# EXPERIMENT NO.: - 10

**AIM:** To study about different Flip flop circuit.

**THEORY:**

**R-S Flip Flop:**

A multivibrator is a regenerative circuit with two active devices, designed so that one device conducts while the cuts off. Multivibrator can store binary numbers. So, it can perform essential functions like counting of pulsed, synchronizing arithmetic operations etc. Such type of circuit is known as Flip-Flop circuits.



The R-S Flip-Flop is another name of bi-stable multivibrator, one whose output is low or high, 0 or 1. This output can be changed to other state only with the help of an external input called ‘TRIGGER’. Until the external input is applied, the original state of output remains unchanged indefinitely fig. no. 1 shows the circuit diagram of R-S flip-flop, which of two NOT gates and two NAND gates. This flip-flop has two inputs namely R and S (R=reset & S=set) and has outputs namely Q and Q’, where Q’ is always the complement of Q. The truth-table of this R-S flip-flop is as under.



|  |  |  |
| --- | --- | --- |
| **R** | **S** | **Q** |
| 0 | 0 | Last state |
| 0 | 1 | 1(Set) |
| 1 | 0 | 0(Reset) |
| 1 | 1 | 1 Forbidden |

The first input condition in the truth-table is R=0 & S=0. Since 0 input has no effect on its output, the flip-flop simply remains on its previous state i.e. Q remains unchanged.

The second input condition of the truth-table is R=0 & S=1 forces the output to switch over to 1 i.e. at high level. Thus input at 1 level is said that the flip-flop has SET i.e. Q=1(naturally Q’=0).

The third input condition of the truth-table is R=1 & S=0 forces the output to switch over to 0 i.e. at low level. Thus input at 0 level is said that the flip-flop has RESET i.e. Q=0(naturally Q’=1).

The fourth input condition of the truth-table is R=1 & S=1 forces the output of both NAND gates to switch over to 0 i.e. at low level. In other words Q=Q’+0 at the same time. This is nothing but violation of the basic definition of flip-flop that Q must complement of Q’. This state is known as forbidden state. Generally it is agreed upon never to impose this input condition.

**D Flip Flop:**

A multivibrator is a regenerative circuit with two active devices, designed so that one device conducts while the cuts off. Multivibrator can store binary numbers. So, it can perform essential functions like counting of pulsed, synchronizing arithmetic operations etc. Such type of circuit is known as Flip-Flop circuits.



The R-S Flip-Flop has two data input R & S. To store a high bit you need a high S. To store a low bit you need a high R. Generation of two signals to drive a Flip-Flop is a disadvantage in many applications. Further more the forbidden condition of both R=S=1 may occur inadvertently. This had led to change R-S Flip-Flop i.e. a Flip-Flop that needs only a single data input. This Flip-Flop is shown in figure. The truth-table of D Flip-Flop is as under:

|  |  |  |
| --- | --- | --- |
| **CLK** | **D** | **Qn+1** |
| 0 | X | On(Last state) |
| 1 | 0 | 0(Reset) |
| 1 | 1 | 1(Set) |

This kind of Flip-Flop prevents the value of D from reaching the Q output until a clock occurs.

In general D Flip-Flop is a bi-stable circuit whose D input is transferred to the output only after clock pulse is received.

**EQUIPMENT REQUIRED:**

* Trainer kit

**COMPONENTS REQUIRED:**

* IC 7432
* ICs 7400, 7432, 7408
* Hook up wires.

**PROCEDURE:**

1. Connect circuit as per the ckt. Diagram and give 5V DC power supply to input terminals.
2. Switch ON the power supply.
3. Change the state of flip flop as per truth-table and note down the status of output at every stage as per truth-table.

**OBSERVATIONS:**

**CONCLUSION:**