FACULTY OF ENGINEERING & TECHNOLOGY

Logic gates are used to carry out logical operations on single or multiple binary inputs & give one binary output. In simple terms, logic gates are the electronic circuits in a digital system.

Truth Table

A truth table shows how a logic circuit's output responds to various combinations of the inputs, using logic 1 for true and logic 0 for false.
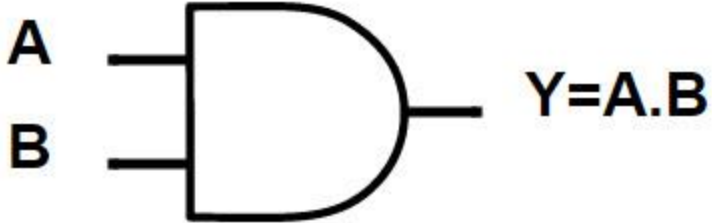
Type of Logic Gate

There are three types of logic gate
1. Basic Gate (AND,OR & NOT)
2. Universal Gate (NAND & NOR)
3. Arithmetic Gate (EXOR & EXNOR)
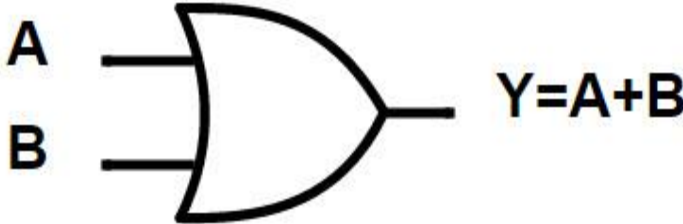
1. **Basic Gate**
- **AND Gate:**
  In AND gate the output of an AND gate attains the state 1 if and only if all the inputs are in state 1.

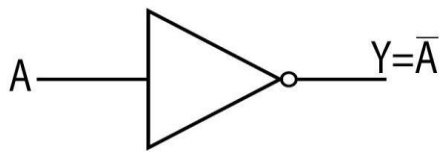| Symbol	Truth Table		
2-input AND Gate	A	B	Y
	0	0	0
A B Y=A.B	0	1	0
	1	0	0
	1	1	1
Boolean Expression **Y = A.B**	Read as A **AND** B gives Y		

- **OR Gate:**

In OR gate the output of an OR gate attains the state 1 if one or more inputs attain the state 1.

Symbol		Truth Table		
2-input OR Gate	$Y=A+B$	A	B	Y
		0	0	0
		0	1	1
		1	0	1
		1	1	1
Boolean Expression **Y = A + B**		Read as A **OR** B gives Y		

- **NOT Gate:**

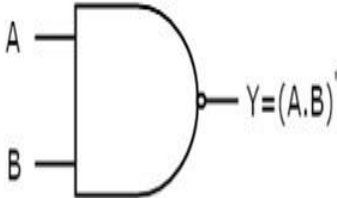In NOT gate the output of a NOT gate attains the state 1 if and only if the input does not attain the state 1.

Symbol		Truth Table	
$Y=\overline{A}$		A	Y
		0	1
		1	0
Boolean Expression Y = not A or Á		Read as inverse of **A** gives Y	

2. Universal Gate:
• **NAND Gate**
This gate is the combination of AND & NOT gate.
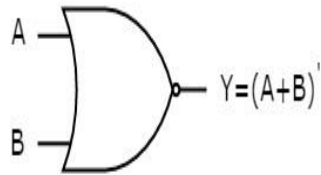
Symbol	Truth Table		
2-input NAND Gate	A	B	Y
	0	0	1
	0	1	1
	1	0	1
	1	1	0
Boolean Expression Y = (A . B)'	Read as A N**AND** B gives Y		

•**NOR Gate**
This gate is the combination of OR & NOT gate.

Symbol	Truth Table		
2-input NAND Gate	A	B	Y
	0	0	1
	0	1	0
	1	0	0
	1	1	0
Boolean Expression Y = (A + B)'	Read as A **NOR** B gives Y		

$Y = (A+B)'$