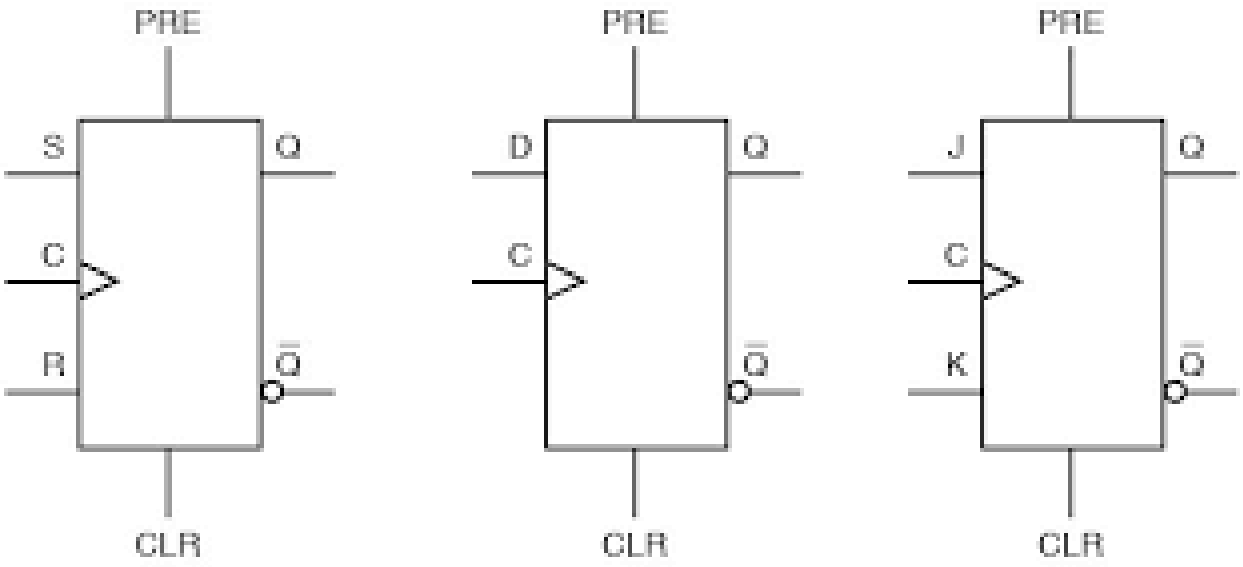
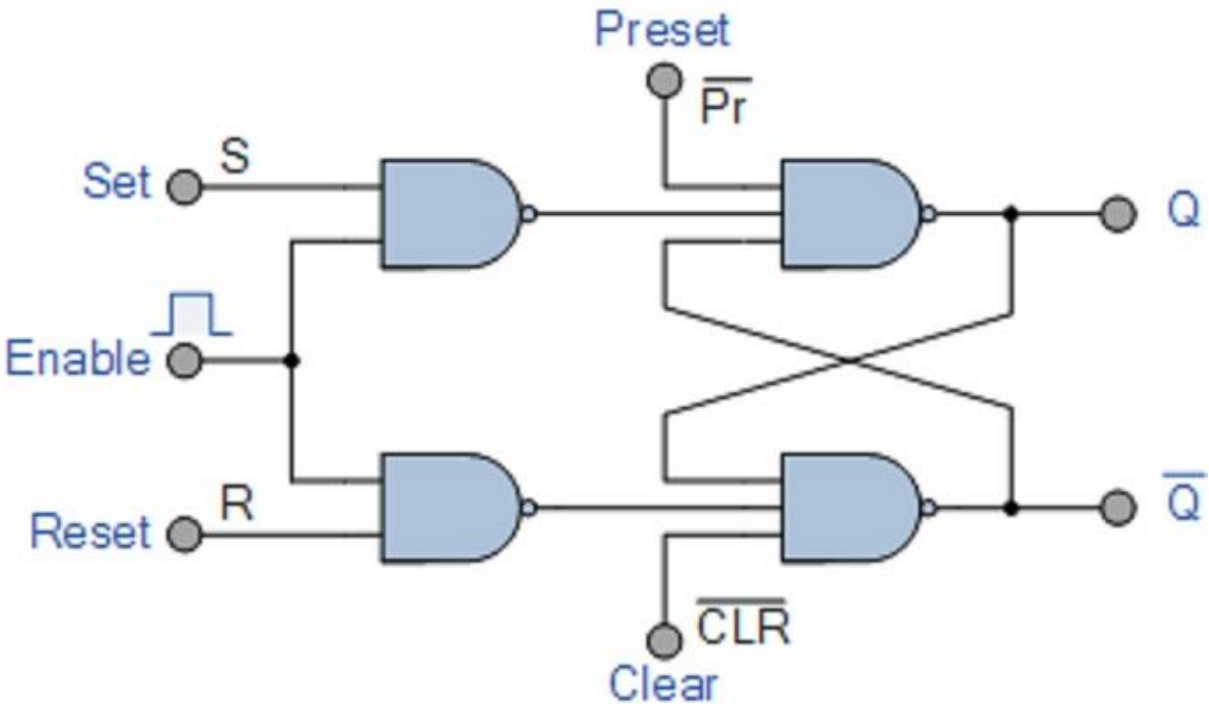
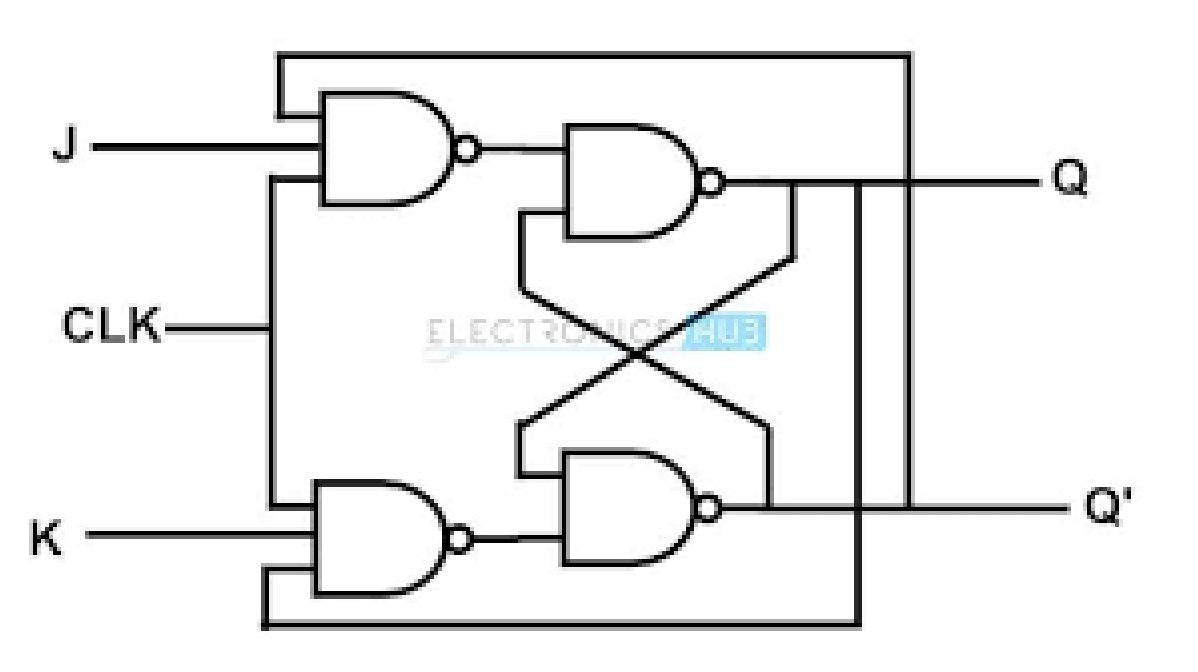
Asynchronous Preset and Clear Inputs in FFs






J
CLK
K
Q
Q'

4.10 JK FLIP-FLOP

[June 07]

Q. Write truth table of JK flip-flop.

- In SR flip-flop the input condition $S_n = R_n = 1$ results in uncertain state.
- This can be eliminated by using JK flip-flop.

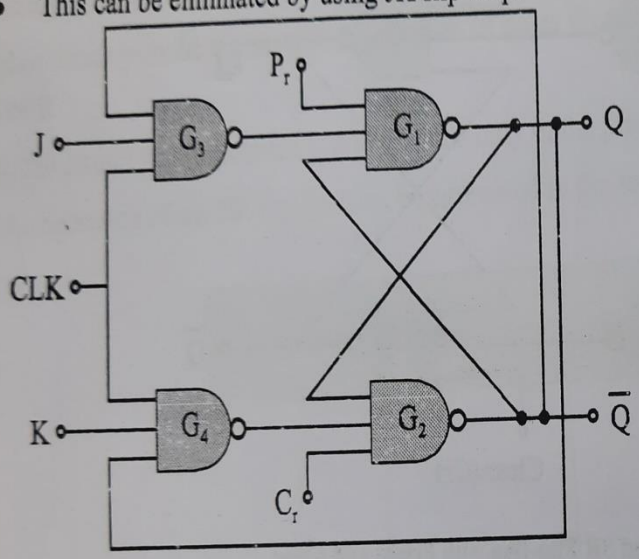


Fig. 4.11 : Logic Diagram of JK Flip-flop

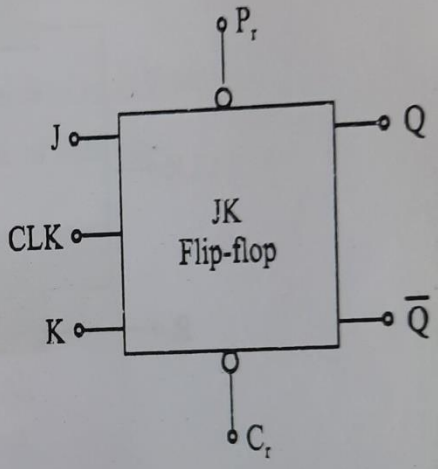


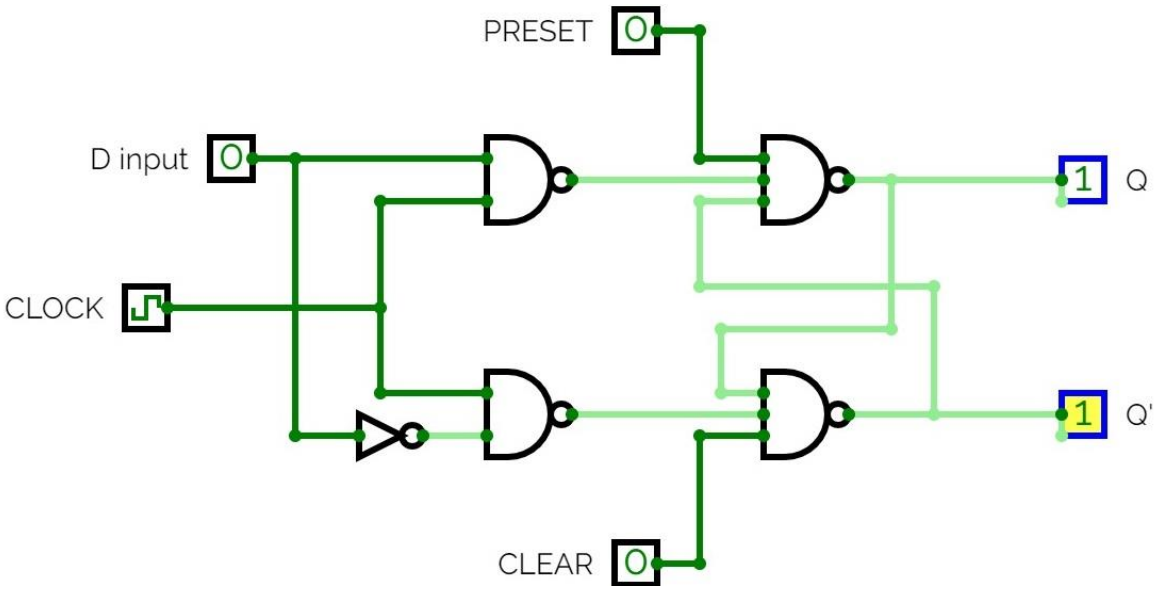
Fig. 4.12 : Logic Symbol of JK Flip-flop

- The operation of JK flip-flop can be expressed in the form of truth table.

Input		Output
J_n	K_n	Q_{n+1}
0	0	Q_n
1	0	1
0	1	0
1	1	$\overline{Q}_n$

Table 4.4 : Truth Table of JK Flip-flop

	Input					Output	
	Preset	Clear	CLK	J	K	Q	$\overline{Q}$
Invalid	0	0	X	X	X	1*	1*
Preset	0	1	X	X	X	1	0
Clear	1	0	X	X	X	0	1
No change	1	1	X	X	X	Qo	$\overline{Qo}$
No change	1	1	↓	0	0	Qo	$\overline{Qo}$
Reset	1	1	↓	0	1	0	1
Set	1	1	↓	1	0	1	0
Toggle	1	1	↓	1	1	$\overline{Qo}$	Qo



TRUTH TABLE

INPUTS				OUTPUTS	
$\overline{PR}$	$\overline{CLR}$	CLK	D	Q	$\overline{Q}$
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	X	X
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	X	Q_0	$\overline{Q}_0$