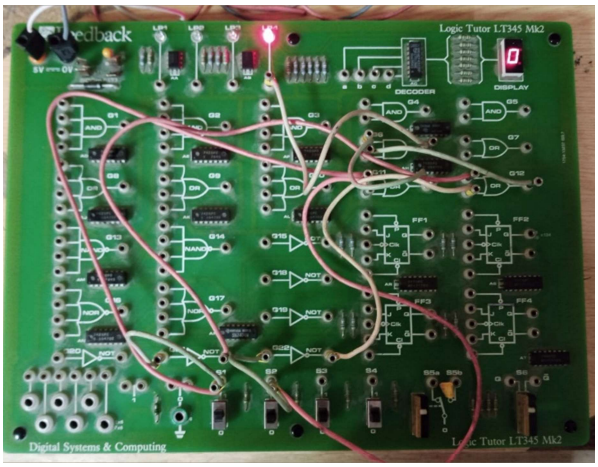
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

NOR:



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

XOR:



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