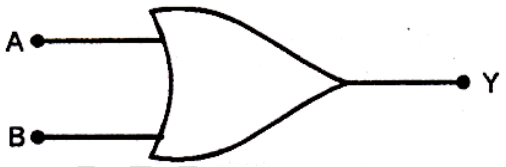
Project Report

Project Name : OR GATE



Submitted To:

Submitted By:

Aim: To Design and simulate the OR Gate circuit.

Components: Two Ideal p-n diodes and a battery of emf E.

Theory and Construction:

Gate

A digital circuit, which either allows a signal to pass through or stops it, is called a gate. Such gate allows the signal to pass through only when some logical conditions are satisfied. Hence, they are called logic gates. The logic gates are the building blocks of a digital system.

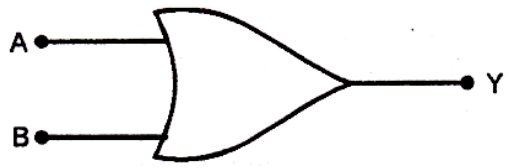
Truth Table

It is a table that shows all possible input combinations and the corresponding output combinations for a logic gate. It is also called a table of combinations.

Boolean expression

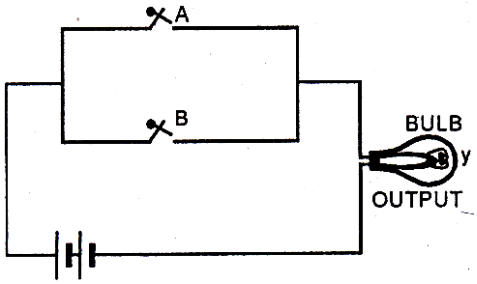
George Boole invented a kind of algebra, which deals with logical statements that have only two values, namely either true or a false value. The logical statements are called Boolean variables. The true of a Boolean variable is denoted by 1 and the false value by 0. It is to be noted that the symbols 1 and 0 have nothing to do with numerical values 1 and 0.

Symbol of OR gate :



Analogue Circuit of OR gate

The analogue electric circuit having function similar to the OR gate is shown in the figure.



In this arrangement, off (or open) corresponds to 0 and on (or closed) corresponds to 1. The inputs are introduce through the switch A and B. The lighting of the bulb is the output. Here we find that the bulb glows (i.e. output is 1) when either switch A is closed or B is closed or both the switches are closed. The bulb remains off (i.e. output is 0) only when both the switches A and B are open

(i.e. A = 0, B = 0)

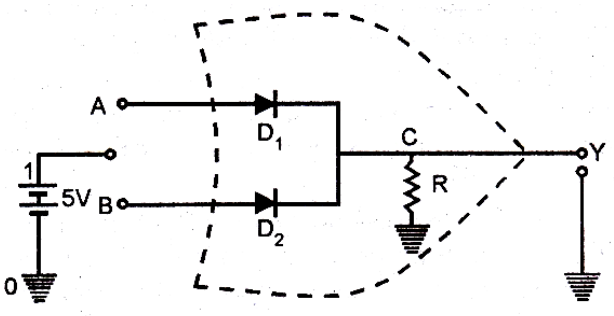
Boolean Expression for OR gate :

Y = A+B

Circuit Diagram of OR gate :

The OR gate is a device that has two or more inputs and one output. In Boolean algebra, the term OR is represented by plus (+) and Boolean expression

A + B = Y, indicates y equals A OR B. In practice, an OR gate can be realized by electronic circuit, making use of two ideal p-n junction diodes D1 and D2 as shown in the figure



Truth Table of OR gate :

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

Working:

Here negative terminal of the battery is grounded and corresponds to the zero level, and the positive terminal of the battery (i.e. 5V in the present case) corresponds to the level 1. The output y is voltage at C w.r.t. earth. The operation of OR gate can be understood by the following four cases.

When both A and B are connected to earth (i.e. A=0 and B = 0) both the diodes do not conduct and therefore no voltage develops across resistance R. The voltage at C is zero w.r.t. earth. Hence the output Y is 0 (in level).

When A is connected to earth and B is connected to positive terminal of battery 5V (i.e. A=0 and B = 1), the junction diode D1 does not conduct while D2 conducts being forward biased. Since diode D2 is ideal, no voltage drop takes place across D2. Now a voltage drop of 5V takes place across R with C at +5V w.r.t earth. Therefore the output y will be 1 (in level).

When A is connected to positive terminal of battery 5V and B is earthed (i.e. A=1 and B=0), the junction diode D1 will conduct being forward biased and junction diode D2 is ideal, no voltage drop takes place across D1. Now a voltage drop of 5V takes place across R, with C at +5V w.r.t. earth. Therefore, the output y will be 1 (in level).

When A and B are connected to positive terminal of battery 5V (i.e. A = 1 and B =1), both the diodes being forward biased will conduct. Since the diodes are ideal and connected in parallel, the voltage drop across R cannot exceed 5V, with C at +5V w.r.t. earth. Hence the output y will be 1 (in level).