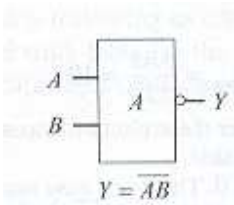
NAND Gate:

An NAND gate has two or more inputs and a single output , and it operates in accordance with the following definition.

The output of an NAND assumes the 0 state if and only if all inputs assume the 1 state.

The logic symbol, Boolean expression, and truth table for the NAND are given in figure below.



Input		Output
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(b)

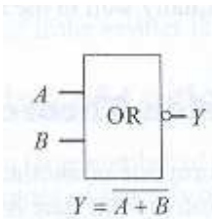
So NAND gate is the combination of AND gate and NOT gate.

NOR Gate:

An NOR gate has two or more inputs and a single output , and it operates in accordance with the following definition.

The output of an NOR assumes the 1 state if and only if all inputs assume the 0 state.

The logic symbol, Boolean expression, and truth table for the NAND are given in figure below.



Input		Output
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(b)

So NOR gate is the combination of OR gate and NOT gate.

Realization of NAND and NOR gates:

NAND & NOR Gates can be implemented by using

1. Diode-Transistor Logic (DTL)

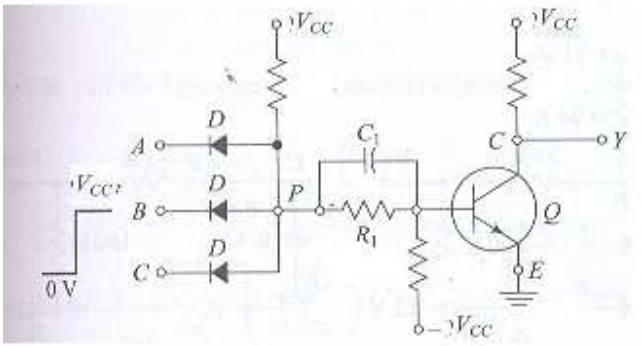
2. Resistor-Transistor Logic (RTL)

Circuits involving diodes and transistors are called diode transistor logic(DTL) gates.

Circuits involving resistors and transistors are called Resistor transistor logic (RTL) gates.

Diode- Transistor Logic:

The NAND may be implemented by placing a transistor NOT circuit after the diode AND circuit as shown in figure below. This is the positive logic NAND gate.



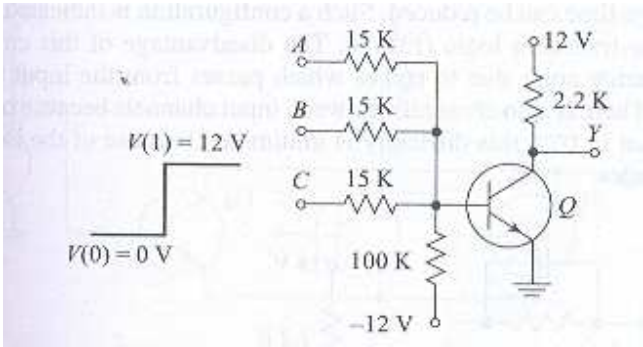
Similarly we can implement negative logic NAND , positive and negative logic NOR gates simply by placing NOT gate after the corresponding gate.

Resistor-Transistor Logic:

In the DTL by replacing diodes with resistors resistor transistor logic will be obtained.

By using RTL also we can implement NAND and NOR gates for the required logic, simply by choosing proper resistor values.

For example, we have resistor transistor logic positive NOR gate is shown below.



Here if all inputs are in low state, then Q is OFF so output is in HIGH state.

If at least one input is in high state, then Q is in ON state and output is low.

The RTL gate has a relatively slowly transient response due to the junction capacitance of a transistor. By using capacitors in parallel with input resistor its response will be improved. Then this circuit is named as RCTL logic circuit. It is shown below.

RCTL means resistor capacitor transistor logic.