SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

23ECB222- Digital Principles and Computer Organization

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II YEAR/ III SEMESTER

UNIT 1 – **MINIMIZATION TECHNIQUES AND LOGIC GATES**

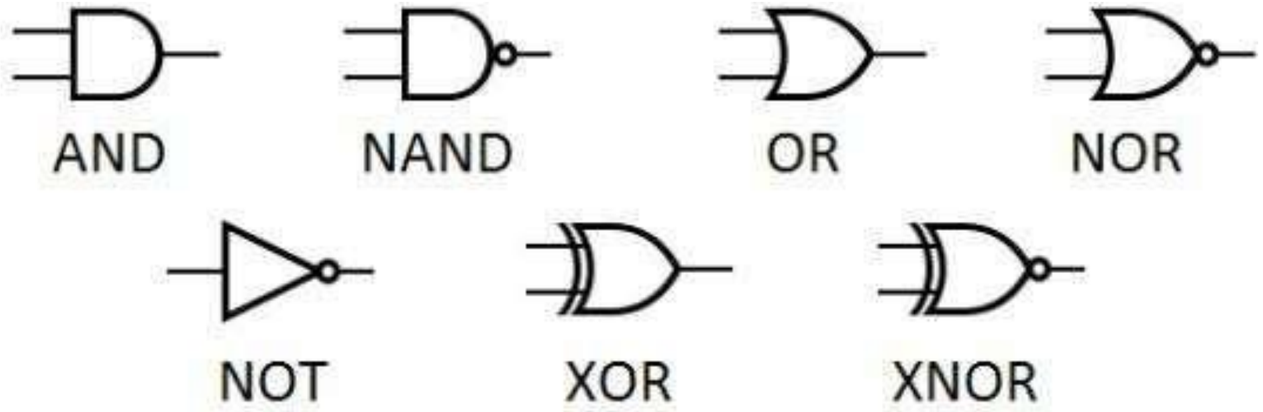
TOPIC –LOGIC GATES

LOGIC GATES

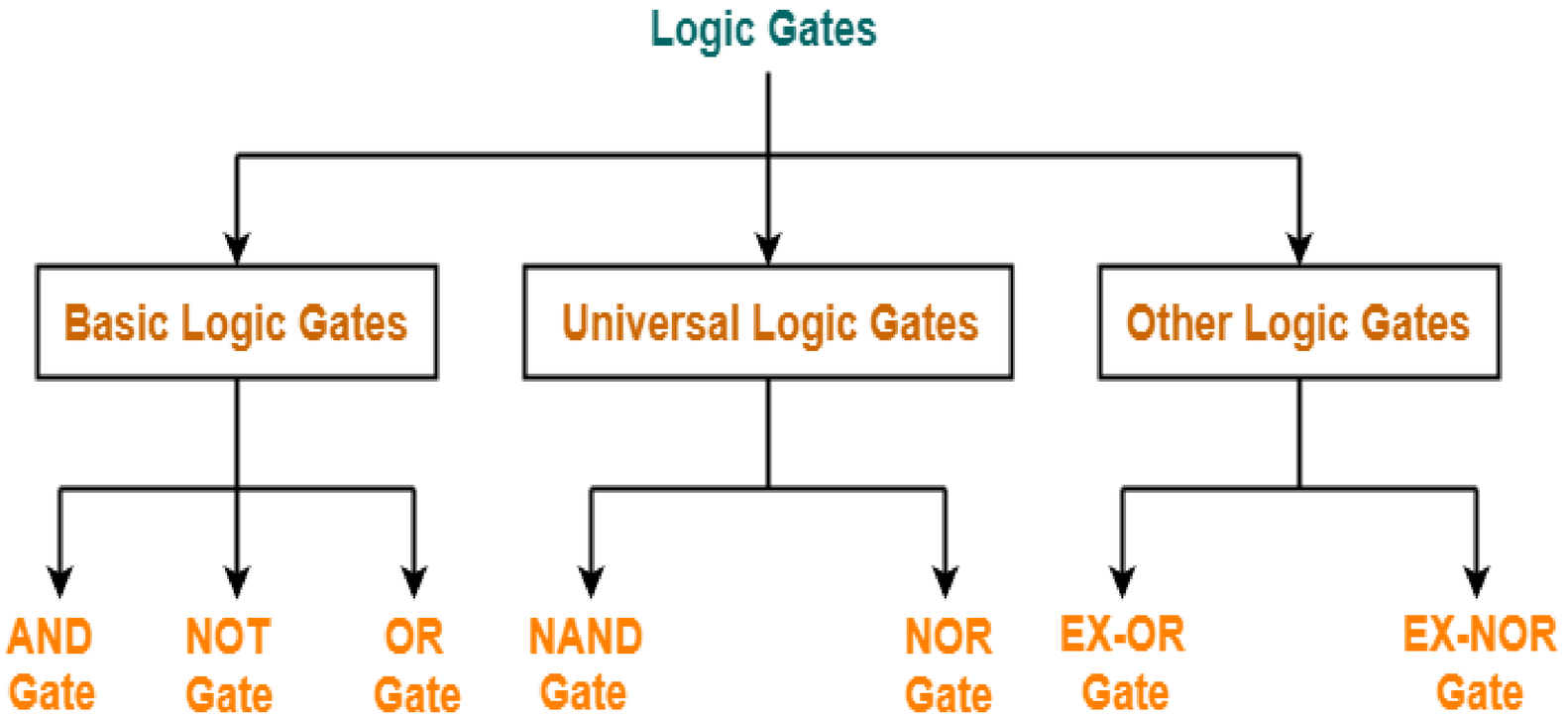
- AND
- OR
- NOT
- NAND
- NOR
- XOR
- XNOR

WHAT IS LOGIC GATE?

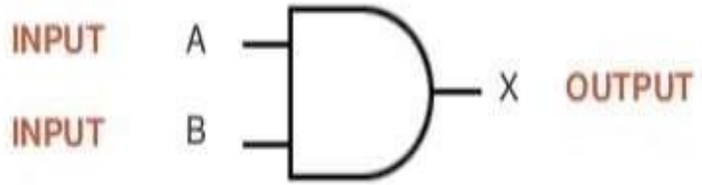
- A Logic Gate is an idealized or physical electronic device which is used for implementing a boolean function, a logical operation performed on one or more binary inputs that produce a single binary output.



CLASSIFICATION OF LOGIC GATES



AND GATE



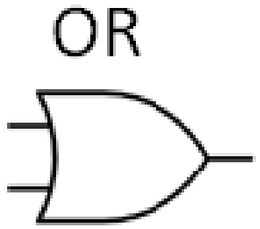
The output will be positive (true) when both inputs (the input one AND the input two) are positive (true).

X = A AND B

AND

INPUT		OUTPUT
A	B	
0	0	0
1	0	0
0	1	0
1	1	1

OR GATE



INPUT		OUTPUT
A	B	
0	0	0
1	0	1
0	1	1
1	1	1

In Boolean Algebra the OR function is the equivalent of addition so its output state represents the addition of its inputs.

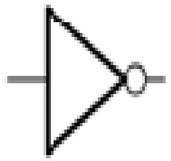
In Boolean Algebra the OR function is represented by a “plus” sign (+) so for a two input OR gate the Boolean equation is given as:

Q = A+B,

that is Q equals either A OR B.

NOT GATE

NOT



INPUT	OUTPUT
A	
0	1
1	0

The NOT function is not a decision making logic gate like that of AND or OR gates, but instead it is used to invert or complement a digital signal. In other words, its output state will always be the opposite of its input state.

NAND GATE

NAND

INPUT		OUTPUT
A	B	
0	0	1
1	0	1
0	1	1
1	1	0

- The term NAND is a contraction of NOT-AND and implies an AND function with a complemented(inverted) output.
- The output will be HIGH,when any one of the inputs is LOW and the output will be LOW when both the inputs are HIGH.
- This operation is opposite to that of AND Gate.

NOR GATE

NOR

INPUT		OUTPUT
A	B	
0	0	1
1	0	0
0	1	0
1	1	0

- The term NOR is a contraction of NOT-OR and implies an OR function with a complemented(inverted) output.
- The output will be LOW, when any one of the inputs is HIGH and the output will be HIGH when both the inputs are LOW.
- This operation is opposite to that of OR Gate.

UNIVERSAL GATES

- The NAND and NOR gates are used to generate AND,OR and NOT functions.

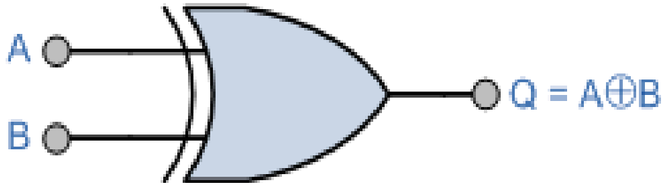
- Any logic logic function can be implemented using NAND and NOR gates. So it is called as Universal gates.

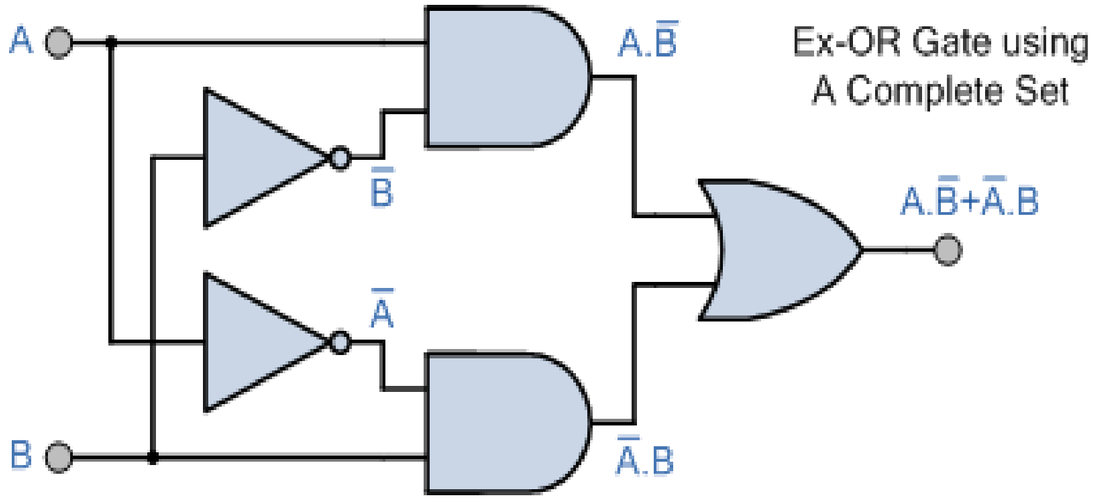
EX-OR GATE

XOR

INPUT		OUTPUT
A	B	
0	0	0
1	0	1
0	1	1
1	1	0

Exclusive-OR Symbol





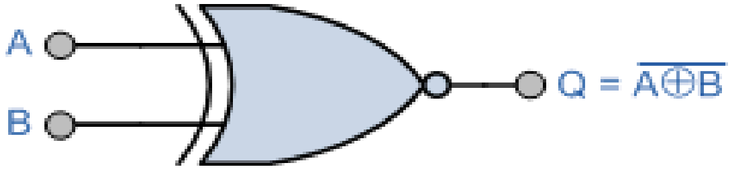
Ex-OR Gate using
A Complete Set

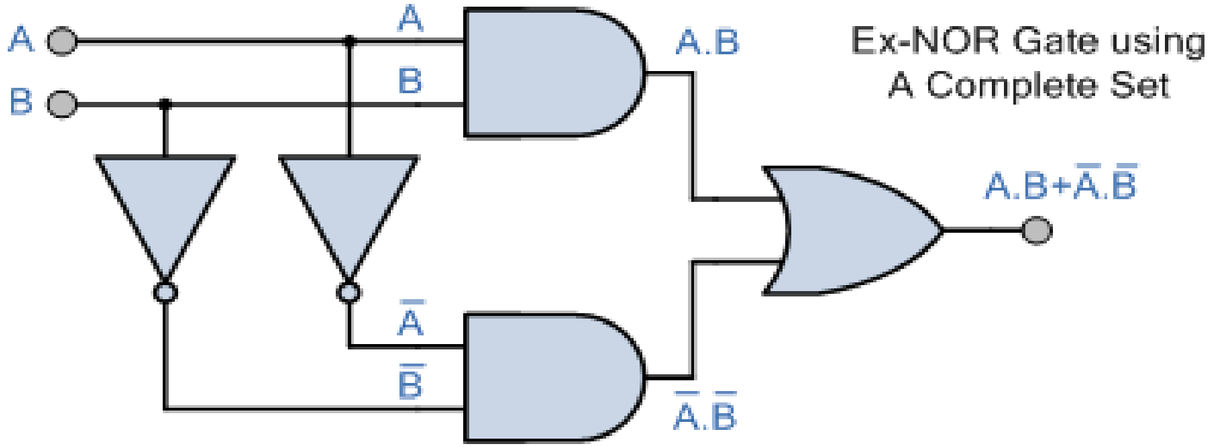
EX-NOR GATE

XNOR

INPUT		OUTPUT
A	B	
0	0	1
1	0	0
0	1	0
1	1	1

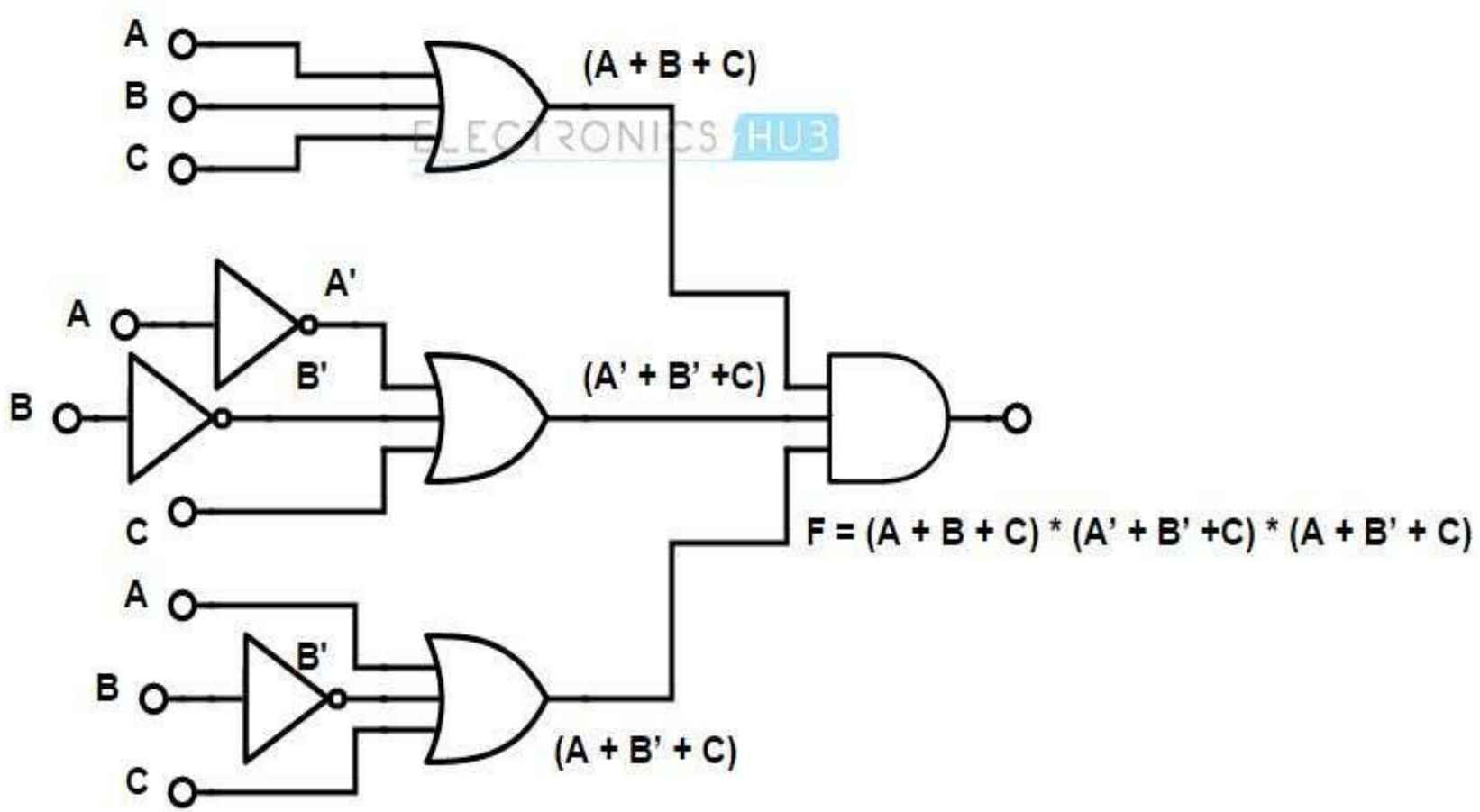
Exclusive-NOR Symbol





Ex-NOR Gate using A Complete Set

BOOLEAN EXPRESSION USING LOGIC GATES



THANK YOU