The Basic Latch

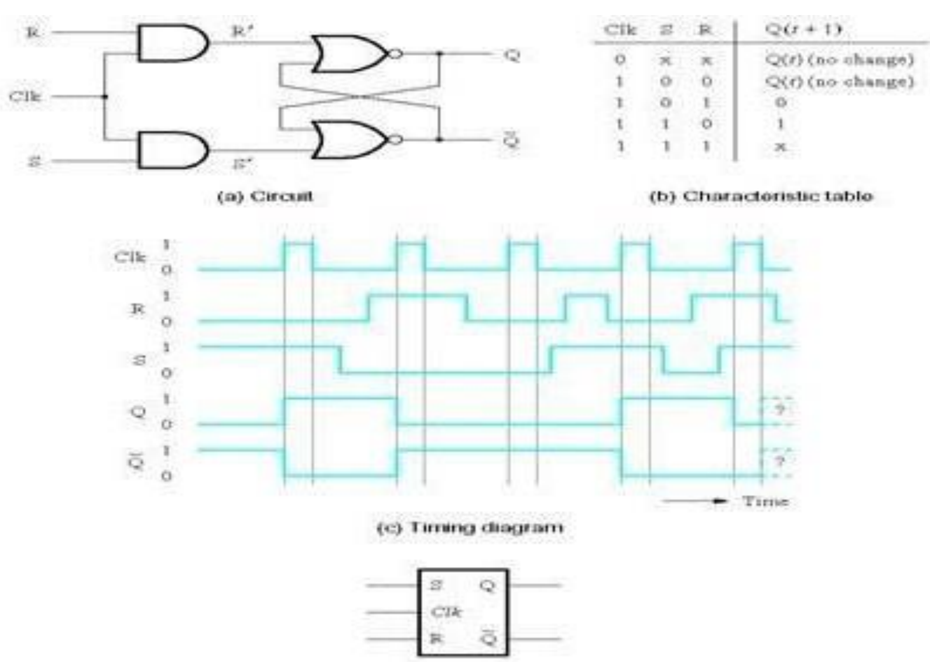
- **Basic latch**is a feedback connection of two NOR gates or two NAND gates
- It can store one bit of information

It can be set to 1 using the *S* input and reset to 0 using the *R* input

The Gated Latch

- **Gated latch** is a basic latch that includes input gating and a control signal
- The latch retains its existing state when the control input is equal to 0
- Its state may be changed when the control signal is equal to 1. In our discussion we referred to the control input as the clock
- We consider two types of gated latches:
  - **Gated SR latch** uses the *S* and *R* inputs to set the latch to 1 or reset it to 0, respectively.
  - **Gated D latch** uses the *D* input to force the latch into a state that has the samelogic value as the *D* input.

Gated S/R Latch

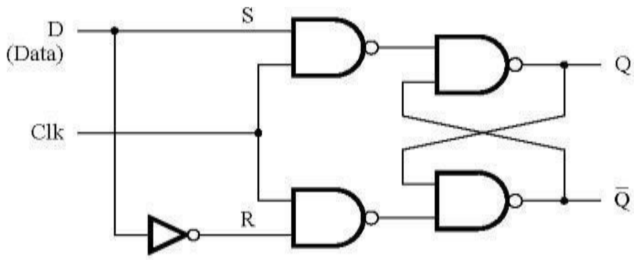


(a) Circuit (b) Characteristic table

(c) Timing diagram

(d) Graphical symbol

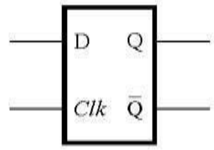
Gated D Latch



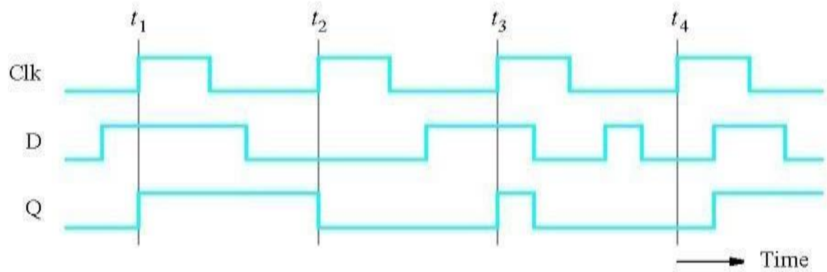
(a) Circuit

Clk	D	$Q(t+1)$
0	x	$Q(t)$
1	0	0
1	1	1

(b) Characteristic table



(c) Graphical symbol



(d) Timing diagram

Setup and Hold Times

- Setup Time t_{su}

  The minimum time that the input signal must be stable prior to the edge of the clock signal.

- Hold Time t_h

  The minimum time that the input signal must be stable after the edge of the clock signal.