



# SNS COLLEGE OF TECHNOLOGY

Coimbatore-35  
An Autonomous Institution



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 & COMMUNICATION ENGINEERING

### 19ECB231 – DIGITAL ELECTRONICS

Latches/ DIGITAL  
ELECTRONICS/P.Umamaheswari/AP/ECE/SN  
SCT

II YEAR/ III SEMESTER

UNIT 3 – SEQUENTIAL CIRCUITS

TOPIC – FLIP FLOP –SR ,D FLIP FLOP



# FLIP FLOP



A flip flop is an electronic circuit with two stable states that can be used to store binary data. The stored data can be changed by applying varying inputs. Flip-flops and latches are fundamental building blocks of digital electronics systems used in computers, communications, and many other types of systems.

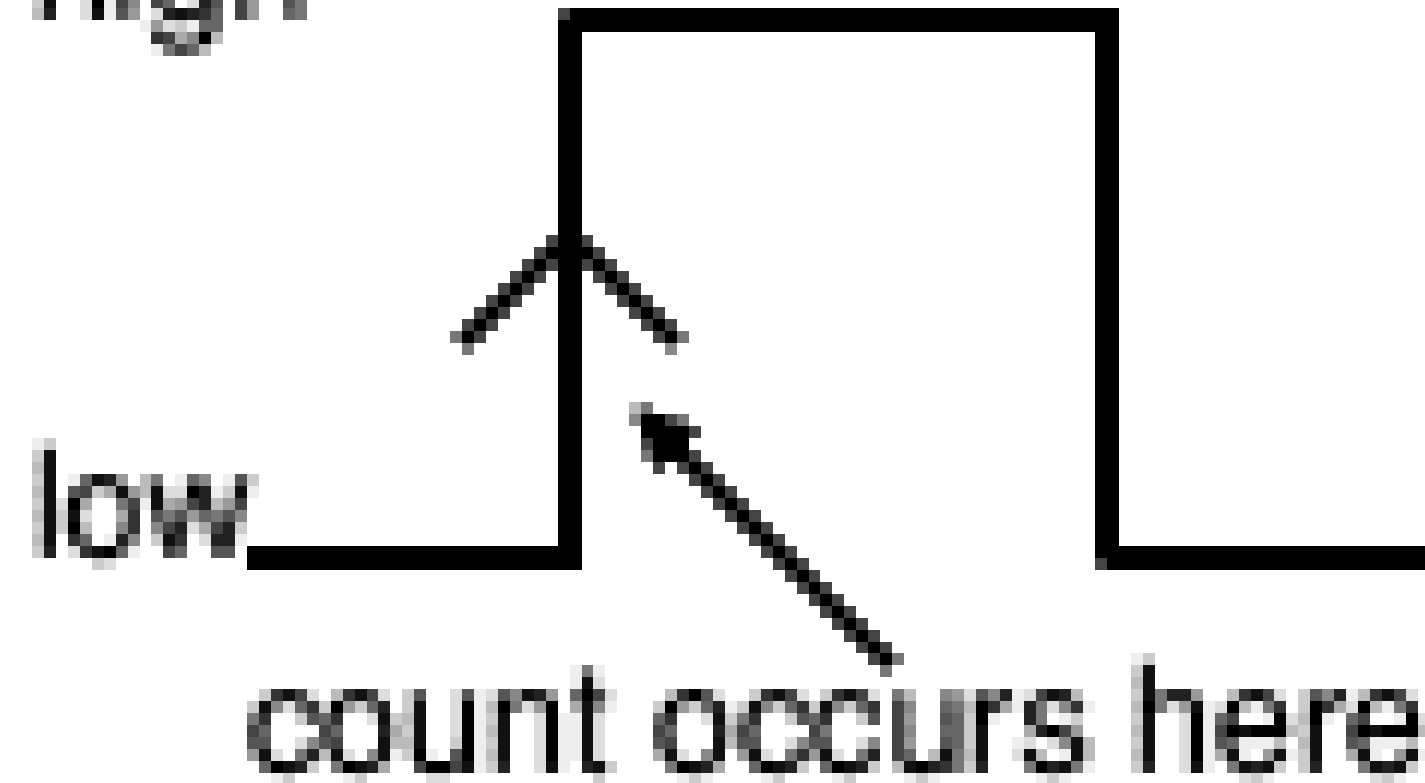


# EDGE TRIGGERING

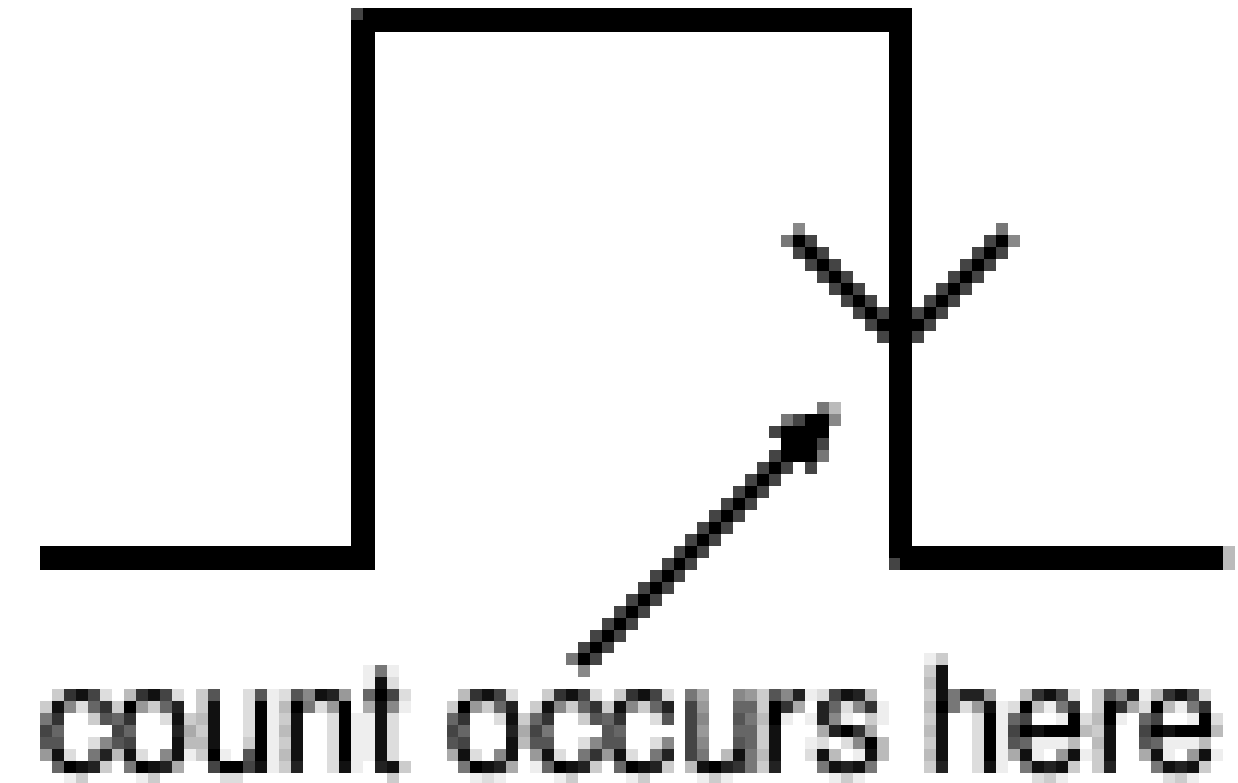


## Rising-edge

high



## Falling-edge





Level Triggering	Edge Triggering
<p>1. It is of two types</p> <ul style="list-style-type: none"><li>- High level triggering</li><li>- Low level triggering</li></ul> <p>2. The latch or flip-flop circuits which change their outputs only corresponding to active high or low levels are called as level triggered latches or flip-flops.</p>	<p>1. It is of two types :</p> <ul style="list-style-type: none"><li>- Positive edge triggering</li><li>- Negative edge triggering</li></ul> <p>2. Those flip-flops which change their outputs only corresponding to the positive or negative edge of the clock input are called as edge triggered flip-flops.</p>



# TYPES OF FLIP FLOP



1.SR FF

R=Reset and S=Set

2.D FF

D means Delay

3.T FF

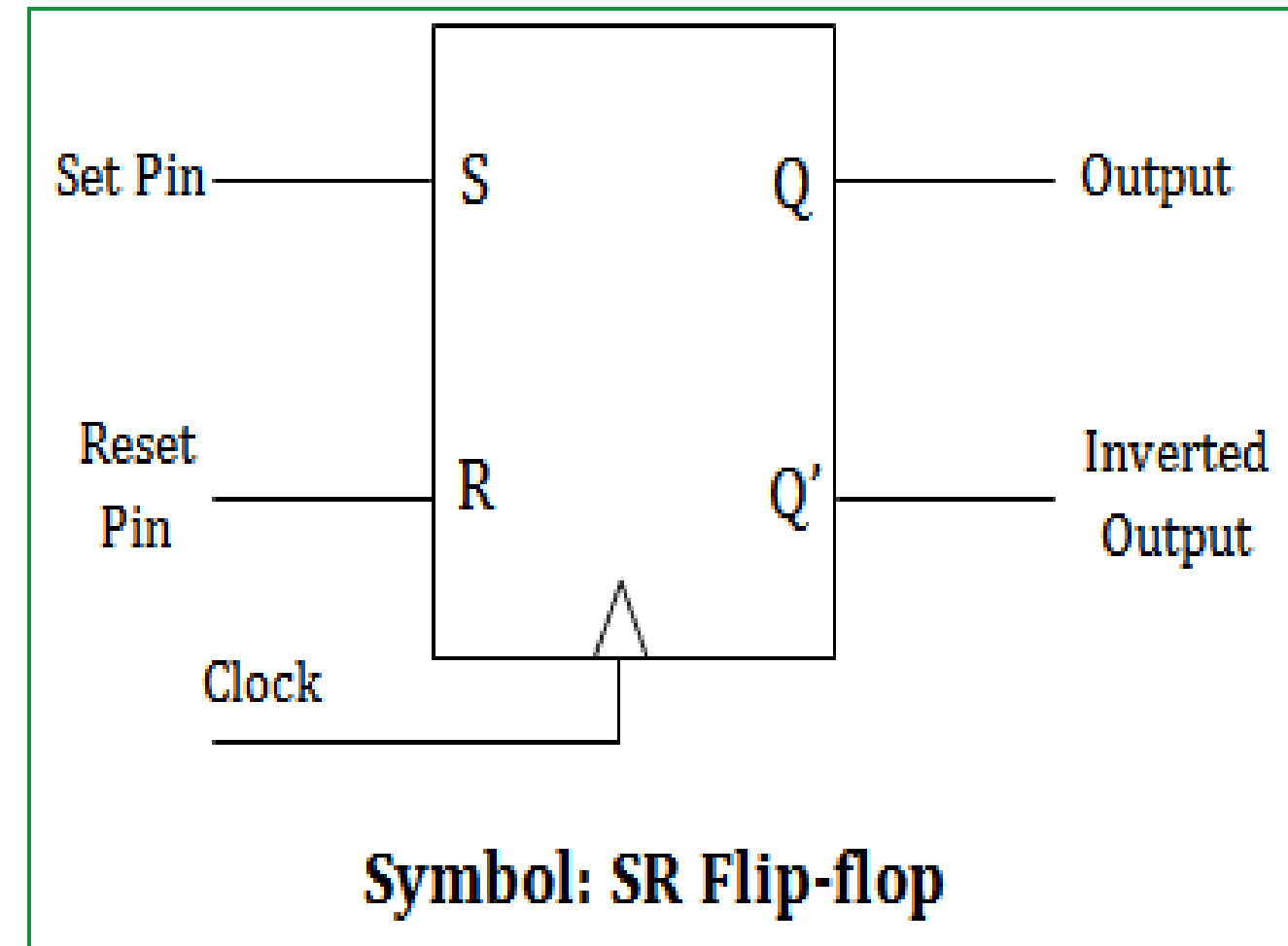
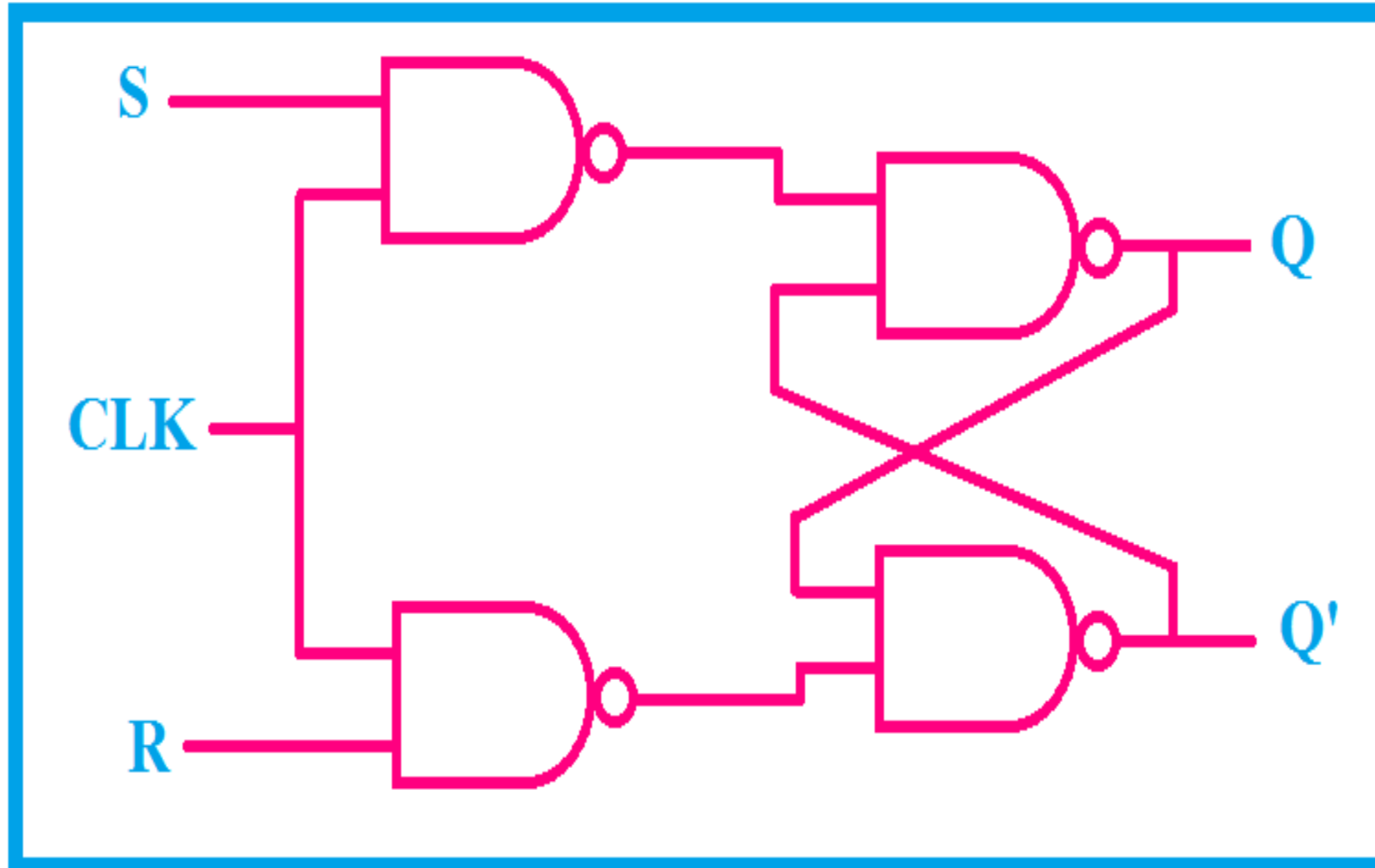
T means Toggle

4.JK FF





# SR FLIP FLOP





## SR FLIP FLOP -TRUTH TABLE



Fig. 0.7

S	R	$Q_n$	$Q_{n+1}$	State
0	0	0	0	No change (NC)
0	0	1	1	
0	1	0	0	Reset
0	1	1	0	
1	0	0	1	Set
1	0	1	1	
1	1	0	X	Indeterminate
1	1	1	X	
X	X	0	0	No change (NC)
X	X	1	1	



# SR FLIP FLOP



Characteristics Equation

S	R Q <sub>n</sub>			
	00	01	10	11
0	0	1	0	0
1	1	1	X	X

$$Q_{n+1} = S + \bar{R} Q_n$$





# SR FLIP FLOP

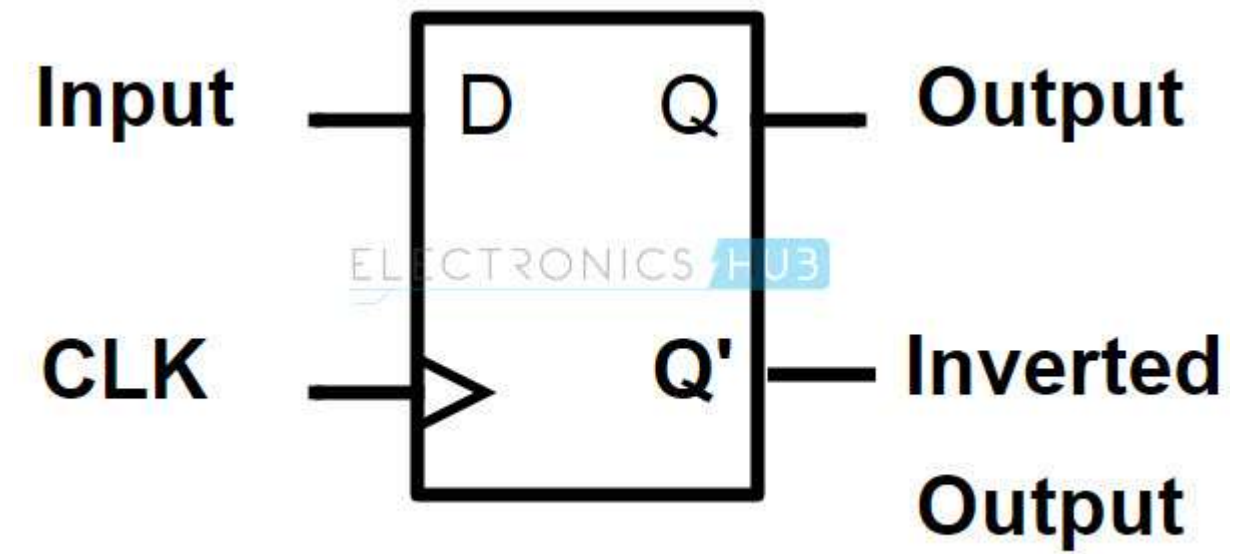
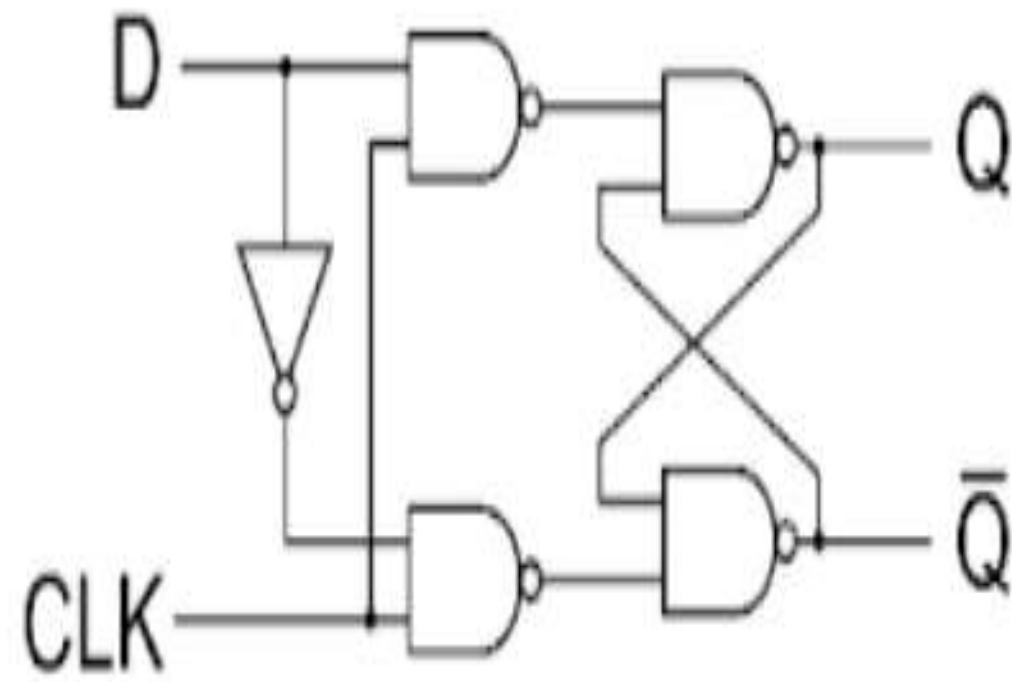


Excitation Table

$Q_n$	$Q_{n+1}$	$S$	$R$
0	0	0	X
0	1	1	0
1	0	0	1
1	1	X	0



# D FLIP FLOP





## D FLIP FLOP -TRUTH TABLE



$D$	$Q_n$	$Q_{n+1}$
0	0	0
0	1	0
1	0	1
1	1	1
0	X	0
1	X	1



## Characteristic Equation

D	$Q_n$	0	1
0	0	0	0
1	1	1	1

$$Q_{n+1} = D$$

## Excitation table

$Q_n$	$Q_{n+1}$	D
0	0	0
0	1	0
1	0	0
1	1	1



## APPLICATIONS OF FLIP FLOPS:



Flip flops have a wide variety of applications. They are:

- ✓ REGISTERS
- ✓ FREQUENCY DIVIDERS
- ✓ DIGITAL COUNTERS





# ASSESSMENTS



- 1.What is Latch?
- 2.List the types of latches.
- 3.Difference between level trigger and edge triggering.



THANK YOU