Exp. 07

Aim: To implement the circuit and to verify the truth table

Component: IC7474, IC7476, power supply, CRO

Theory:
Basically Flip-Flops are the bistable multivalue that stores logic 1 and 0. Shift register, memory and counters are built by using Flip-Flops. Sequential circuit (machine) outputs depends on the present state and input applied at that instant.

Types of flip flop
1. SR Flip Flop
2. JK Flip Flop
3. D Flip Flop
4. T Flip Flop

1 SR Flip Flop
The most common flip-flop is the SR flip-flop. This simple flip-flop circuit has a set input (S) and a reset input (R).
S → active, Q → high
Once the outputs are established, the wiring of the circuit is maintained until 'S' or 'R' go high, or power is turned off.

2 J-K Flip-Flop

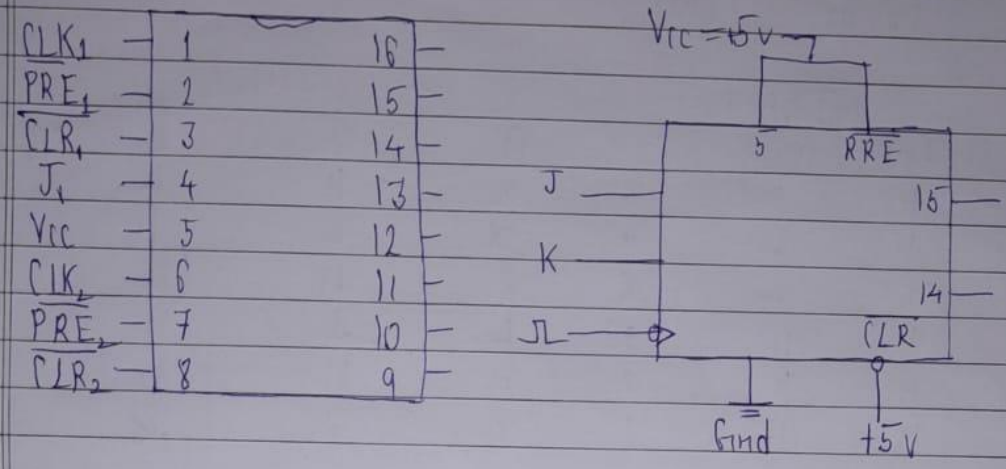
Due to the undefined state in the SR flip-flop. This sim The input condition of J = K = 1, given an output inverting the output state. However the outputs are the same when one tests the circuit praticaly.

I simple words,

If J and K data input are different, then Q takes the value of J at the next clock edge. If J and K are both low, then no change occurs.

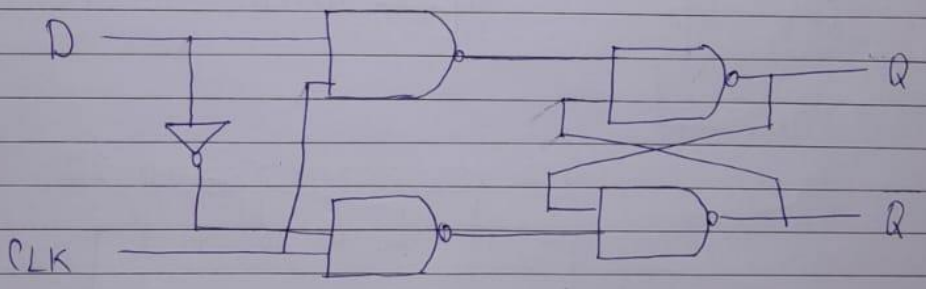
Truth Table:

Input					Outputs	
Present	Clear	CLK	J	K	Q	$\overline{Q}$
L	H	X	X	X	H	L
H	L	X	X	X	L	H
L	L	X	X	X	H	H
H	H	Ω	L	L	Q_0	$\overline{Q_0}$
H	H	Ω	L	H	L	H
H	H	Ω	H	L	H	L
H	H	Ω	H	H	Toggle	



3 D Flip-Flop

D flip-flop is a better alternative that is very popular with digital electronics. They are commonly used for counters and shift-registers and input synchronization.

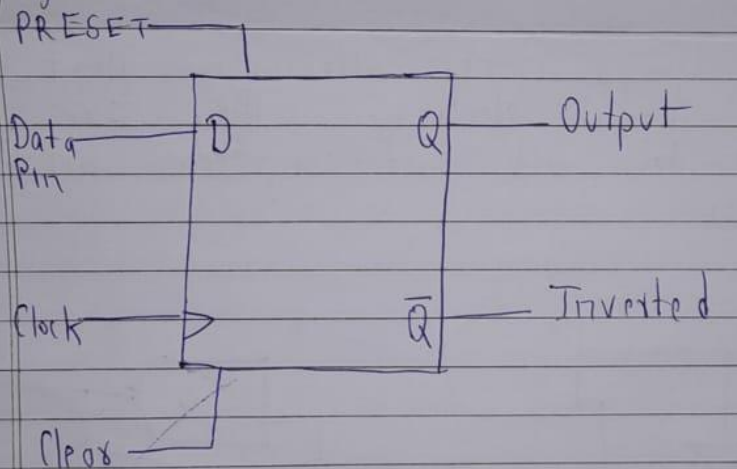


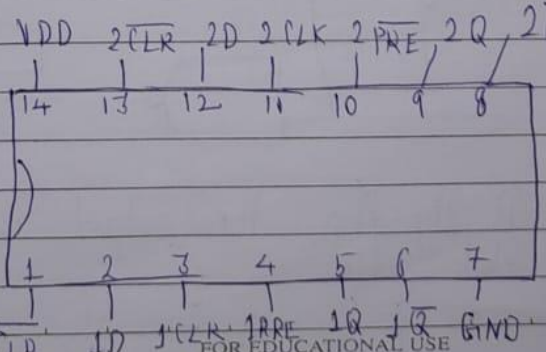
In the D flip-flop, the output can only be changed at the clock edge.

Truth Table :

INPUTS				Outputs	
PRE	CLR	CLK	D	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	x	X	L	H
L	L	X	X	H	H
H	H	↑	L	L	H
H	H	↑	H	H	L
H	H	L	X	Q_0	$\overline{Q_0}$

Symbol :-

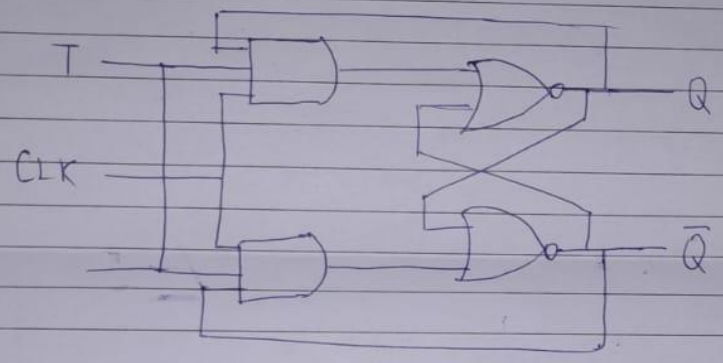




7474 FLOP

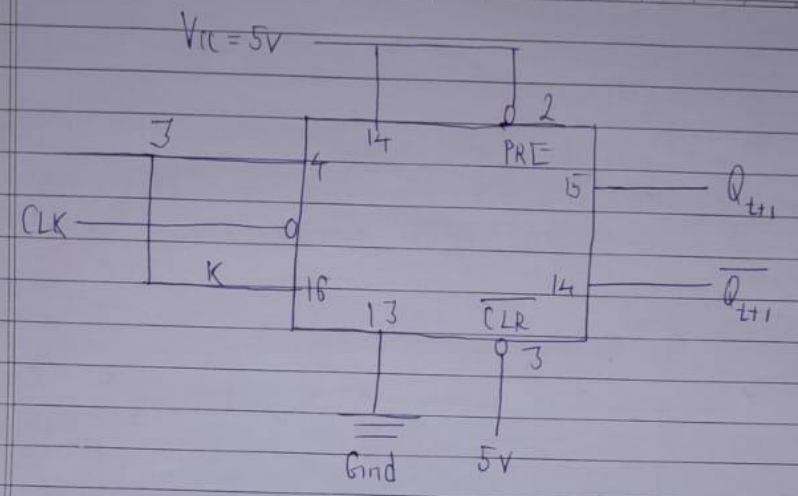
4 T Flip-Flop

A flip-flop is like a JK flip-flop. These are basically single-input versions of JK flip-flop. It has only one input along with the clock input.



Truth Table :-

T	Q	Q(t+1)
0	0	0
1	0	1
0	1	1
1	1	0



Application of Flip flops :-

- Counters
- Frequency Dividers
- Shift Registers
- Storage Registers

Procedure :-

1. Do the connections as per the circuit.
2. Verify the truth table of all the ~~verify~~ Flip - Flops

Conclusion :

I have understood the concept of Flip-Flops.

SR & D Flip Flop using DIP switch