



SNS COLLEGE OF ENGINEERING

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 CSE (IoT)

23ITT201 – DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION

II YEAR/ III SEMESTER

UNIT 2 – SYNCHRONOUS SEQUENTIAL LOGIC

TOPIC – Flip Flops



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.

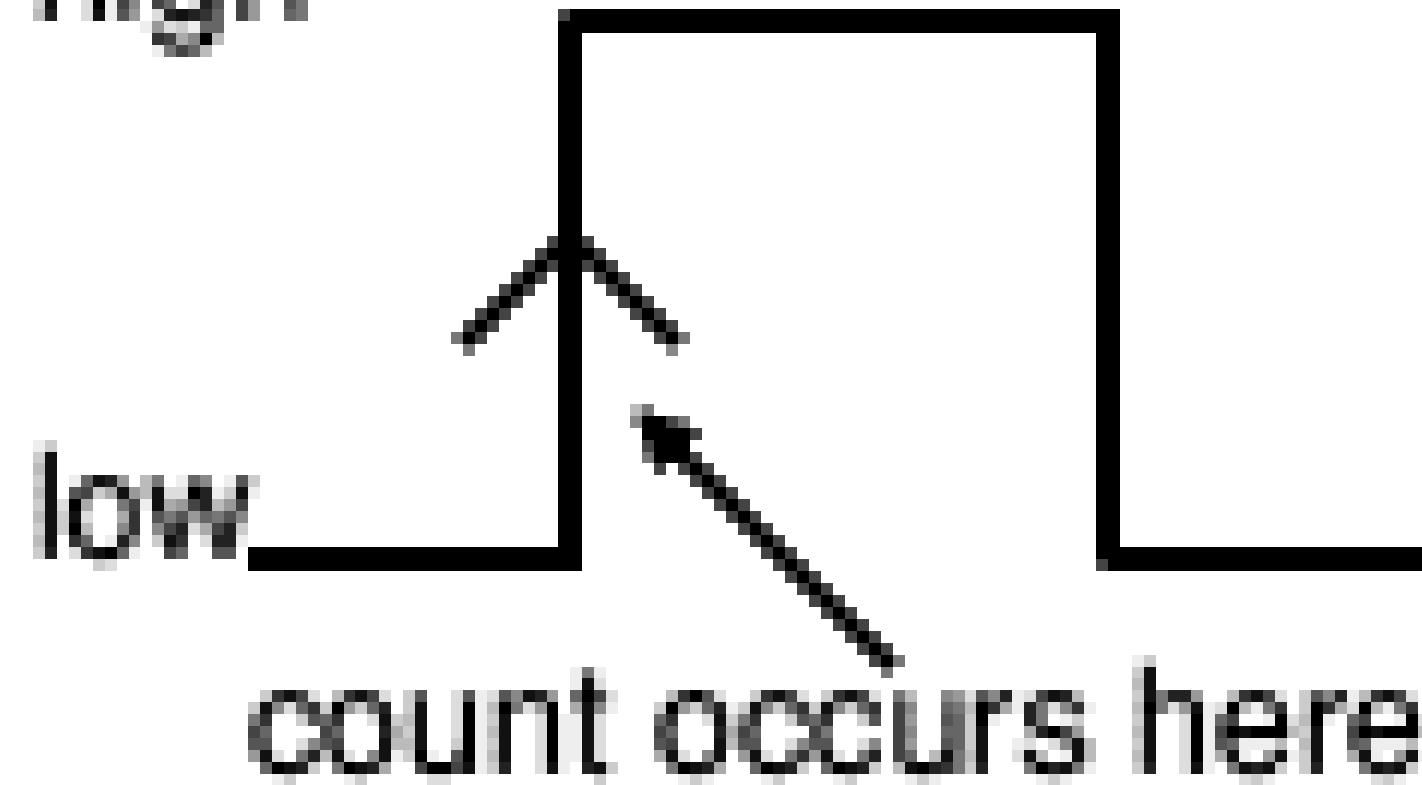


EDGE TRIGGERING

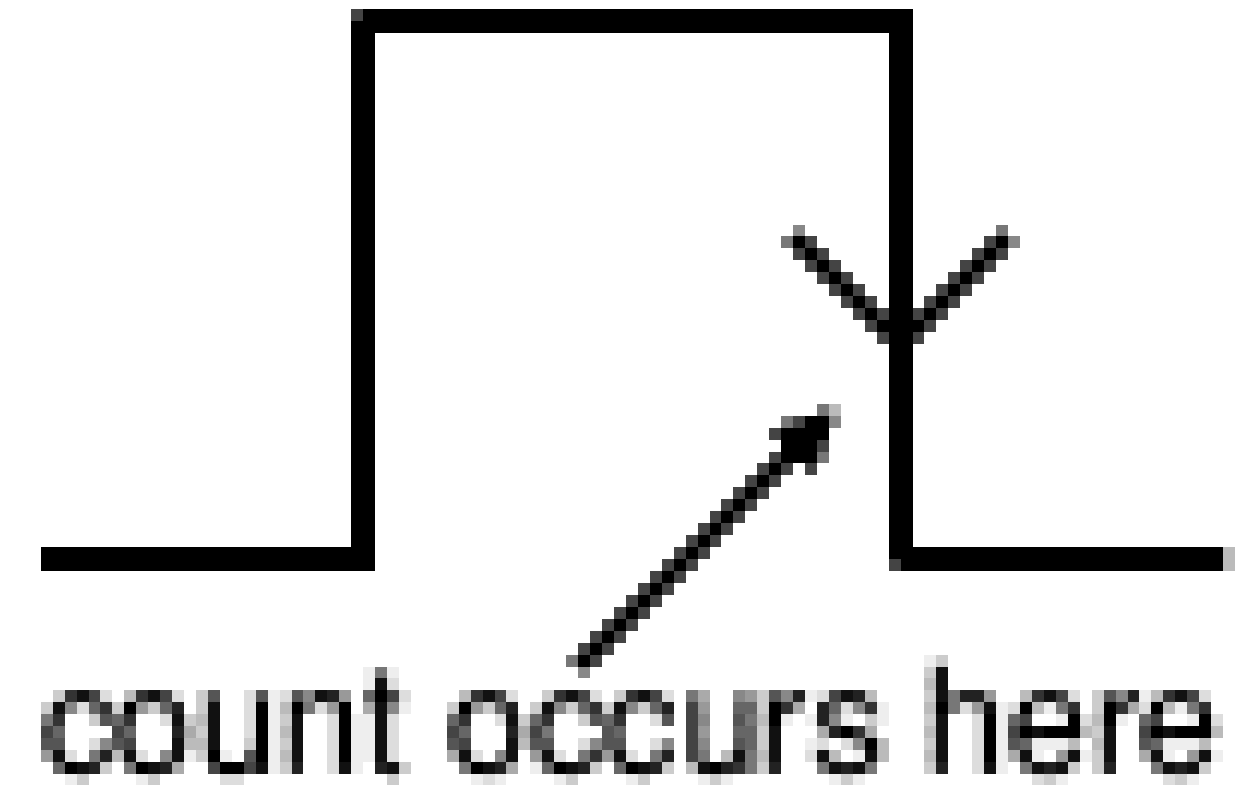


Rising-edge

high



Falling-edge





Level Triggering	Edge Triggering
<p>1. It is of two types</p> <ul style="list-style-type: none">- High level triggering- Low level triggering <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">- Positive edge triggering- Negative edge triggering <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

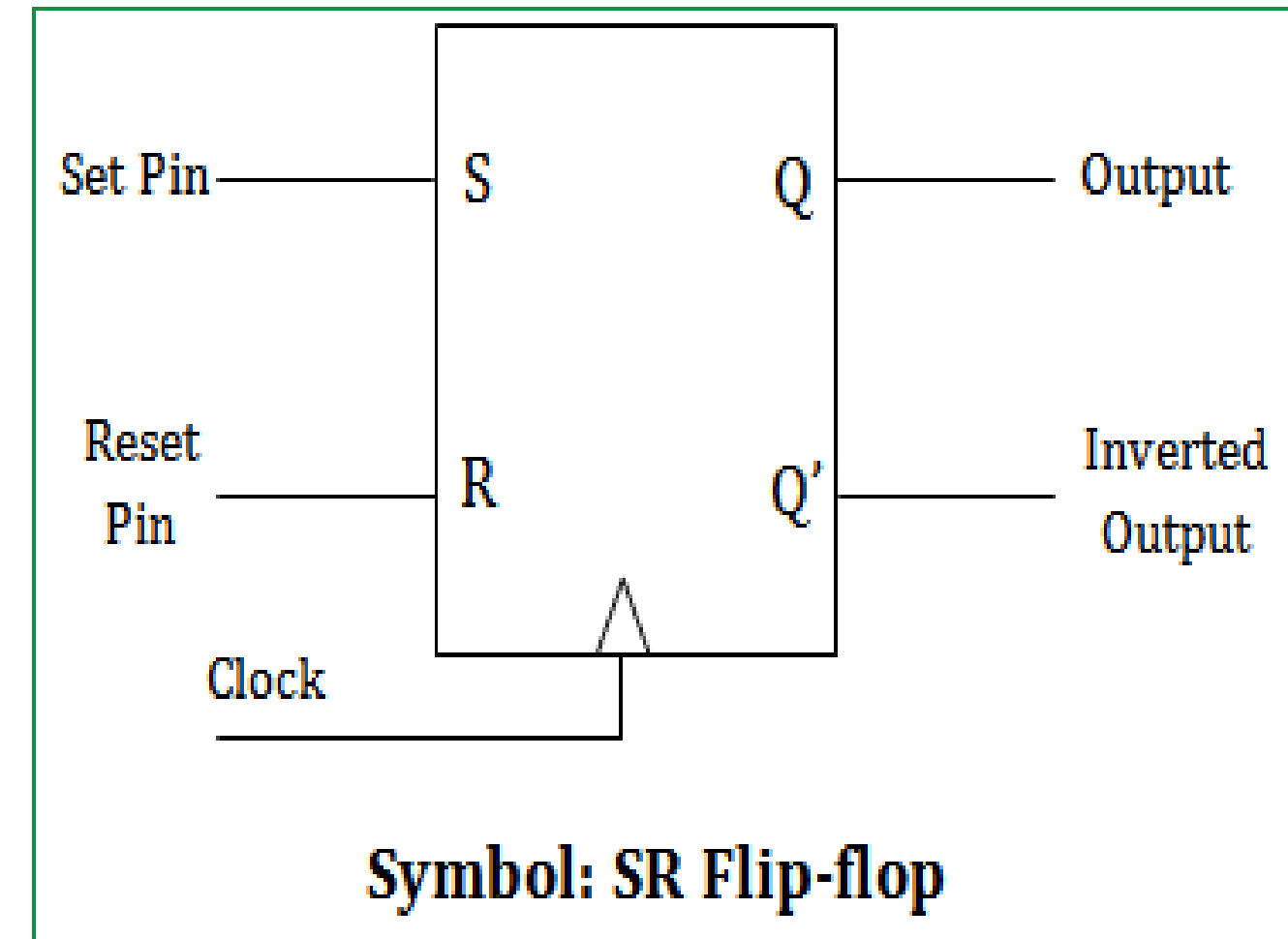
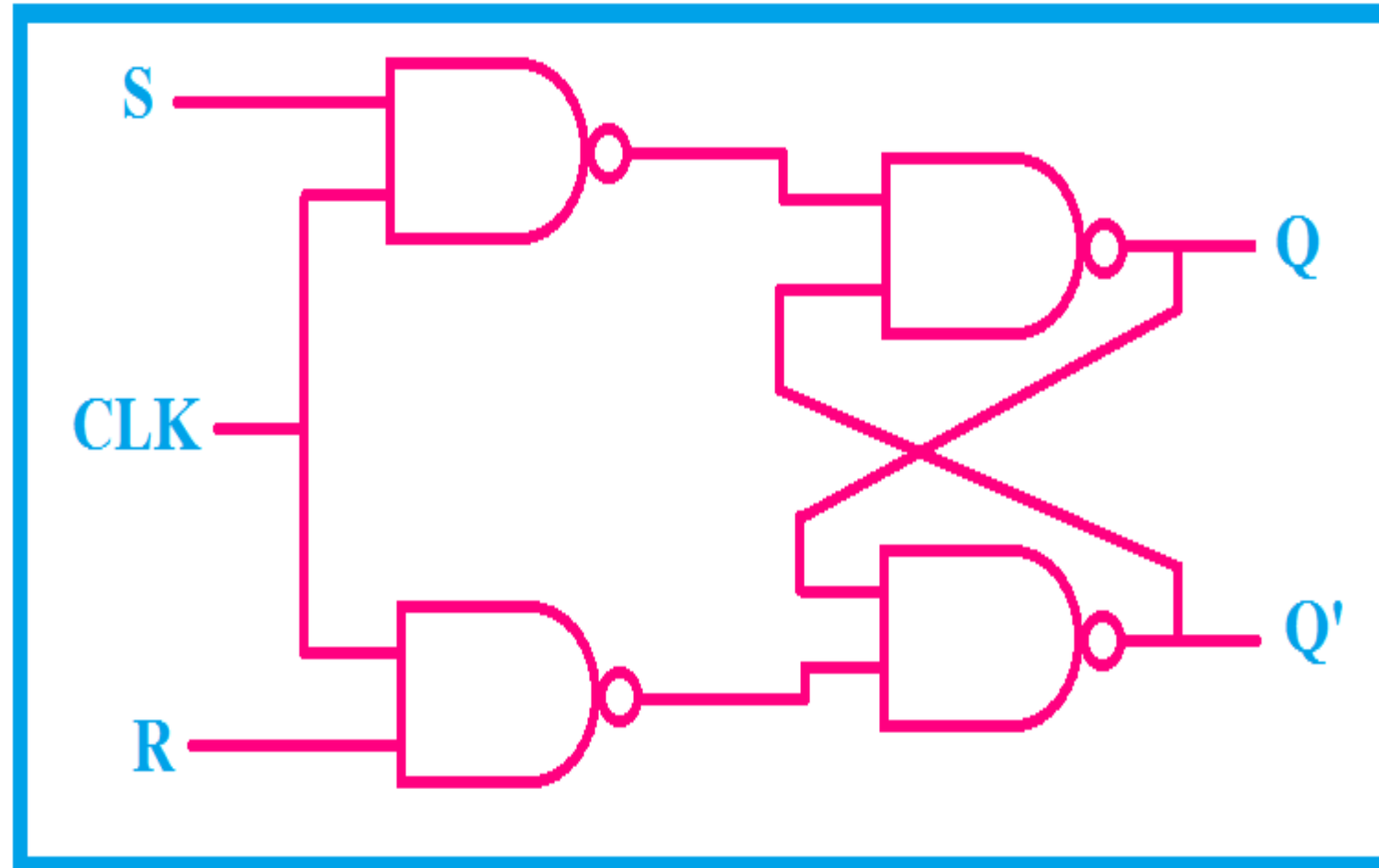
3.T FF

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 _n			
	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

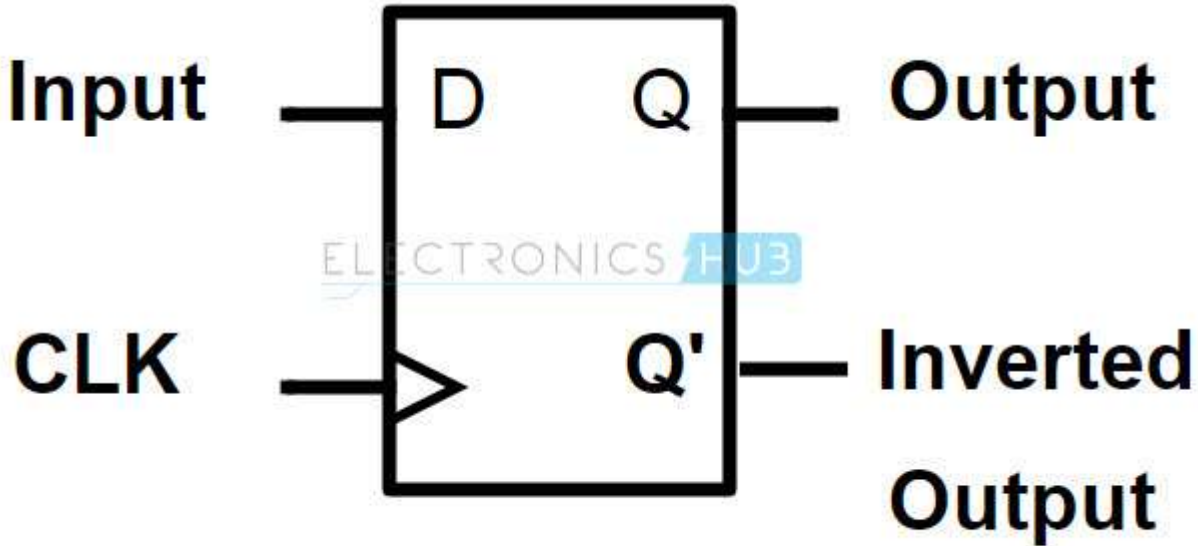
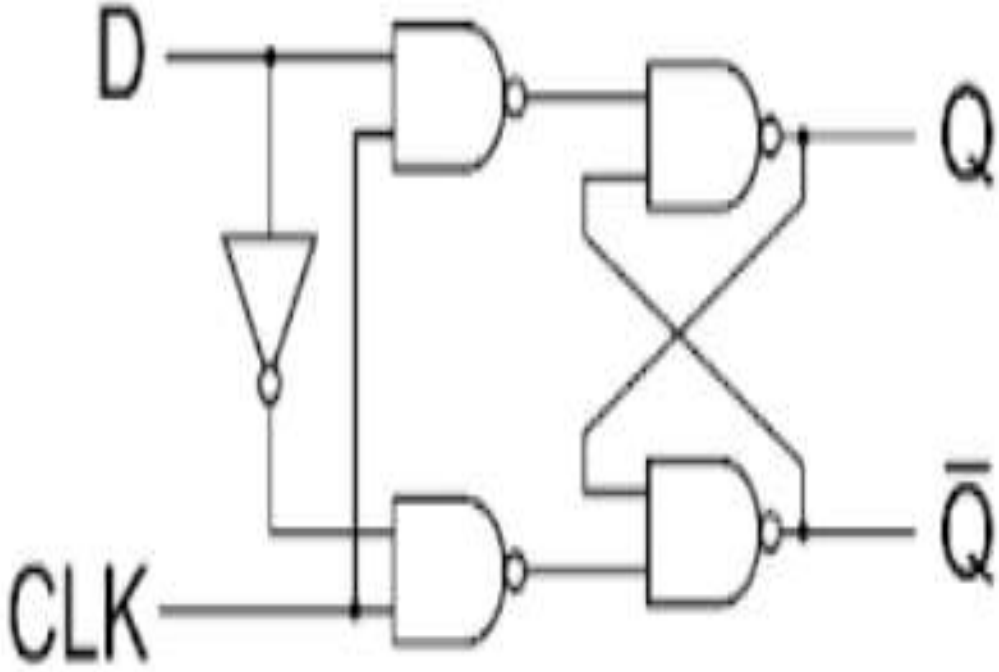


Excitation Table

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	1
1	0	0
1	1	1
0	X	0
0	X	1



Characteristic Equation

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

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

Excitation Table

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