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**NAND gate:** The NAND or 'NOT-AND' gate is a special type of logic gate in the digital logic circuit. The NAND gate is the universal gate. It means all the basic gates such as AND, OR, and NOT gate can be constructed using a NAND gate. The NAND gate is the combination of the NOT-AND gate.

The output state of the NAND gate will be low only when all the inputs are high. Simply, this gate returns the complement result of the AND gate.

The logic or Boolean expression for the NAND gate is the complement of logical multiplication of inputs denoted by a full stop or a single dot as

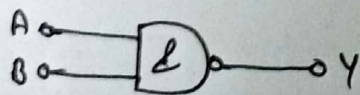
$$(A.B)' = Y$$

### Types of Digital Logic AND Gate

The NAND gate is also classified into three based on the input it takes. These are the following types of AND gate.

#### The 2-input NAND Gate -

This is the simple formation of the NAND gate. In this type of NAND gate there are only two input values and an output value.



#### Truth table

Input		Output
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

The 3-input NAND gate -

logic gate -



Truth table -

input			Output
A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

The Multi-input NAND Gate -

Just like AND, NOT and OR gates, we can also form n-input NAND gate. If the number of inputs required is odd, any "unused" input can be held high by directly connecting it to the power supply using high "suitable" pull-up resistors there is the following expression of the 4-input NAND gate

$$Y = ((A.B).(C.D))$$

in simple words, it is expressed as:

$$Y = A \text{ NAND } B \text{ NAND } C \text{ NAND } D$$