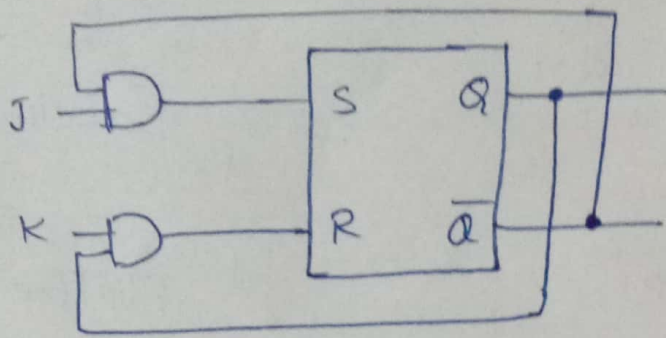


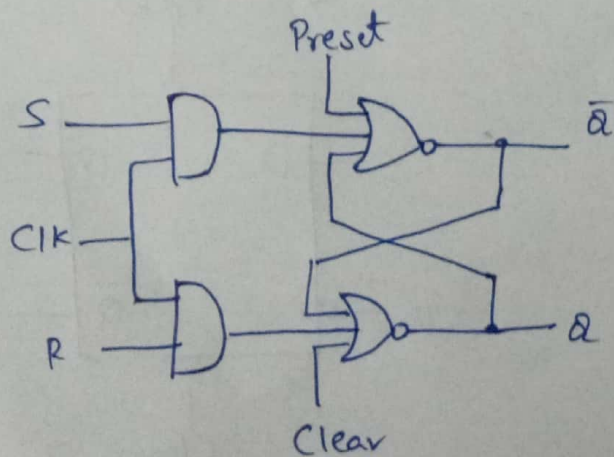
Latch J-K Flip Flop



$$Q^+ = J\bar{Q} + \bar{K}Q$$

| JK | Q | |
|----|---|---|
| | 0 | 1 |
| 00 | 0 | 1 |
| 01 | 0 | 0 |
| 11 | 1 | 0 |
| 10 | 1 | 1 |

$J\bar{Q}$ (points to the 1 in the 10 row, 0 column)
 $\bar{K}Q$ (points to the 1 in the 10 row, 1 column)



Preset = 1, Clear = 0 → Set

Preset = 0, Clear = 1 → Clear

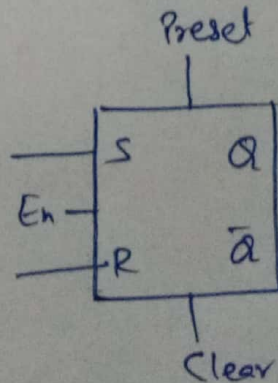
| J | K | Q | S | R | Q ⁺ |
|---|---|---|---|---|----------------|
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 | 1 | 0 |

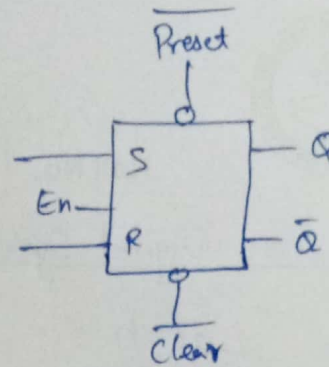
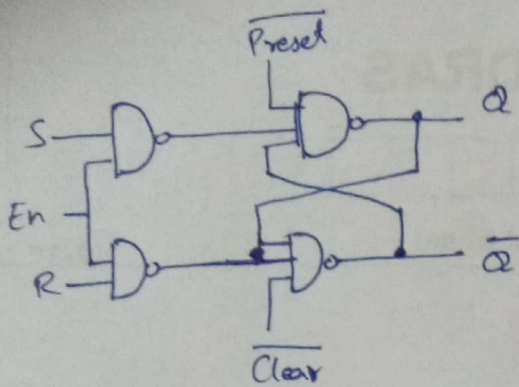
T-Latch
For ~~J-K~~ Flip Flop

$$Q^+ = T \oplus Q$$

Preset and Clear

Asynchronous inputs





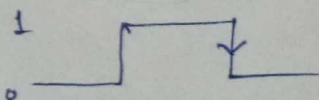
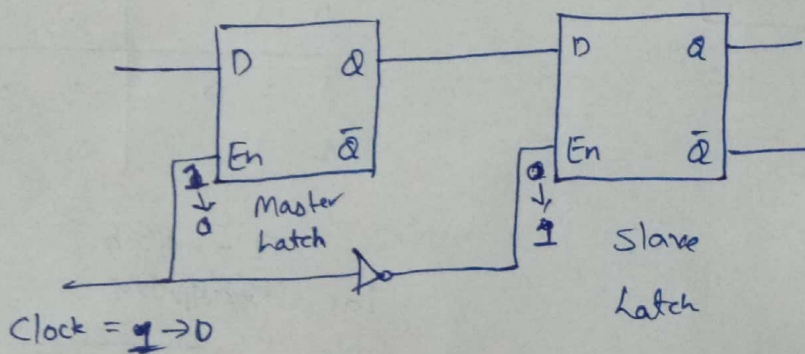
$\overline{\text{Clear}}=1, \overline{\text{Preset}}=0 \Rightarrow Q=1, \overline{Q}=0$

$\overline{\text{Preset}}=1, \overline{\text{Clear}}=0 \Rightarrow Q=0, \overline{Q}=1$

Edge Triggered D-Flip Flop

Latch-level triggered

FlipFlop - Edge triggered



negative edge-triggered master-slave DFF

Positive edge (or) rising edge $\begin{matrix} 1 \\ \uparrow \\ 0 \end{matrix}$

negative edge (or) falling edge $\begin{matrix} 1 \\ \downarrow \\ 0 \end{matrix}$

