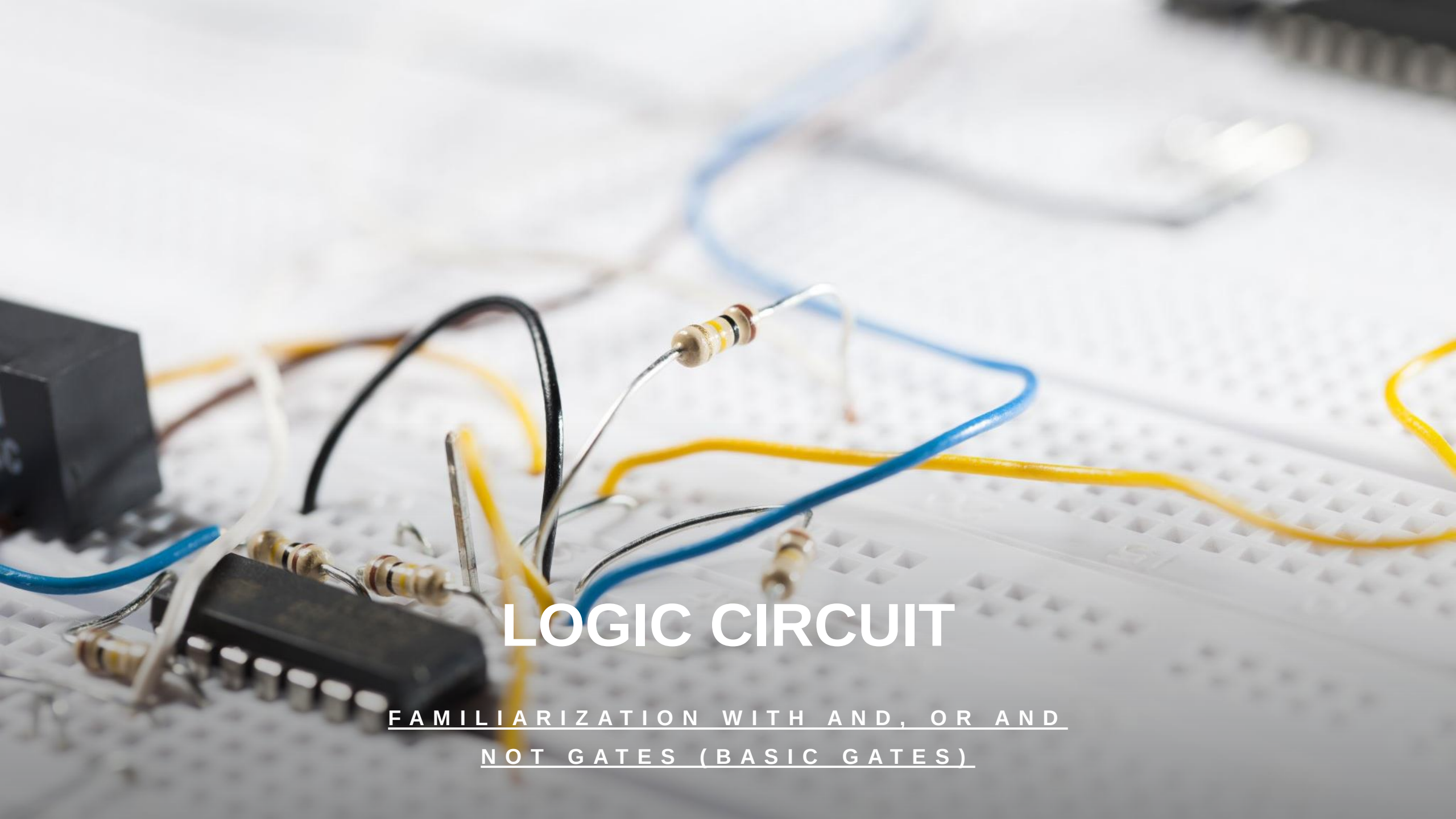


LOGIC CIRCUIT

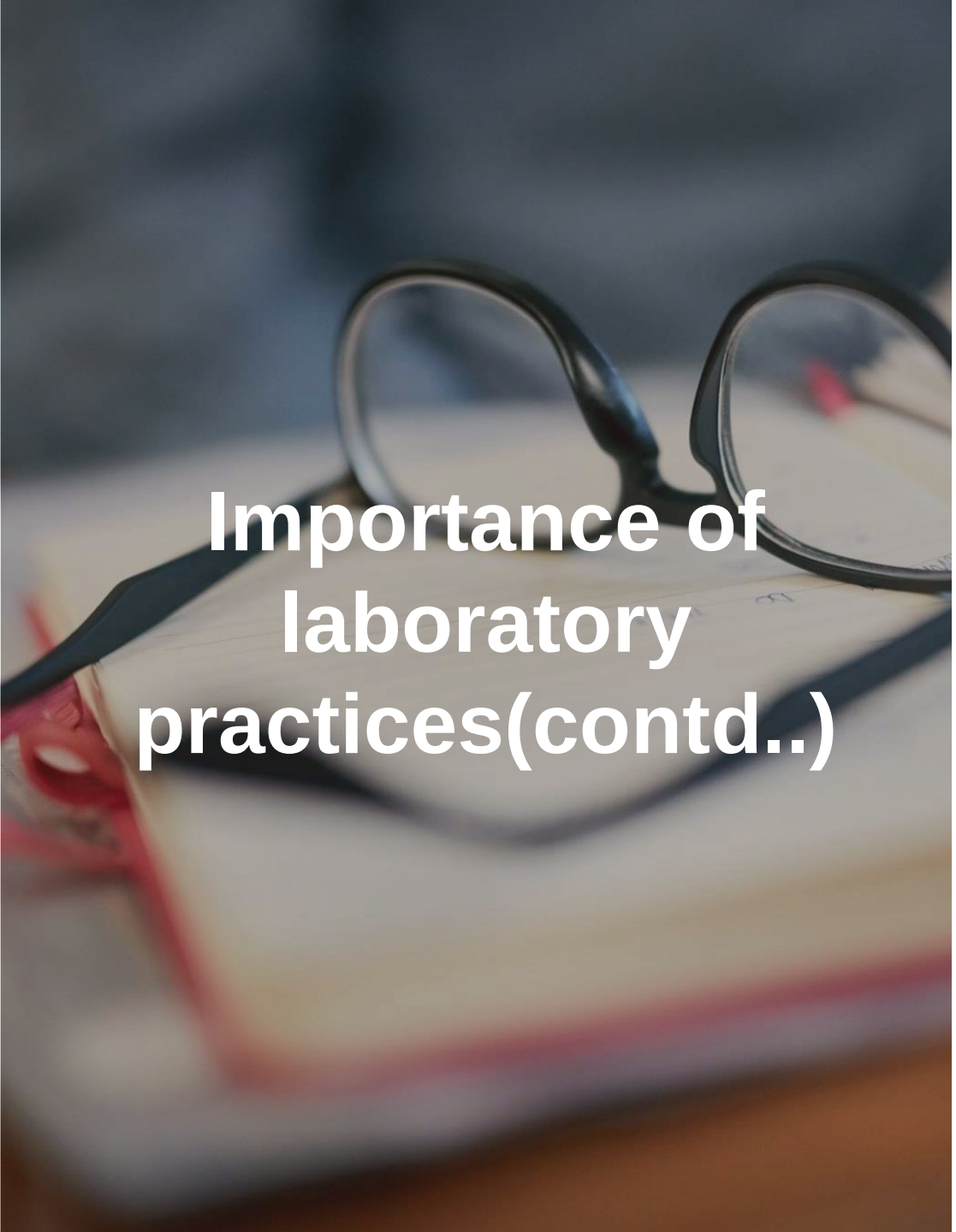
FAMILIARIZATION WITH AND, OR AND NOT GATES (BASIC GATES)

Objectives:

- •To investigate and verify the property of two input AND gate.
- •To investigate and verify the property of two input OR gate.
- •To investigate the property of NOT gate.
- •To construct and verify three input AND gate using two input AND gates.
- •To construct and verify four input OR gate using two input OR gates.
- •To connect inverter gates in series in odd numbers and even number and observe its property.

Importance of laboratory practices

- To provide an experimental foundation for the theoretical concepts introduced in the lectures. It is important that students have an opportunity to verify some of the ideas for themselves.
- To familiarize students with experimental apparatus, the scientific method, and methods of data analysis so that they will have some idea of the inductive process by which the ideas were originated.
- To teach how to make careful experimental observations and how to think about and draw conclusions from such data.



Importance of laboratory practices(contd..)

- To reinforce the understanding of textbook.
- To learn how to write a technical report which communicates scientific information in a clear and concise manner.
- To facilitate in the better understanding in the materials of the text book.
- To clear up the things which were not clear in the class room.
- To Help in the future with same kind of practices in research and developments.

Theory

Electricity:

- Electricity is a type of energy.
- Types of electricity depending on the sources:

    (i) Alternating current AC

    (ii) Direct current DC

Direct Current Alternating Current

- **Direct current (DC)** electricity is produced either by changing chemical energy to electrical energy or by changing AC to DC. All of the electronics and computer devices use direct current DC.
- **Alternating current (AC)** is generated by the generator. To produce this type of electricity, potential energy is converted into mechanical energy then into electrical energy. We use AC as city supply in our home. AC is directly supplied to the devices like iron, water pumping motor, heaters etc.

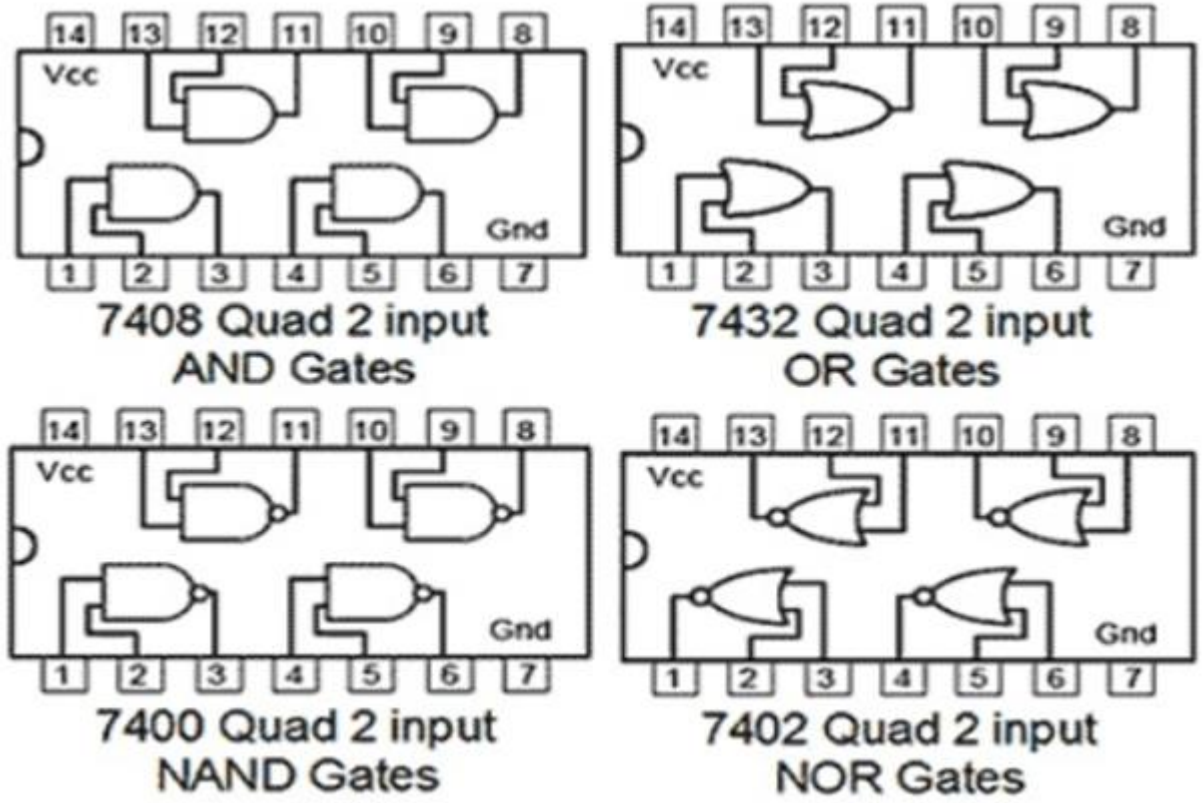
Logic Circuit &Logic Gates::

- **Logic circuit** is the smallest part of the digital IC which is used in computer .
- **Logic Circuit** is the circuit representation of the operation involving Binary numbers.
- **Logic gates** are the circuits with one or more input signals but only one output. In which the output is switched between two voltage levels determined by the combination of input signals.

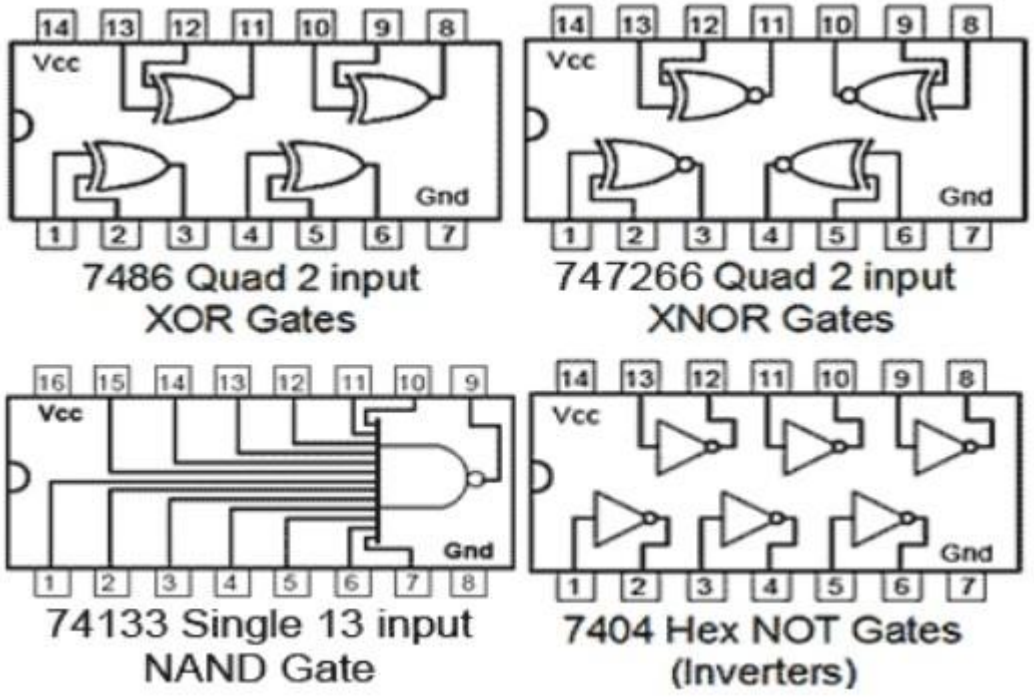
74 TTL IC series

- **7400** is quad two input **NAND** gates.
- **7402** is quad two input **NOR** gates.
- **7404** hex **inverter**.
- **7408** is quad two input **AND** gates.
- **7410** triple three input **NAND** gates.
- **7411** triple three input **AND** gates.
- **7420** dual four input **NAND** gates.
- **7432** is quad two input **OR** gates.
- **7474** is **D** flip flop.
- **7476 is JK flip flop.**

Pin Configuration



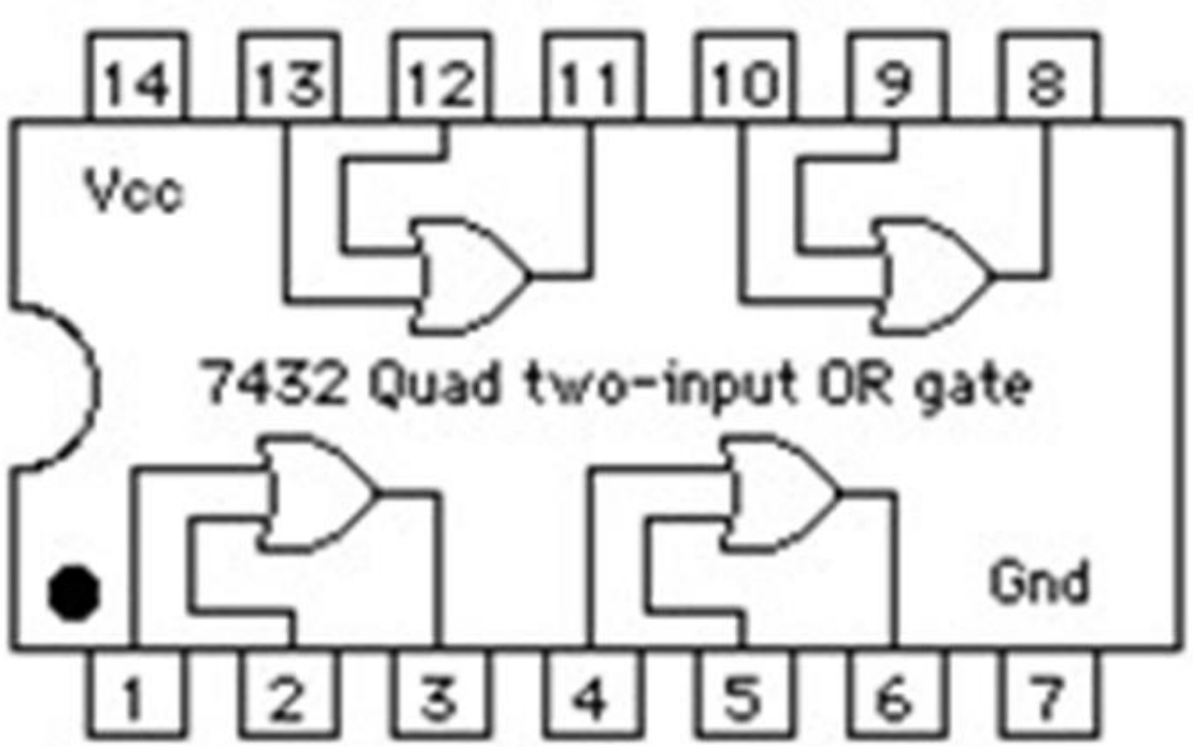
Pin Configuration



CMOS series

- **CD 4011** Quad two input **NAND** gates.
- **CD 4001** Quad two input **NOR** gates.
- **CD 4069** Hex **inverter**.
- **CD 4081** Quad 2 input **AND** gate.
- **CD 4071** Quad 2 input **OR** gate.
- **CD 4073** triple 3 input **AND** gate.

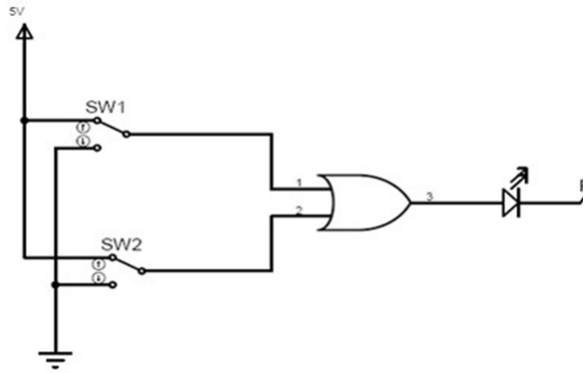
7432 Quad two input OR Gate:



OR Gate

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

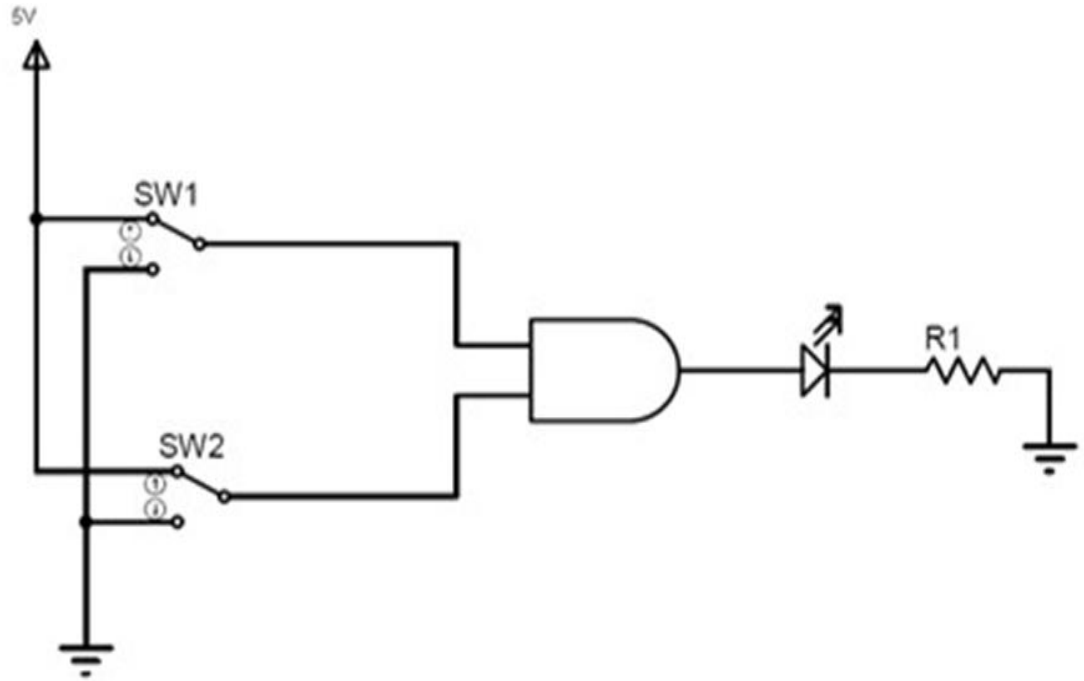
- •OR gate is the logic gate whose output is high if any one of the input is high.
- OR gate logic equation: Y= A+B
- OR Gate truth table



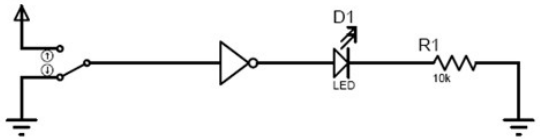
AND Gate

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

- **AND** gate is the logic gate whose output is High when all of its input are high.
- **AND** gate logic equation: Y = A.B
- **AND** gate Truth Table:



A	Y
0	1
1	0

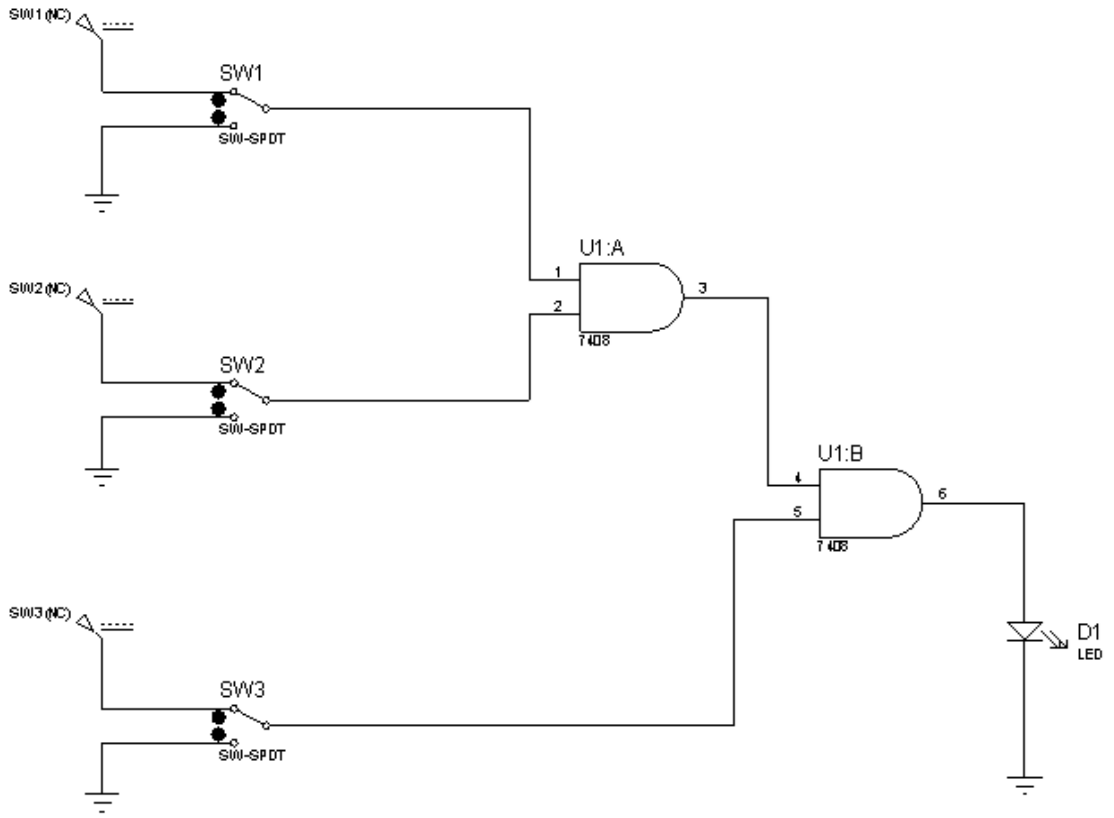


NOT gate Verification

- **NOT** Gate is the logic gate whose output is the complement of input.
- **NOT** Gate logic equation: Y = A'.
- **NOT** Gate truth table.

Practical Diagram For three input AND

THREE INPUT AND USING TWO INPUT AND GATES.



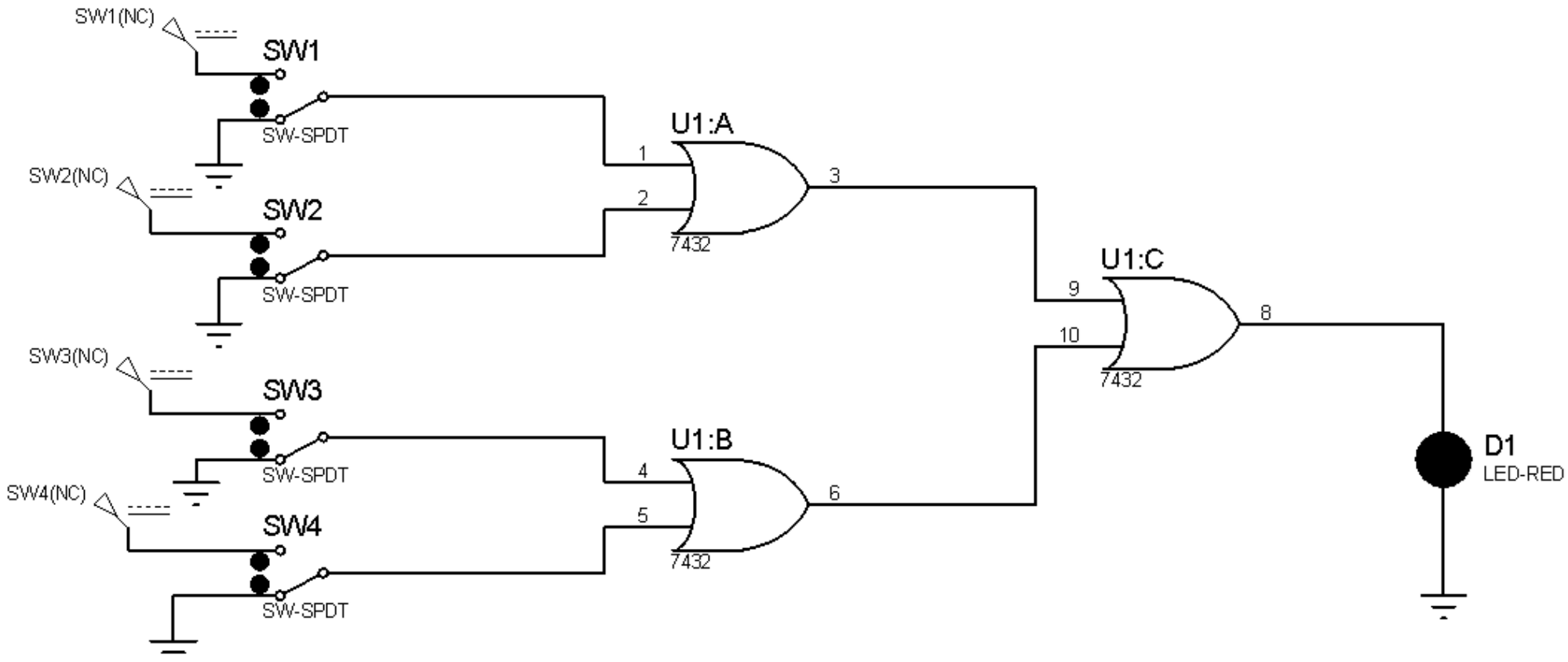
Three Input AND gate Truth Table

X=A.B.C

3 Input AND Gate Truth Table

Inputs			Outputs
A	B	C	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

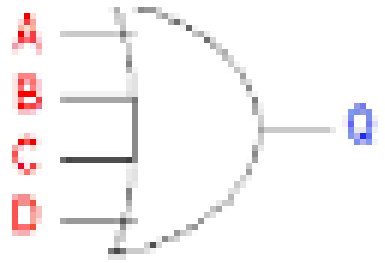
Four input OR Gate Using two input OR Gates



Four input OR gate Truth Table

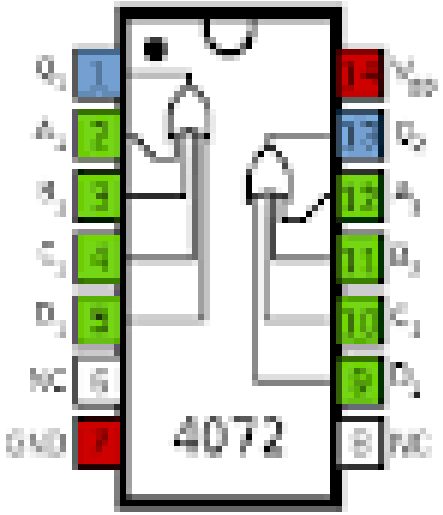
A	B	C	D	O
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

4 input OR GATE
Truth Table



4 input OR GATE SYMBOL

4072 (Dual 4-In OR)



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Inverter Gates In Series