Toggle Flip Flop

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T Flip Flop

A T flip flop is known as a toggle flip flop because of its toggling operation. It is a modified form of the JK flip flop. A T flip flop is constructed by connecting J and K inputs, creating a single input called T. Hence why a T flip flop is also known as a single input **JK flip flop**.

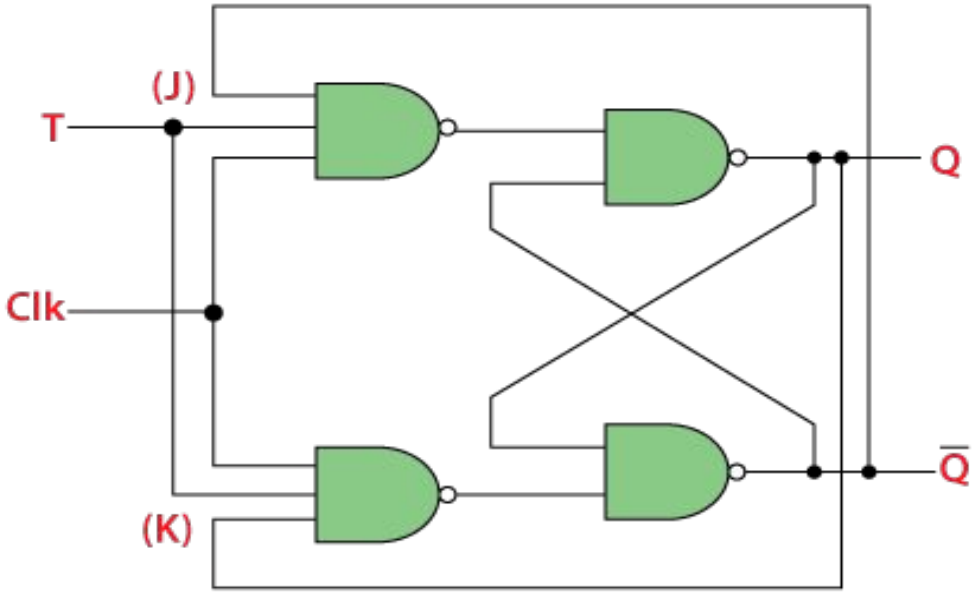


Fig: Logic Diagram of T Flip Flop

Deriving T Flip Flop from JK Flip Flop

If J=K in JK flip-flop then it will act as a T Flip-Flop. By observing the truth table of JK Flip-Flop, we can conclude that if J=K=1 then the previous state is toggle and if J=K=0 then the previous state remains unchanged.

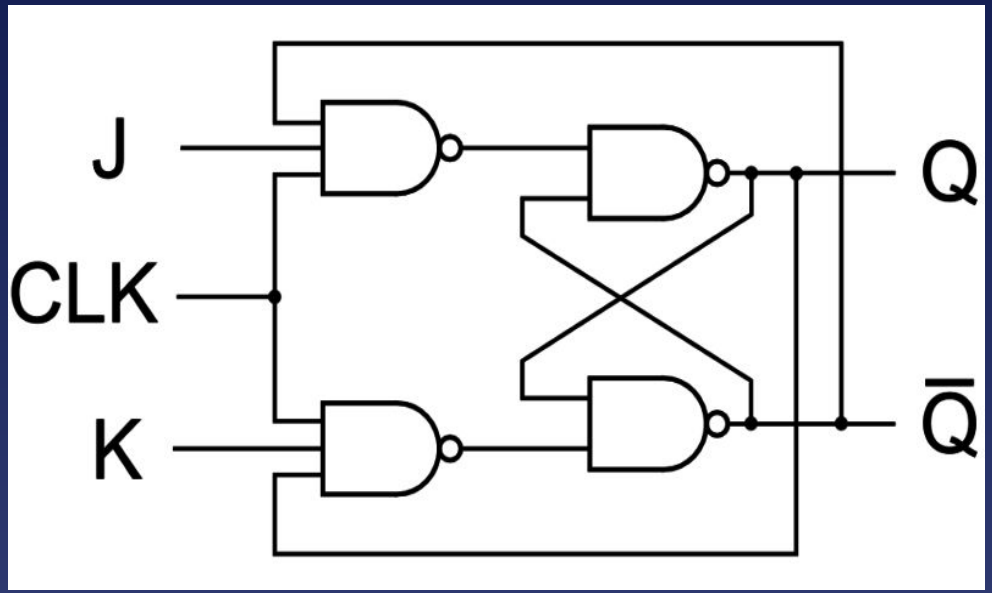


Fig: Logic Diagram of JK Flip-Flop

CP	J	K	Q	Q_{+1}	State
1	0	0	0	0	NO CHANGE
1	0	0	1	1	
1	0	1	0	0	RESET
1	0	1	1	0	
1	1	0	0	1	SET
1	1	0	1	1	
1	1	1	0	1	TOGGLES
1	1	1	1	0	

Truth Table of JK flip flop

Truth Table of and Excitation Table T Flip Flop

T	Present state Q_n	Next state Q_{n+1}
0	0	0
0	1	1
1	0	1
1	1	0

Truth table of T flip flop

Q_n	Q_{n+1}	T
0	0	0
0	1	1
1	0	1
1	1	0

Excitation table of T flip flop

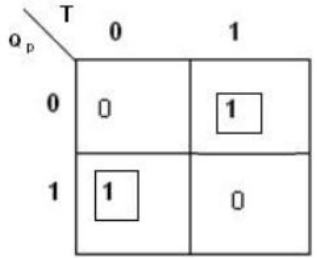
Characteristics Table of T Flip-Flop

CHARACTERISTIC EQUATION OF T FLIP-FLOP:

THE TRUTH TABLE IS AS

	Previous		New	
T	Q_p	Q_p (bar)	Q	Q (bar)
0	1	0	1	0
0	0	1	0	1
1	1	0	0	1
1	0	1	1	0

And the equation we get is as:

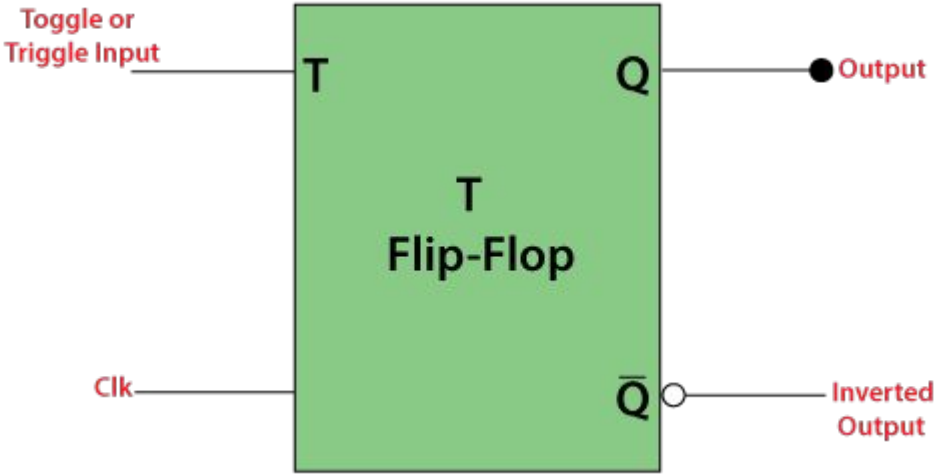


The Equation we get is

$Q = T\,Q_p' + T'\,Q_p$

$= T \text{ XOR } Q_p$

Block Diagram of T Flip Flop



Thank You