Assam Textile Institute
Empowering Textile Education

COURSE TITLE = TEXTRONICS
COURSE CODE= TT-603

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:Digital Logic Gate:

➤ ***Logic gates*** are the basic building blocks of any digital system. It is an electronic circuit having one or more than one input and only one output. The relationship between the input and the output is based on a certain logic. Based on this, logic gates are named as -
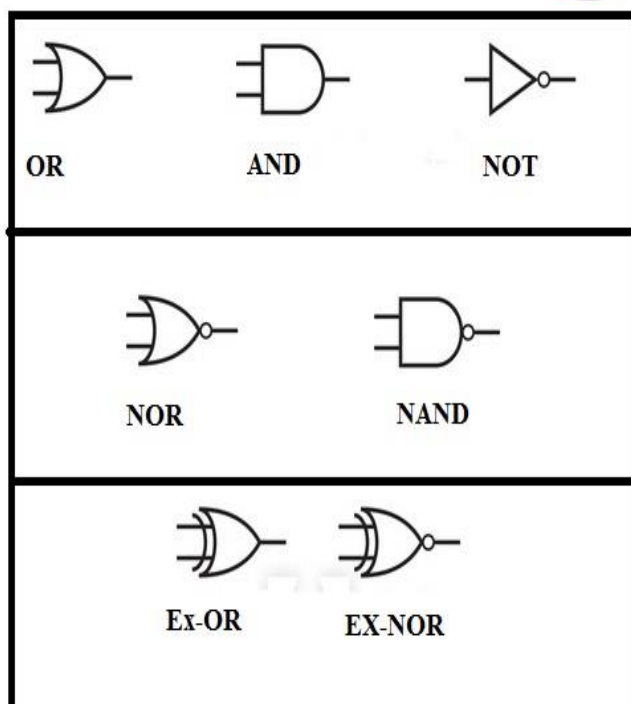
    OR gate, AND gate, NOT gate,

    NOR gate, NAND gate,

    Exclusive-OR gate, Exclusive-NOR gate etc.

❑ ***Universal Logic Gate***: A universal gate is a a gate which can implement any Boolean function without use any other gates.
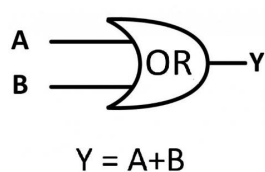
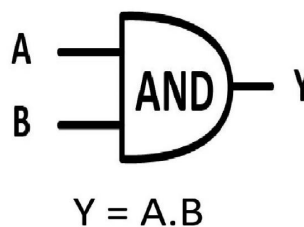   The ***NAND and NOR*** gates are universal logic gates.

: Truth Table of Logic Gates :
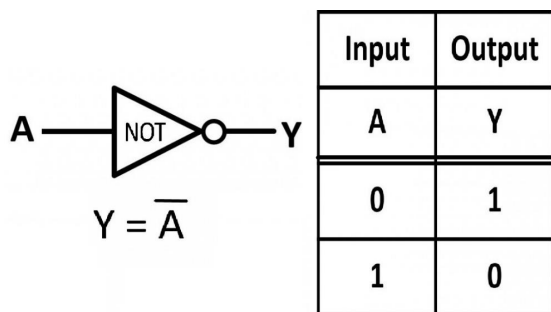
➡️ *Block Diagram and Truth Table of* **OR** *gate.*

$$Y = A+B$$

Inputs		Output
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

➡️ *Block Diagram and Truth Table of* **AND** *gate.*

$$Y = A.B$$

Inputs		Output
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

➡️ *Block Diagram and Truth Table of* **NOT** *gate.*

$$Y = \overline{A}$$

Input	Output
A	Y
0	1
1	0

➡️ *Block Diagram and Truth Table of* **BUFFER** *gate.*

$$Y = A$$
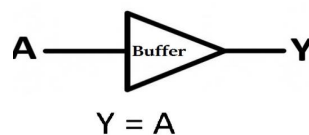
Input	Output
A	Y
0	0
1	1

: Truth Table of Logic Gates :

Block Diagram and Truth Table of NOR gate.

NOR = OR + NOT

A ──┐
    NOR○─ Y
B ──┘

$Y = \overline{A+B}$

Inputs		Output
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0
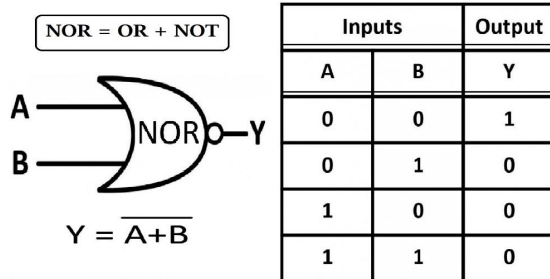
Block Diagram and Truth Table of NAND gate.

NAND = AND + NOT

A ──┐
    NAND○─ Y
B ──┘

$Y = \overline{A.B}$

Inputs		Output
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0
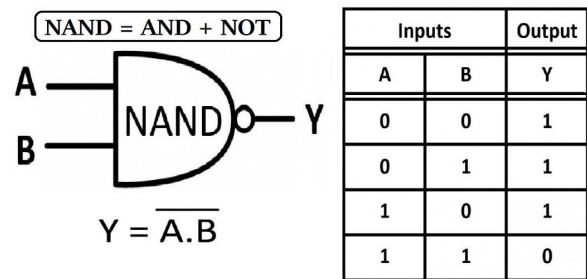
Block Diagram and Truth Table of Ex-OR gate.

A ──┐
    XOR─ Y
B ──┘

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

$Y = A \oplus B$

Inputs		Output
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0
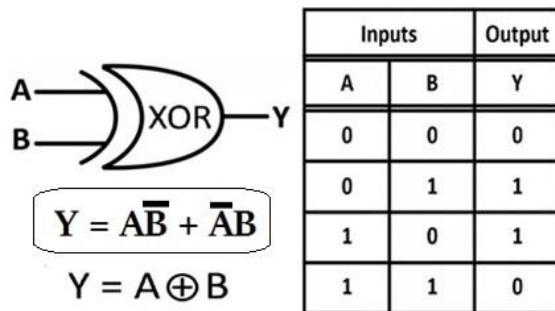
Block Diagram and Truth Table of Ex-NOR gate

Ex-OR + NOT = Ex-NOR

A ──┐
    XNOR○─ Y
B ──┘

$Y = \overline{A \oplus B}$
$= A \odot B$

$Y = AB + \overline{\overline{AB}}$

Inputs		Output
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1
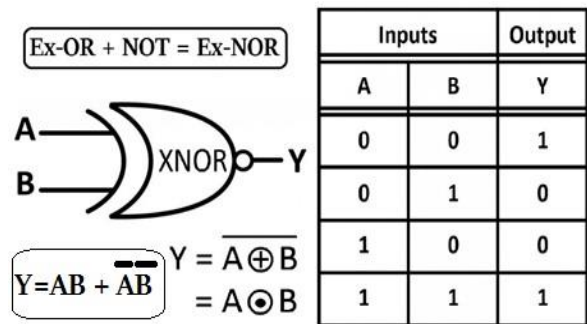
: RAM and ROM :

• **Random Access Memory (RAM) :**

➢ RAM is a form of data storage. It is a hardware in computing device where the operating system , applications & data in current use are kept so they can be quickly reached by the device's Processor .

➢ RAM is much faster to read and write in comparison to other kinds of storage in a computer, such as a hard disk drive (H.D.D) etc.

➢ Data remains in RAM as long as the computer is running, When the computer is turned off, RAM loses its data.

• **Read Only Memory (ROM) :**

➢ The instructions in ROM prepare the computer for use.

➢ These instructions can only be read and cannot be changed or deleted.

➢ Writing new information or instruction into the ROM is not possible.

➢ ROM stores data and instructions permanently. When the power is switched off, the instructions stored in ROM are not lost.

: Differences between RAM and ROM :

RAM

➢ Volatile*(maintains its data while the device is powered).*

➢ Stores information temporary.

➢ Requires flow of electricity to retain data.

➢ Large size with higher capacity

➢ Used for both read and write

➢ Very fast but uses a lot of power

➢ Used in CPU cache, primary memory

➢ Costlier

ROM

➢ Non-Volatile *(does not lose content when power is lost).*

➢ Stores information permanently.

➢ Does not require flow of electricity to retain data.

➢ Small size with less capacity

➢ Used only for reading

➢ Fast but uses very little power

➢ Used in firmware, microcontrollers.

➢ Cheaper than RAM

: Types of RAM and ROM :

Types of memory

- RAM
  - SRAM
  - DRAM
- ROM
  - PROM
  - EPROM
  - EEPROM
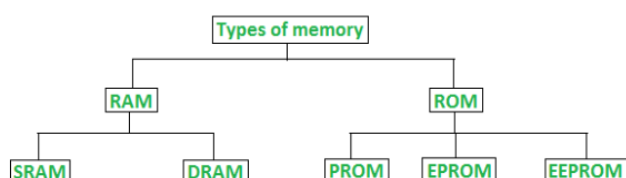
DRAM (Dynamic RAM)	SRAM (Static RAM)
1. Constructed of tiny capacitors that leak electricity.	1. Constructed of circuits similar to D flip-flops.
2. Requires a recharge every few milliseconds to maintain its data.	2. Holds its contents as long as power is available.
3. Inexpensive.	3. Expensive.
4. Slower than SRAM.	4. Faster than DRAM.
5. Can store many bits per chip.	5. Can not store many bits per chip.
6. Uses less power.	6. Uses more power.
7. Generates less heat.	7. Generates more heat.
8. Used for main memory.	8. Used for cache.

Types of Read Only Memory (ROM)

1. **PROM** *(Programmable read-only memory)* – It can be programmed by user. Once programmed, the data and instructions in it cannot be changed.

1. **EPROM** *(Erasable Programmable read only memory)* – It can be reprogrammed. To erase data from it, expose it to ultra violet light. To reprogram it, erase all the previous data.

2. **EEPROM** *(Electrically erasable programmable read only memory)* – The data can be erased by applying electric field, no need of ultra violet light. We can erase only portions of the chip.