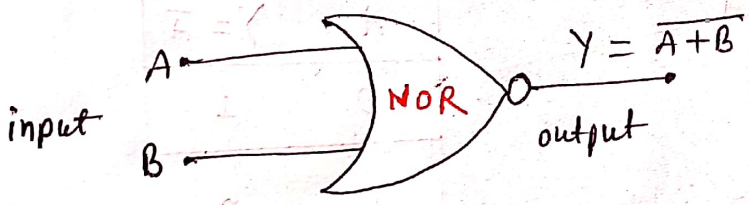
NOR Gate :- The NOR gate is the type of universal logic gate. NOR gate returns the complement result of the OR gate. It is basically a combination of two basic logic gates that is OR gate and NOT gate.

The Boolean expression of NOR gate is given as

$$Y = \overline{A + B}$$

Symbol



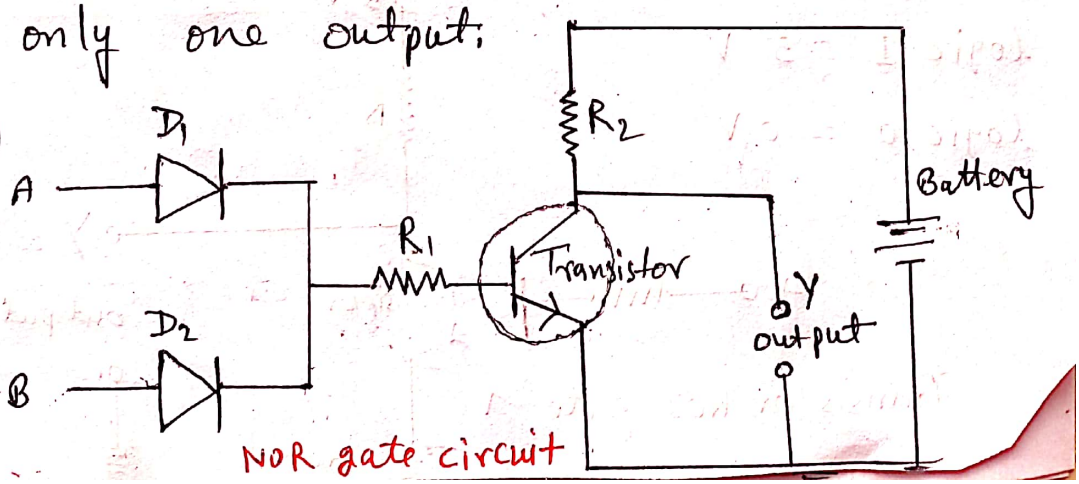
Truth Table

A	B	$Y = \overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

The output state of the NOR gate will be high(1) when all the inputs are low(0). It takes two or more inputs and gives only one output.

Logic 1 = 5 V (high)

Logic 0 = 0 V (Low)

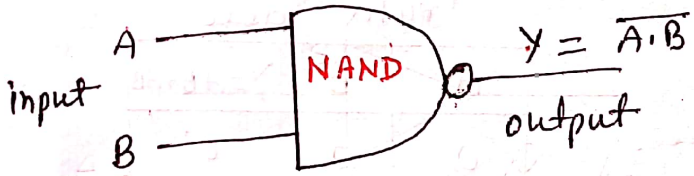


NOR gate circuit

NAND Gate ⇒ NAND gate is another type of Universal logic gate. The NAND gate is the combination of two basic logic gates AND gate and NOT gate. It performs the inverted operation of AND gate.
The Boolean expression for NAND gate is given as

$$Y = \overline{A \cdot B}$$

Symbol



Truth Table

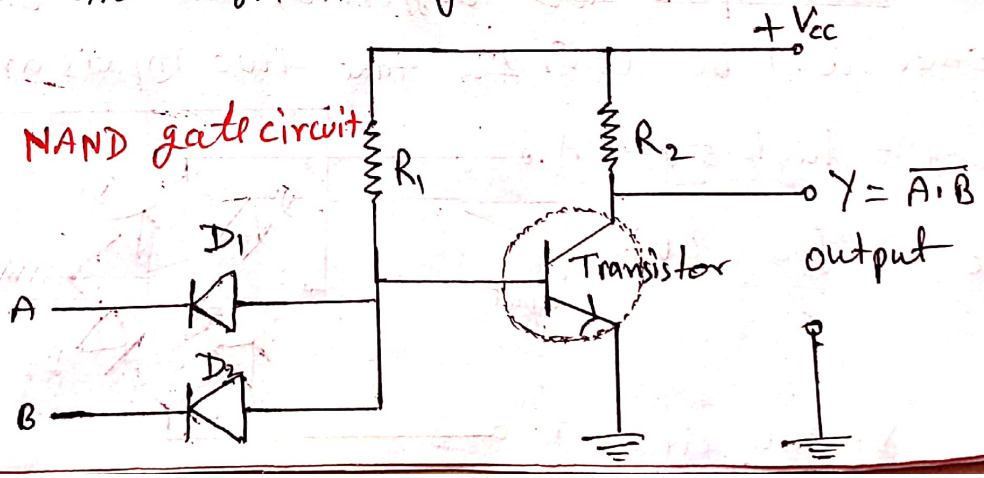
A	B	$Y = \overline{A \cdot B}$
0	0	1
0	1	1
1	0	1
1	1	0

The output of the NAND gate will be high (1) when either of its input is low (0). It takes two or more inputs and gives only one output.

Logic 1 = 5 V (high)

Logic 0 = 0V (low)

NAND gate circuit

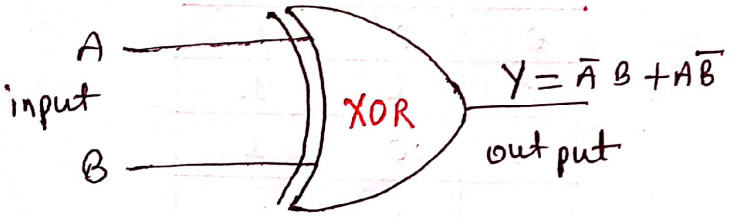


XOR Gate :- In digital electronics, there is a specially designed logic gate named XOR gate. which is used in digital circuit to perform modulo sum. It is also known as Exclusive OR gate or Ex-OR gate. It is used extensively in arithmetic logic circuits.

The Boolean expression of XOR gate is given as

$$Y = \bar{A}B + A\bar{B} \quad \text{or} \quad Y = A \oplus B$$

Symbol



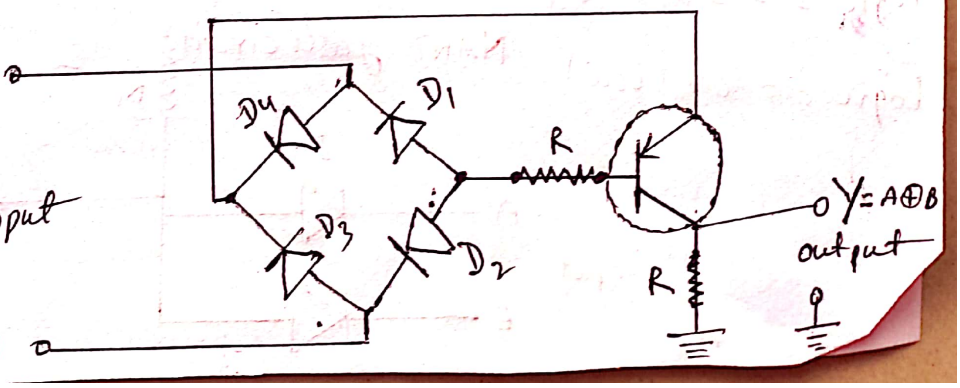
Truth Table

A	B	$Y = \bar{A}B + A\bar{B}$
0	0	0
0	1	1
1	0	1
1	1	0

The output state of the XOR gate is high (1) only when its two inputs are different, that is one is high and other will be low, It take two inputs and gives one output,

Logic 1 = high (5 V)

Logic 0 = low (0 V)



XOR gate circuit

XNOR Gate :- XNOR gate is the complement of the XOR gate. It is also known as Enclusive-NOR gate. It acts as a logical equally or equivalence gate.

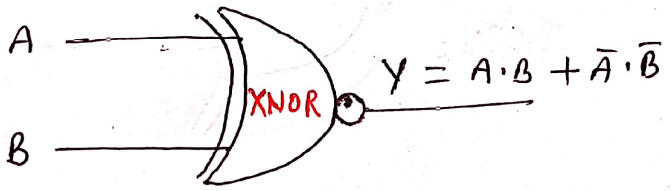
The Boolean expression of XNOR gate is given as

$$Y = A \cdot B + \bar{A} \cdot \bar{B}$$

or

$$Y = A \odot B$$

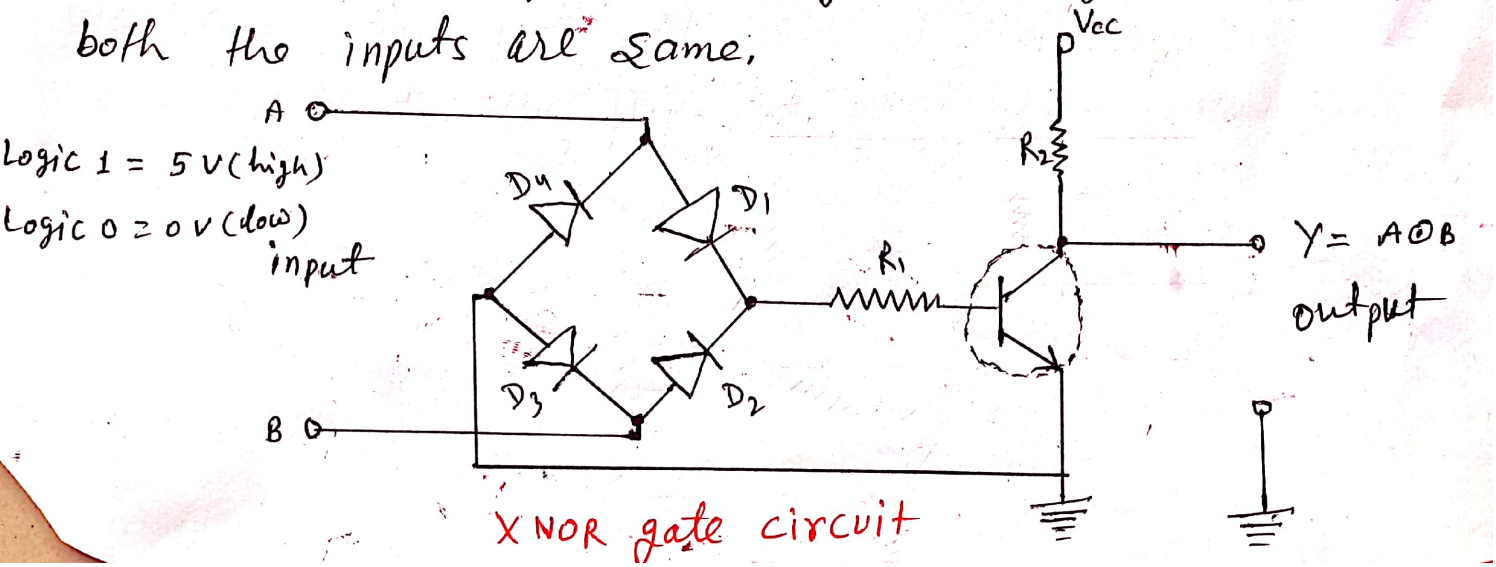
Symbol



Truth Table

A	B	$Y = A \cdot B + \bar{A} \cdot \bar{B}$
0	0	1
0	1	0
1	0	0
1	1	1

The output state of the XNOR gate is high (1) when both the inputs are same.



XNOR gate circuit