CSL 302 Digital Logic & Computer Organization and Architecture

Aim – To realize the gates using universal gates

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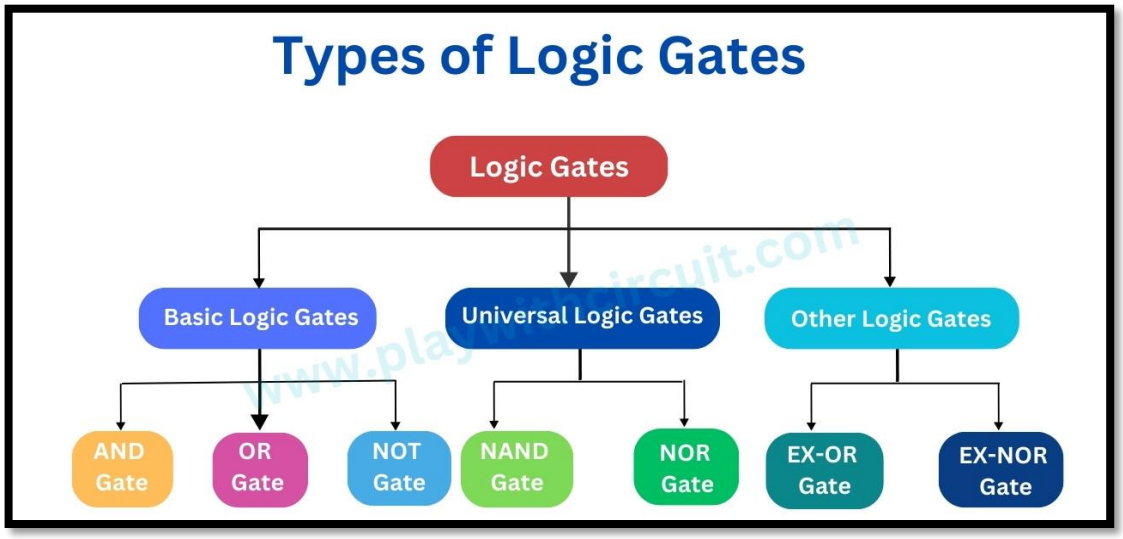
- **What are Logic gates?**

  Logic gates are the fundamental building blocks of digital circuits. They perform basic logical functions that are essential for digital computation.

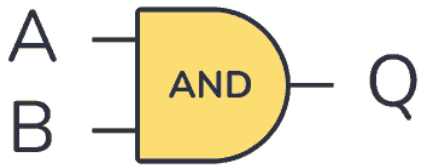
- Types of gates -
  1. AND gate
  2. OR gate
  3. NOT gate



Detail description regarding these gates:

1. AND gate

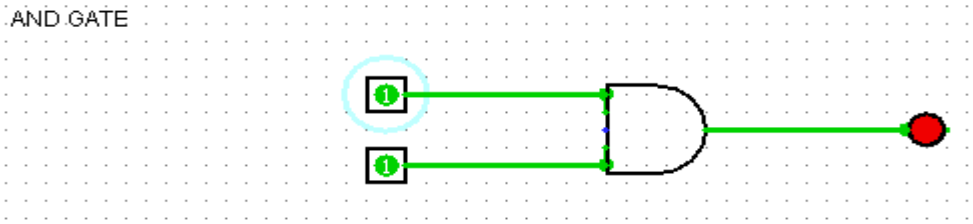
- In digital electronics, the AND gate is one of the basic logic gates that performs the logical multiplication of inputs applied to it.
- It generates a high or logic 1 output, only when all the inputs applied to it are high or logic 1. Otherwise, the output of the AND gate is low or logic 0.



Pictorial representation of AND gate

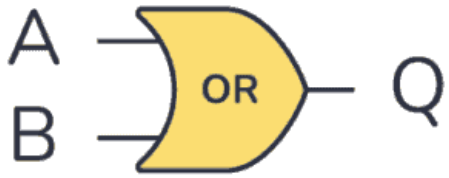
A	B	Q
0	0	0
0	1	0
1	0	0
1	1	1

Truth table of AND gate



2. **OR GATE**

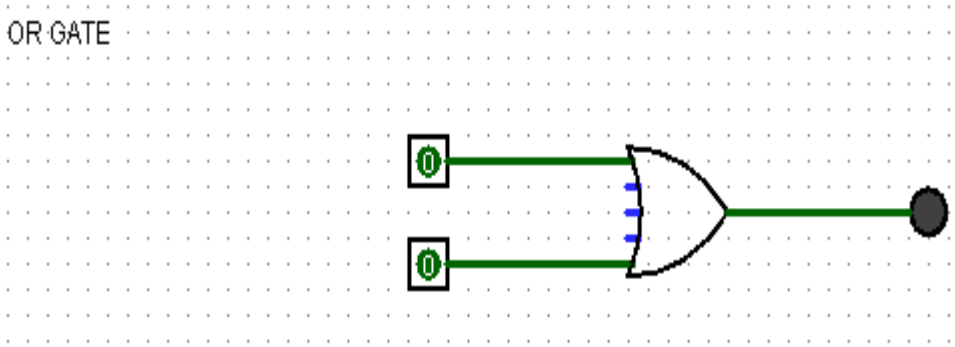
- In digital electronics, there is a type of basic logic gate which produces a low or logic 0 output only when it's all inputs are low or logic 0.
- For all other input combinations, the output of the OR gate is high or logic 1.



Pictorial representation of OR gate

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	1

Truth table for OR gate



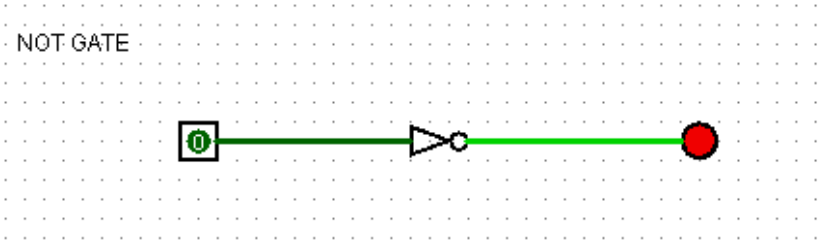
3. NOT gate

- In digital electronics, the NOT gate is another basic logic gate used to perform compliment of an input signal applied to it.
- It takes only one input and one output. The output of the NOT gate is complement of the input applied to it.

Pictorial representation of NOT gate

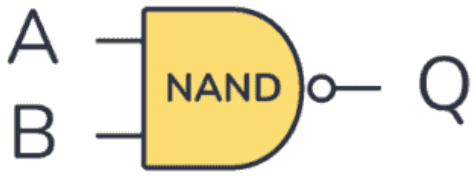
A	Q
0	1
1	0

Truth table for NOT gate



4. NAND gate

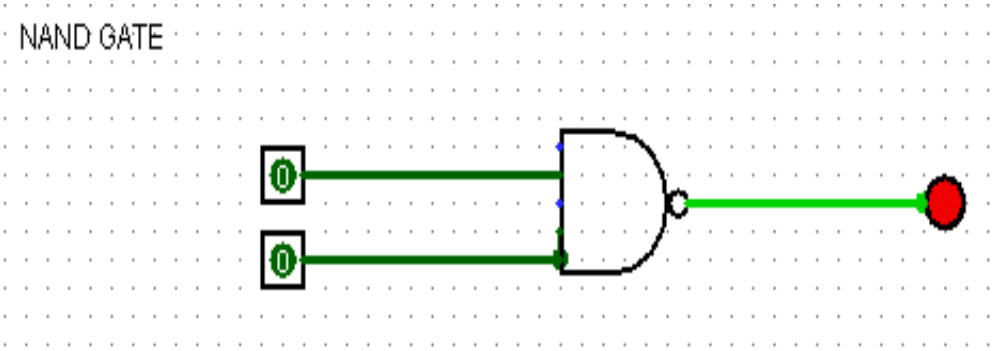
- NAND gate, also known as Not-AND gate, does the exact opposite or complement of the AND gate.



Pictorial representation of NAND gate

A	B	Q
0	0	1
0	1	1
1	0	1
1	1	0

Truth table of NAND gate



5. NOR GATE

- NOR gate, is considered as a Universal gate, which is opposite or complement of OR
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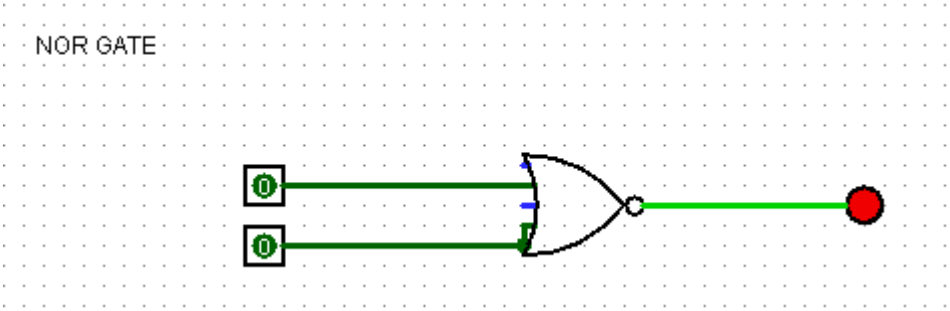
Pictorial representation of NOR gate

A	B	Q
0	0	1
0	1	0
1	0	0
1	1	0

Truth table of NOR gate



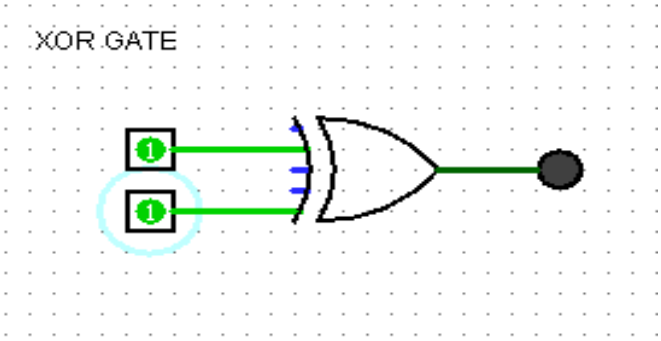
6. XOR GATE

- In digital electronics, there is a logic circuit called XOR Gate that takes two inputs and produces an output which is the result of the exclusive OR operation performed on the combination of inputs.

Pictorial representation of XOR gate

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

Truth table of XOR gate



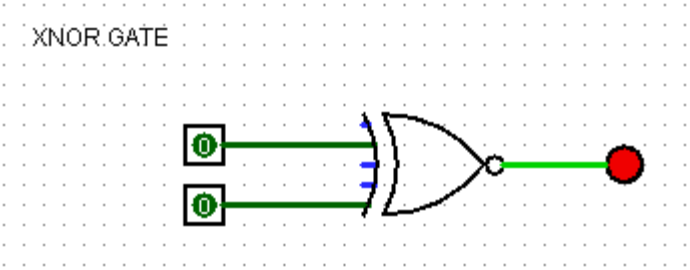
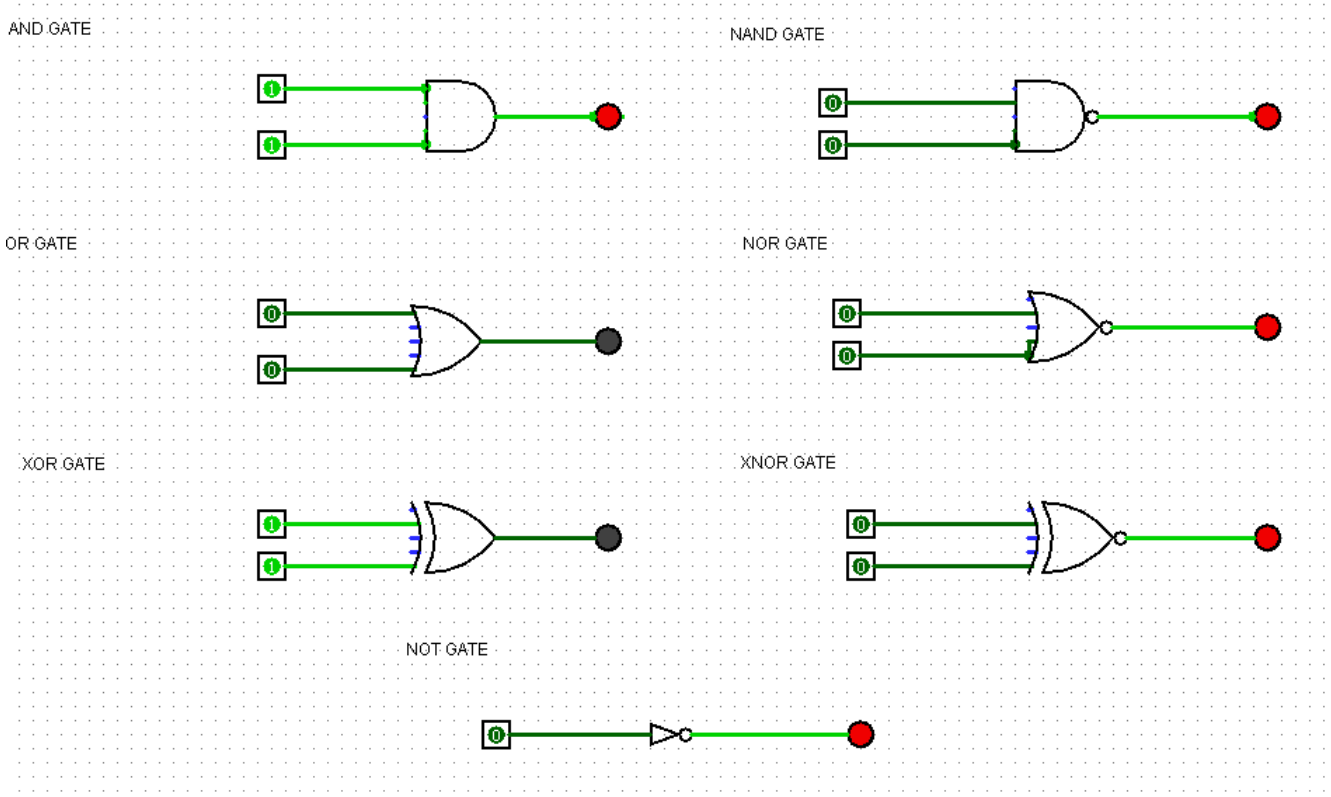
7. XNOR GATE

- An XNOR gate is a logic gate where the output goes HIGH (or “1”) only if both its inputs are equal. So if the inputs A and B are both HIGH or both LOW, the output Q will be HIGH.

Pictorial representation of XNOR gate

A	B	Q
0	0	1
0	1	0
1	0	0
1	1	1

Truth table of XNOR gate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