# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : 19EC306 – Digital Circuits

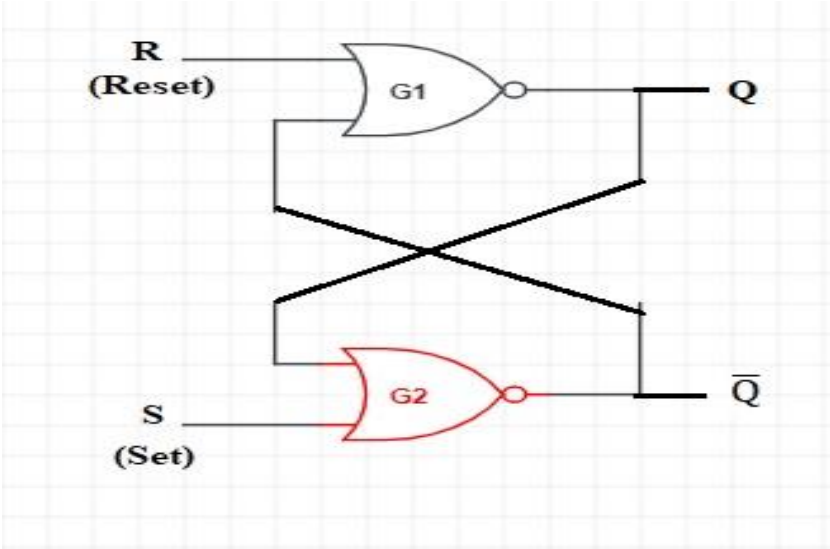
II YEAR / III SEMESTER

Unit III- **Sequential circuits**

Topic : Latches, DT application edge triggering FF SR characteristics table and equation

## SR Latch using NOR gates:

Latch is basic storage element in which we store 0 or 1. Latch as name suggest it holds 0 or 1. In the circuit “R” stands for reset and “S” stand for set. Q and  are the output of the latch. When the circuit will be reset Q value will be equal to 0 and when the circuit will be set the Q value will be equal to 1.



**Case 1:**

When the S =0 and R = 1 and we will study the Q and $\bar{Q}$ output

As we are using NOR gate and its truth table is:

| A | B | Output |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

**Case 2:**

When S = 1, R = 0 then we will see that what will be the values of Q and $\bar{Q}$ output:

**Case 3:**

When S = 1, R = 1 then we will see that what will be the values of Q and $\bar{Q}$ output:

| S | R | Q | $\bar{Q}$ |
|---|---|---|---|
| 0 | 0 | Previous state | |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | Not used | |

## SR Flip Flop truth table:

| Clk | S | R | Q | $\overline{Q}$ |
|---|---|---|---|---|
| 0 | × | × | Previous state | |
| 1 | 0 | 0 | Previous state | |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | Invalid | |

## Characteristics equation for SR flip flop:

| Clk | S | R | $Q_{n+1}$ |
|---|---|---|---|
| 0 | × | × | |
| 1 | 0 | 0 | |
| 1 | 0 | 1 | 0 reset |
| 1 | 1 | 0 | 1 set |
| 1 | 1 | 1 | Invalid |

**By using this table we will draw its characteristics table:**

| $Q_n$ | $S_n$ | $R_n$ | $Q_{n+1}$ |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | × |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | × |

Any Query????

Thank you……