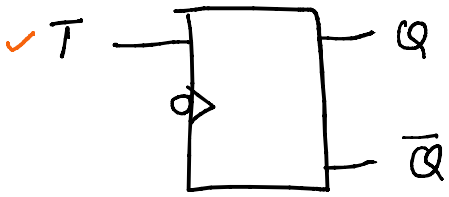
synchronous inputs &Asynchronous inputs

T

The normal data **inputs** to a **flip flop** (D, S and R, or J and K) are referred to as **synchronous inputs** because they have an effect on the outputs (Q and not-Q) only in step, or in sync, with the clock signal transitions.

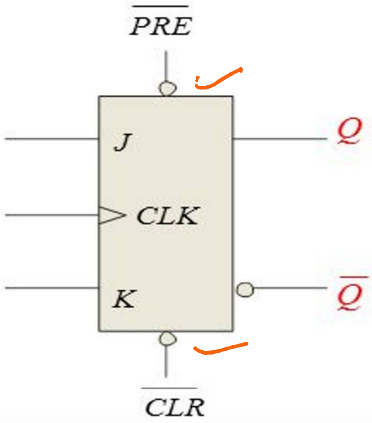


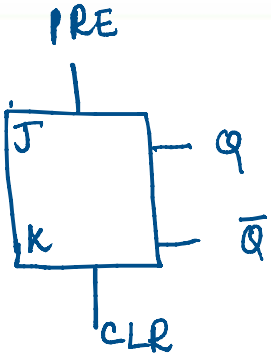
-ve edge triggered T flip flop

Synchronous inputs (for example the *D* or *J-K* inputs) affect the output on the triggering edge of the clock. Most flip-flops also have other inputs that are *asynchronous*, meaning they affect the output independent of the clock.

Two such inputs are normally labeled *PRE* (preset) and *CLR* (clear). These inputs are usually active LOW, as shown here.

Other common names for these pins are *SET* and *RESET*.





$\overline{PRE}$, $\overline{CLR}$ } Active low Asynchro

PRE, CLR → Active high Asynchronous i/p

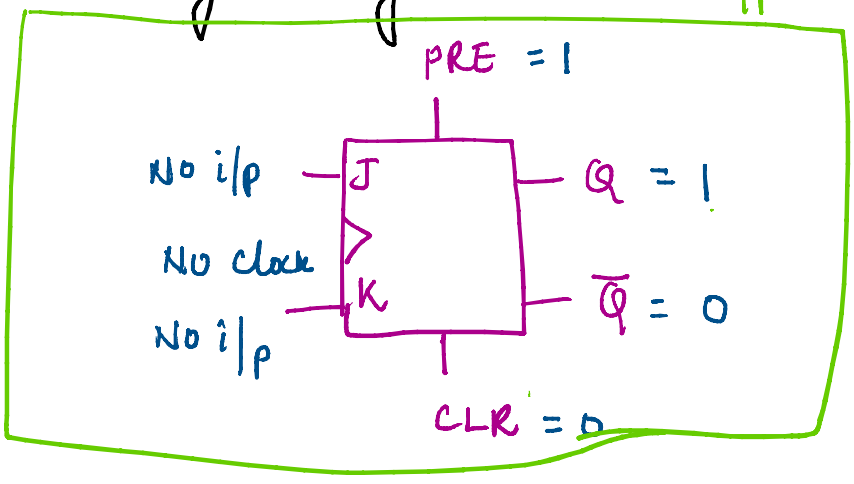
active high means, we need to give logic '1' at asynchronous i/p

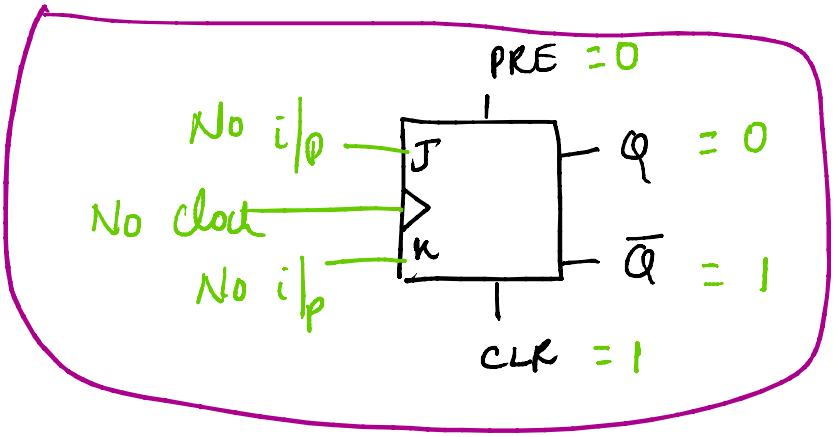
active low means, we need to give logic '0' at asynchronous i/p.

Flip-flops with Asynchronous Preset and Clear

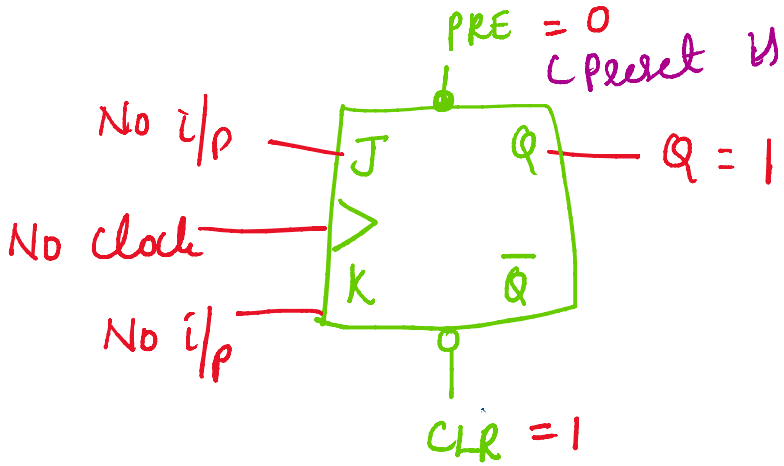
- It is often necessary to initialize a flip-flop to a known state before the circuit operation starts.
  - *Preset* (sets $Q = 1$) and *Clear* (sets $Q = 0$).
  - These are asynchronous operations, and can be easily implemented by using additional inputs on the cross-coupled gates.
    - The term "*asynchronous*" means that it does not depend on the clock.

Active high Asynchronous i/ps

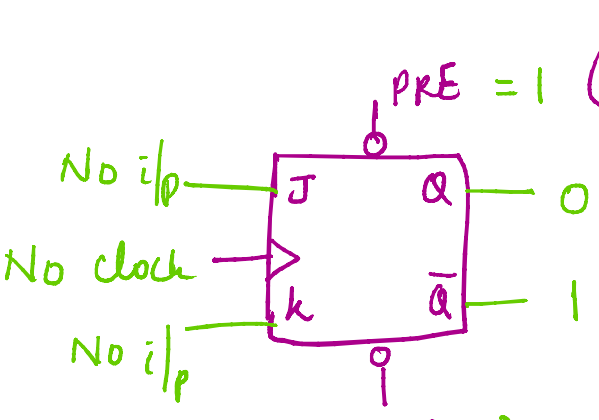




Active low Asynchronous flip flop

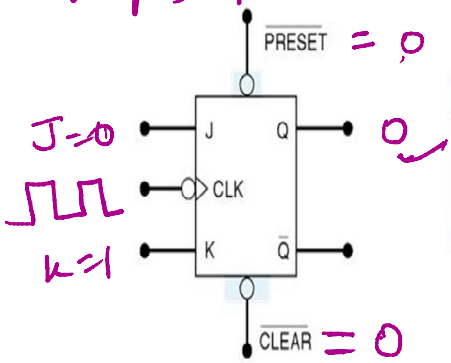


Preset means set i.e Q=1



Asynchronous inputs (override inputs) operate independently of the synchronous inputs and clock and can be used to set the FF to 1/0 states *at any time*.

JK flip flop with Active low Preset and clear

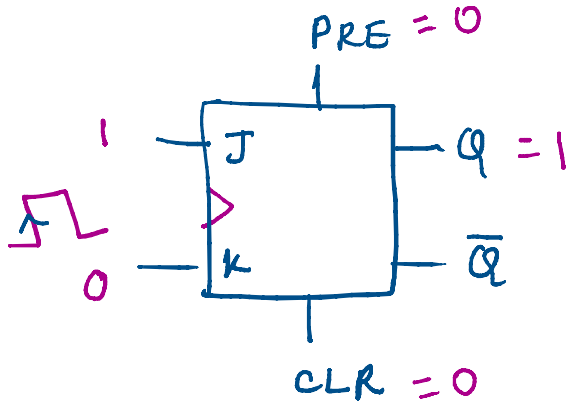


PRESET	CLEAR	FF response
1	1	Clocked operation*
0	1	Q = 1 (regardless of CLK)
1	0	Q = 0 (regardless of CLK)
0	0	Not used

*Q will respond to J, K, and CLK

→ Asynchronous will not be activated

logic diagram of basic JK flip flop with Active high Preset and clear



PRE	CLR	FF response
0	0	clocked operation
0	1	Q = 0
1	0	Q = 1
1	1	Not used