

School of Studies in Physics,

Vikram University, Ujjain (M.P.)

Class - M.Sc. III semester

Sub. - Digital Electronics

Paper - IV

Unit - III (Digital Electronics & system)

Topic → SR FLIP-FLOP

A circuit that changes from 1 to 0 or from 0 to 1 when current is applied. It is one bit storage location.

The basic digital memory circuit is known as FLIP-FLOP. It has two stable states which are known as the 1 state and the 0 state. It can be obtained by using NAND or NOR gates.

Flip-Flops are actually an application of logic gates. When a certain input value is given to them, they will be remembered & executed, if the logic gates are designed correctly. A higher application of flip-flops is helpful in designing better electronics circuits.

The most commonly used application of flip-flops is in the implementation of a feedback circuit. As a memory relies on the feedback concept, flip-flop can be used to.

design it.

Latches & Flip-Flop are the basic elements for storing information. one latch or Flip-Flop can store one bit of information.

The main difference between latches and Flip-Flops is that for latches, their outputs are constantly affected by their inputs as long as the enable signal is asserted. In other words, they are enabled, their content changes immediately when their inputs change.

Flip-Flops, on the other hand, have their content change only either at the rising or falling edge of the enable signal. This enable signal is usually the controlling clock signal. After the rising or falling edge of the clock, the Flip-Flop content remains constant even if the input changes.

There are basically four main types of latches and Flip-Flop: SR, D, JK and T. The major difference in these Flip-Flop types are the number of inputs they have and how they change state. For each type, there are also, different variations that enhance their operations.

## R-S Latch

1. RS Latch have two inputs, S and R, S is called set and R is called reset.
2. The S input is used to produce HIGH on Q (i.e. ~~store~~) (i.e. store binary 1 in Flip-Flop).
3. The R input is used to produce LOW on Q (i.e. store binary 0 in Flip-Flop).
4.  $\bar{Q}$  is Q complementary output, so it always holds the opposite value of Q.
5. The output of the S-R latch depends on current as well as previous inputs or state, and its state (value stored) can change as soon as its inputs change.

There are mainly four types of Flip-Flop that are used in electronics circuits.

1. The Basic Flip-Flop or S-R Flip-Flop
2. Delay Flip-Flop (D-Flip-Flop)
3. J-K Flip-Flop
4. T Flip-Flop