# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

**An Autonomous Institution**

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE NAME : 19EE101-BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

I YEAR /I SEMESTER CSE & CST

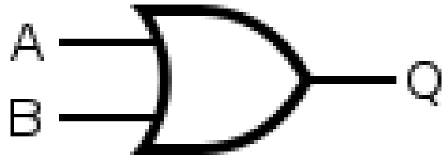
Unit 5: Linear and Digital Electronics

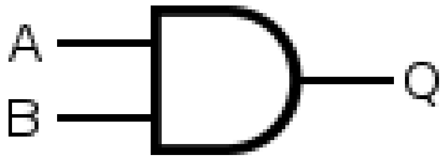
Topic : Logic Gates

# GRADUATE ATTRIBUTES

# INTRODUCTION TO LOGIC GATES

A logic gate is an idealized model of computation or physical electronic device implementing a Boolean function, a logical operation performed on one or more binary inputs that produces a single binary output.



# TYPES OF LOGIC GATE

Six types of gates

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

Typically, logic diagrams are black and white with gates distinguished only by their shape

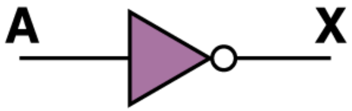
# NOT GATE

A NOT gate accepts one input signal (0 or 1) and returns the opposite signal as output

**Boolean Expression**

X = A'

**Logic Diagram Symbol**




**Truth Table**

| A | X |
|---|---|
| 0 | 1 |
| 1 | 0 |

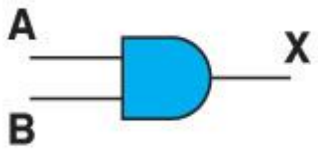
# AND GATE

An AND gate accepts two input signals If both are 1, the output is 1; otherwise, the output is 0

**Boolean Expression**

$$X = A \cdot B$$

**Logic Diagram Symbol**




**Truth Table**

| A | B | X |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

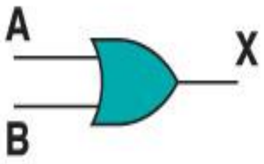
# OR GATE

An OR gate accepts two input signals If both are 0, the output is 0; otherwise, the output is 1

**Boolean Expression**

$$X = A + B$$

**Logic Diagram Symbol**




**Truth Table**

| A | B | X |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

# XOR GATE

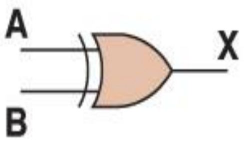
An XOR gate accepts two input signals If both are the same, the output is 0;

Otherwise, the output is 1

**Boolean Expression**

$X = A \oplus B$

**Logic Diagram Symbol**




**Truth Table**

| A | B | X |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

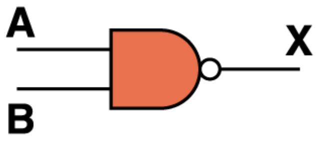
# NAND GATE

The NAND gate accepts two input signals If both are 1, the output is 0; otherwise,the output is 1

**Boolean Expression**

$$X = (A \cdot B)'$$

**Logic Diagram Symbol**




**Truth Table**

| A | B | X |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

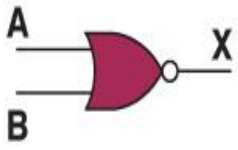
# NOR GATE

The NOR gate accepts two input signals If both are 0, the output is 1; otherwise, the output is 0

**Boolean Expression**

X = (A + B)'

**Logic Diagram Symbol**

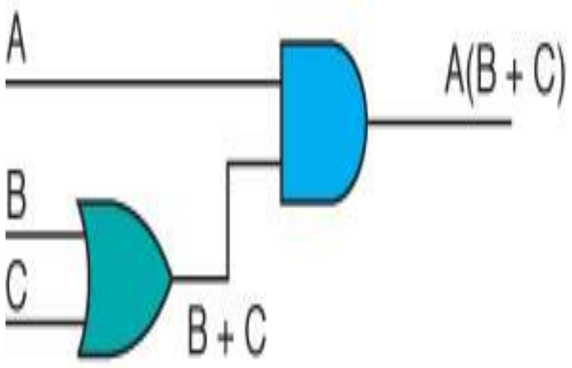



**Truth Table**

| A | B | X |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

# SAMPLE COMBINATIONAL CIRCUIT

Consider the following Boolean expression A(B + C)




| A | B | C | B + C | A(B + C) |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

# REFERENCES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3. Mehta V K, Mehta Rohit, “Principles of Electrical Engineering and Electronics”, S.Chand & Company Ltd, (2010)- UNIT I and II
4. Mehta V K, Mehta Rohit, “Principles of Electronics”, S.Chand & Company Ltd, (2005)- UNIT IV and V


# THANK YOU