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DLCOA

Experiment 8.

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Aim: Study of flip flops using IC's.

Apparatus:

Sr no.	Components
1	JK Flip flop.
2	D Flip flop
3	SR Flip flop.

Theory: Flip flops are the basic single-bit memory elements used to build sequential circuit with one or two inputs/outputs, designed using individual logic gates & feedback loops.

JK Flip Flop.

Characteristic eqn of JK flip flop is:

$$Q_{next} = J\bar{Q} + \bar{K}Q$$

Preset (PRE) and clear (CLR) are as anynchrouns active low inputs and operate immediately of the clock input.

D Flip Flop.

Characteristic eqn of D flip flop is $Q_{next} = D$. Following the hold time interval, data at the D inputs may be changed without affecting levels of output.

Truth Tables: JK Flip Flop.

Q_K	J	K	Q_{n+1}
0	x	x	Q_n
1	0	0	Q_n
1	0	1	0
1	1	0	1
1	1	1	$\overline{Q_n}$

SR Flip Flop

Q_K	S	R	Q_{n+1}	
0	x	x	Q_n	Memory
1	0	0	Q_n	Hold state
1	0	1	0	Reset
1	1	0	1	Set
1	1	1	Invalid	Unused

D Flip Flop

Q_K	D	Q_{n+1}	
0	x	Q_n	– Memory
1	0	0	} Buffer.
1	1	1	

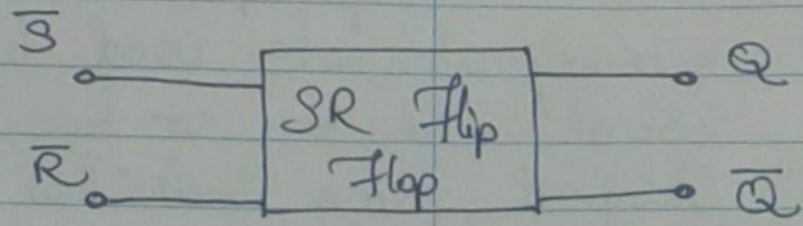
T Flip Flops

Q_K	T	Q_{n+1}	
0	x	Q_n	Memory
1	0	Q_n	Hold
1	1	$\overline{Q_n}$	Toggle.

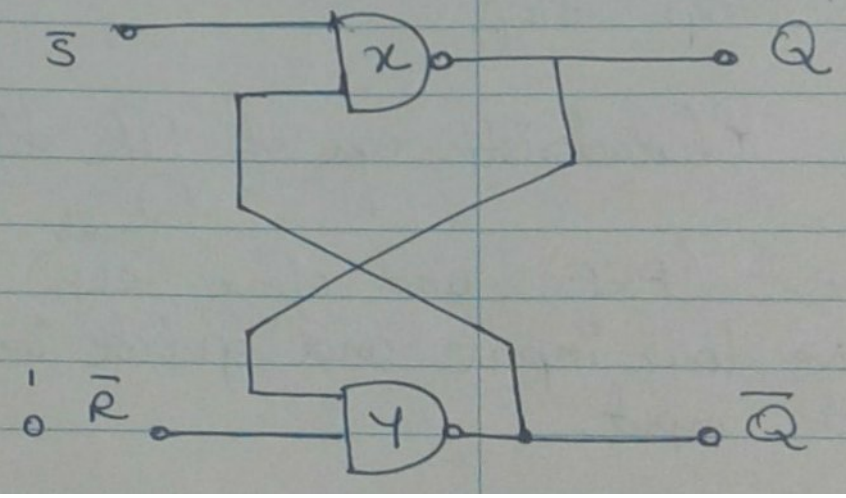
SR Flip Flop.

The SR flip flop is a 1 bit memory device having two inputs i.e SET & RESET.
The SR flip flop stands for 'Set-Reset' flip flop. The reset input is used to get back the flip flop to its original state from the current state with an output Q.

Block diagram:



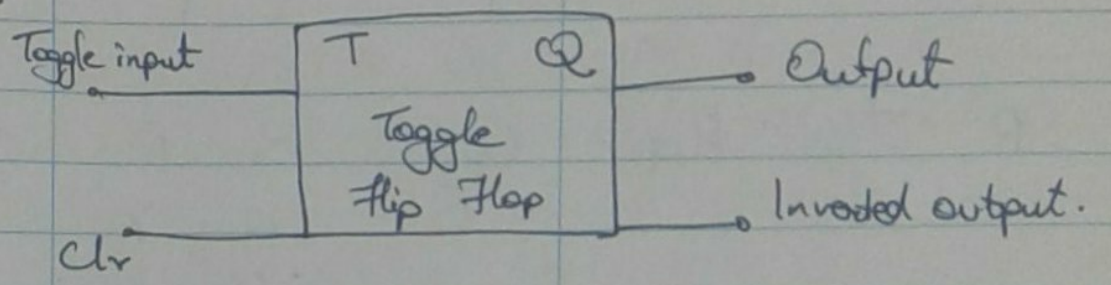
Circuit ~~diag~~ diagram.



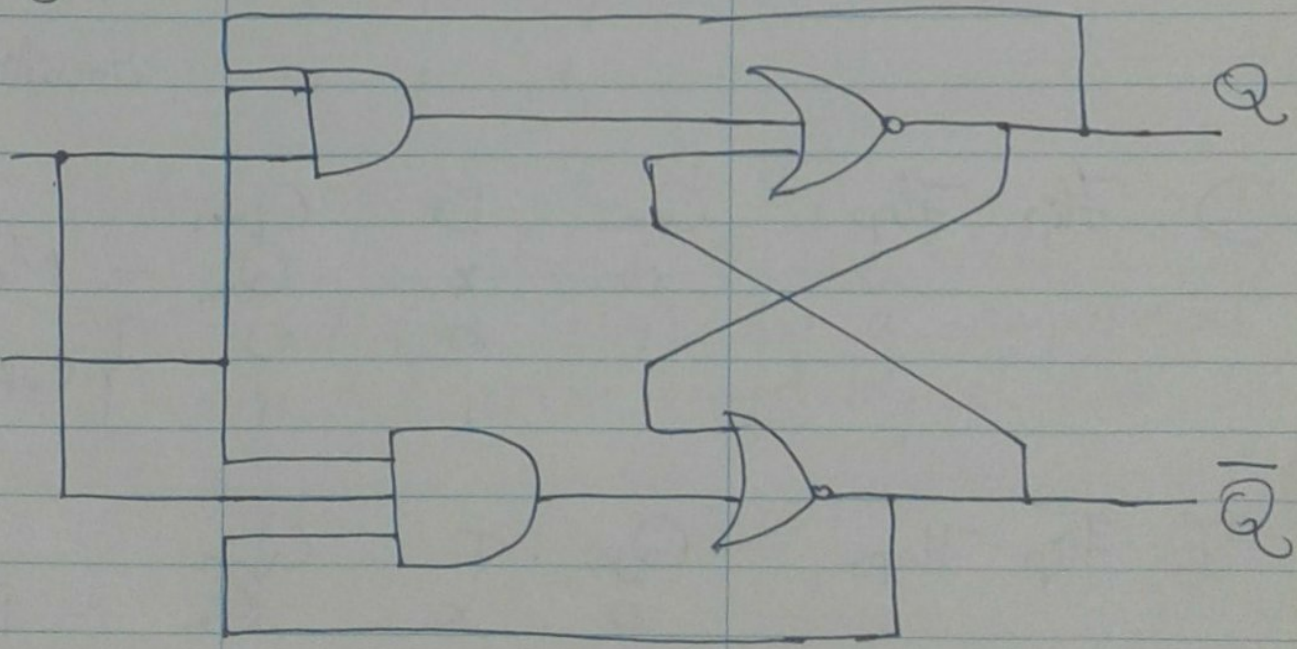
Toggle Flip Flop.

In T- Flip Flop, 'T' defines the term "Toggle". In SR Flip Flop, we provide only a single input called "Toggle" or "Trigger" input to avoid an intermediate state occurence.
Now, flip flop work as a Toggle switcher.

Block diagram:



Circuit diagram:



The T flip flop is toggled when the set & resets inputs alternatively changed by the incoming trigger.

Procedure:

① Mount the required IC's on the bread board and make the connections as per the diagram.

② Give the +5 Vcc & Gnd to IC with the help of connecting wires.

③ With the connecting wires, give the logical inputs to the required pins

④ Connect the outputs ~~pin~~ pin across the logical output terminals (Q, $\bar{Q}$)

⑤ Apply different inputs and verify the truth table.

Conclusion:

Various flip-flops were studied using IC's and their truth tables were verified.