# Alternative Gates
# &
# Digital Logic States

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# Outline

➢ Alternative Gates
  ▪ AND
  ▪ NAND
  ▪ OR
  ▪ NOR
  ▪ XOR
  ▪ XNOR

➢ Digital Logic States

# Alternative Gates

In many cases we can have unavailability of a particular Logic Gate. For example, we only have OR & NOT gate IC and we want to perform AND operation.

In such case we can prepare alternative of AND Gate by bubbling the OR Gate (using NOT gate)

This new gate having combination of OR and NOT gate will work like the AND gate and is known as Alternative Gate.
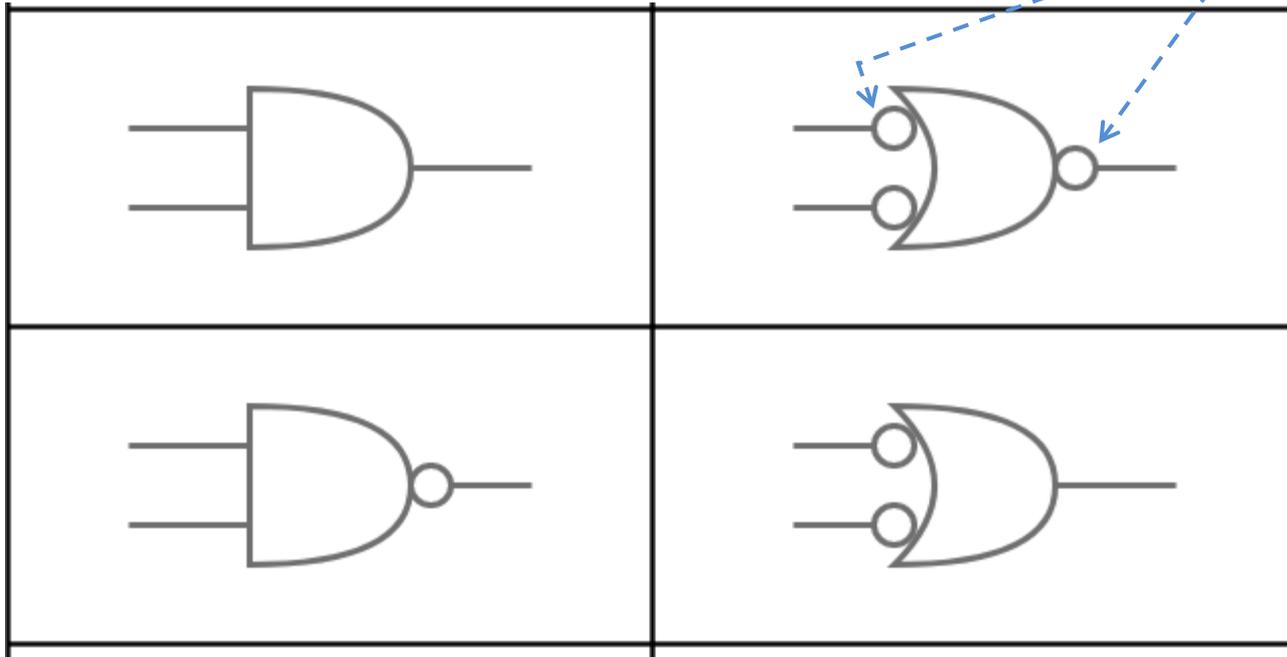
**Alternative Logic Gates** also called as Alternate Gates or Bubbled Gates are the logic gates that can be used during the unavailability of the given logic gates to produce the same output.
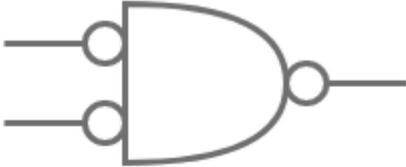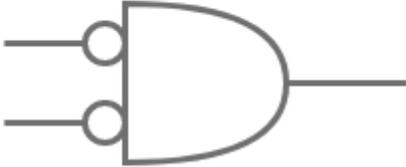
# Alternative for AND & NAND

**Original**          **Alternate**

*Bubble for NOT Operation*
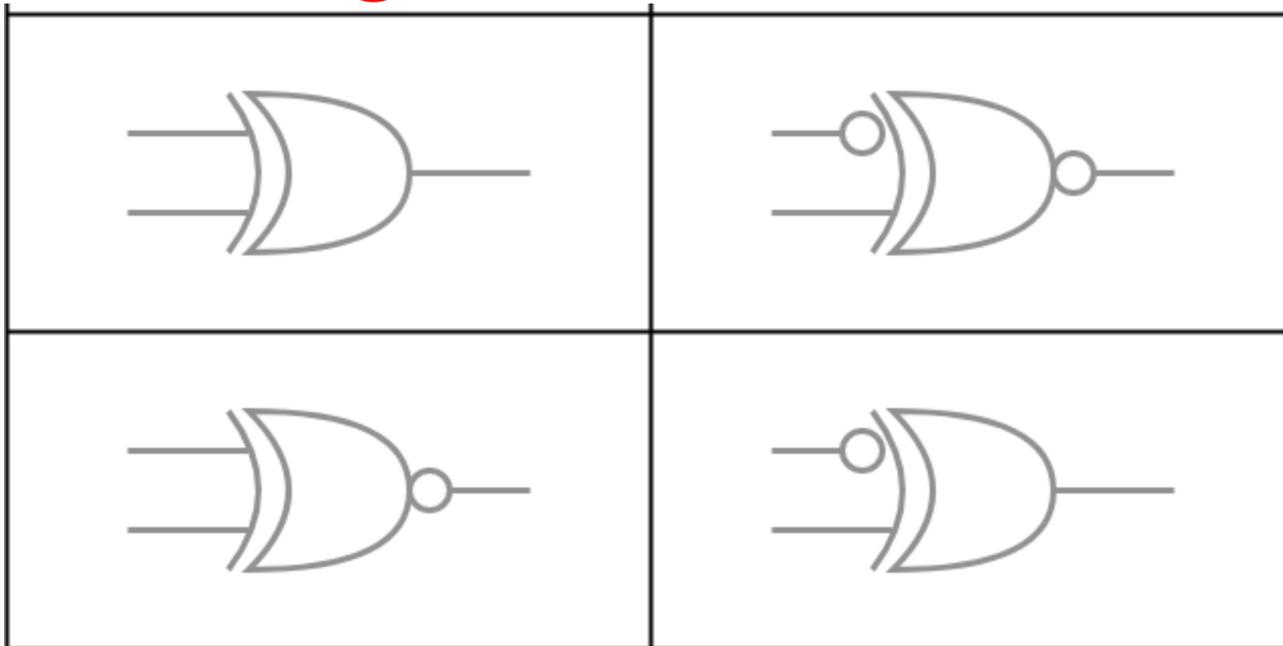
# Alternative for OR & NOR

# Alternative for XOR & XNOR

# Digital Logic States

In digital logic only two voltage levels or states are allowed and referred as Logic "1" and Logic "0", or HIGH and LOW, or TRUE and FALSE. These two states are represented in **Boolean Algebra** and standard truth tables by the binary digits of "**1**" and "**0**" respectively. An example of a digital state is a simple light switch. The switch can be either "ON" or "OFF", one state or the other, **but not both at the same time**.

Most *digital logic gates* and digital logic systems use "**Positive Logic**", in which a logic level "0" or "LOW" is represented by a **zero voltage**, **0V or ground** and a logic level "1" or "HIGH" is represented by a higher voltage such as **+5 volts.**

| Boolean Algebra | Boolean Logic | Voltage State |
|---|---|---|
| Logic "1" | TRUE (T) | HIGH (H) |
| Logic "0" | FALSE (F) | LOW (L) |

**NOTE:** The switching from one voltage level to the other, from either a logic level "0" to a "1" or a "1" to a "0" being made **as quickly as possible** to prevent any faulty operation of the logic circuit.

**NOTE:** There also exists a complementary "Negative Logic" system in which the values and the rules of a logic "0" and a logic "1" are reversed.