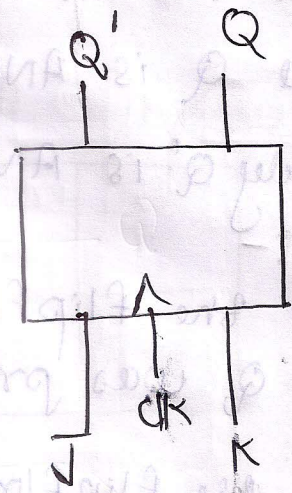
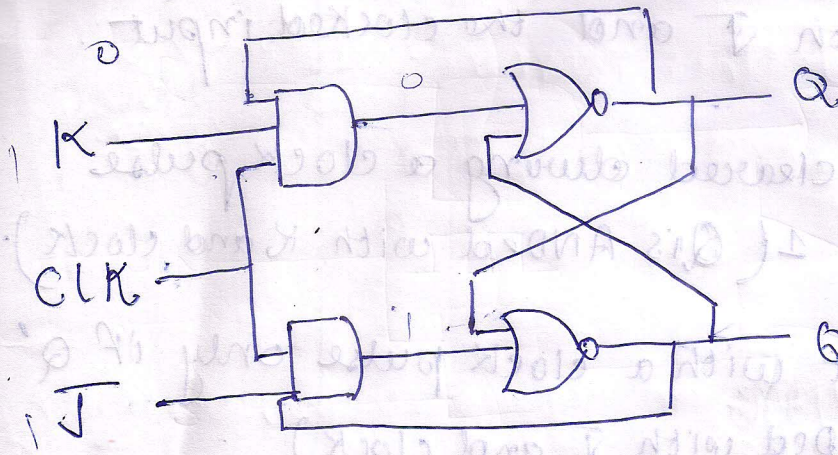


22/04/2015

## Clocked JK FlipFlop:-



Symbol of JK FlipFlop:-  
(+ve edge)

Characteristic Table

| Q | J | K | Q(t+1) |
|---|---|---|--------|
| 0 | 0 | 0 | 0      |
| 0 | 0 | 1 | 0      |
| 0 | 1 | 0 | 1      |
| 0 | 1 | 1 | 1      |
| 1 | 0 | 0 | 1      |
| 1 | 0 | 1 | 0      |
| 1 | 1 | 0 | 1      |
| 1 | 1 | 1 | 0      |

| Q | J | K | 00 | 01 | 11 | 10 |
|---|---|---|----|----|----|----|
| 0 |   |   |    |    | 1  | 1  |
| 1 | 1 |   |    |    |    | 1  |

$$Q(t+1) = JQ' + K'Q$$

## JK FlipFlop:-

A JK FlipFlop is the refinement of RS FlipFlop in that the intermediate (or indeterminate) state of the RS FlipFlop is defined in the JK FlipFlop.

Input J is for Set  
K is for Reset

when inputs are applied to both J and K simultaneously, the flipflop switches to its complement state.



## Clocked JK Flipflop:-

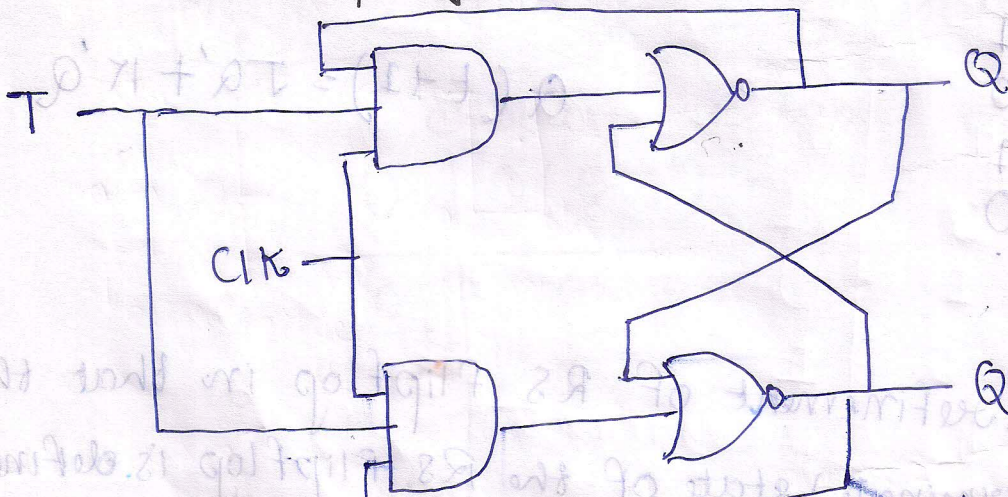
- 1) Output  $Q$  is ANDed with  $K$  and the clocked input.
- 2) Similarly  $Q'$  is ANDed with  $J$  and the clocked input.

Reason:-

- 1) So that the flipflop is cleared during a clock pulse only if  $Q$  was previously 1 ( $Q$  is ANDed with  $K$  and clock).
  - 2) So that the flipflop is set with a clock pulse only if  $Q'$  was previously 1 ( $Q'$  is ANDed with  $J$  and clock).
- \* When both  $J$  and  $K$  are 1, the clock pulse is transmitted through one AND GATE only.

⇒ The one whose input is connected to the flipflop output which is presently equal to 1.

Clocked T Flipflop :- "Toggle"



The T Flipflop is a single input version of the JK Flipflop.



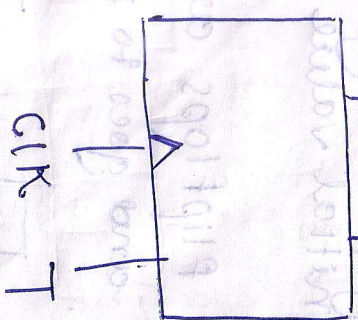
# Characteristic Table :-

| $Q$ | $T$ | $Q(t+1)$ |
|-----|-----|----------|
| 0   | 0   | 0        |
| 0   | 1   | 1        |
| 1   | 0   | 1        |
| 1   | 1   | 0        |

| $Q$ | $T$ | $Q$ |
|-----|-----|-----|
| 0   | 0   | 0   |
| 0   | 1   | 1   |
| 1   | 0   | 1   |
| 1   | 1   | 0   |

$$Q(t+1) = Q \cdot T + Q' \cdot T'$$

| $CLK$ | $T$ | $Q(t+1)$    |
|-------|-----|-------------|
| 0     | X   | $Q_t$       |
| 1     | 0   | $\bar{Q}_t$ |
| 1     | 1   | $\bar{Q}_t$ |



\* Regardless of the present state of the flipflop, it assumes the complement state when the clock pulse occurs while input  $T$  is logic 1.