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

II YEAR/ III SEMESTER

UNIT 3 – SEQUENTIAL CIRCUITS

TOPIC – FLIP FLOPS- JK & T

Flip Flops

Flip flop is a sequential circuit which generally samples its inputs and changes its outputs only at particular instants of time and not continuously. Flip flop is said to be edge sensitive or edge triggered rather than being level triggered like latches
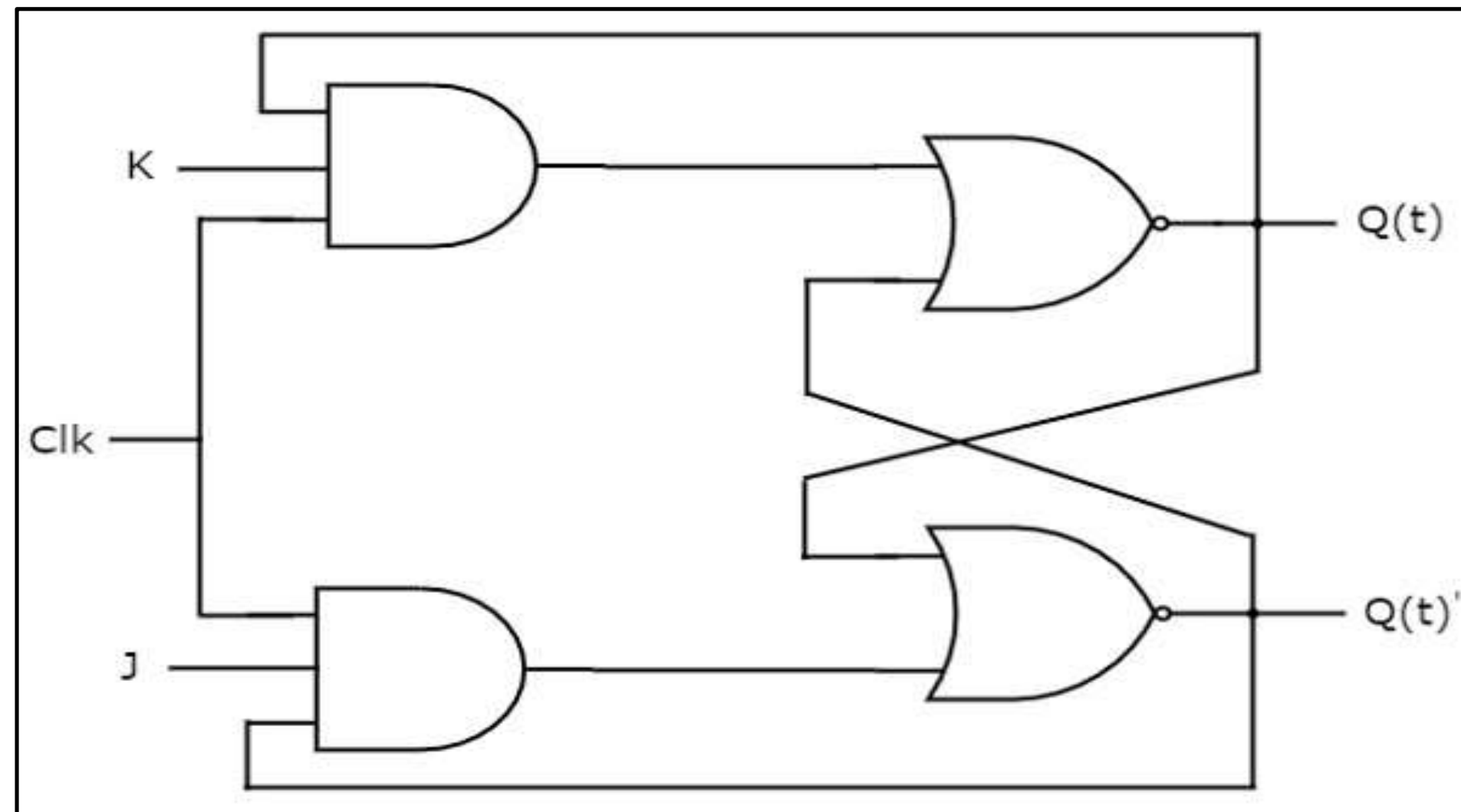
- SR Flip-Flop
- D Flip-Flop
- JK Flip-Flop
- T Flip-Flop

JK Flip Flop

JK flip-flop is the modified version of SR flip-flop. It operates with only positive clock transitions or negative clock transitions.

JK Flip Flop Characteristic Table

Present Inputs		Present State	Next State
J	K	$Q\ t$	$Q\ t+1$
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

JK Flip Flop Truth Table

J	K	Q $t+1$
0	0	Q t
0	1	0
1	0	1
1	1	Q t '

JK Flip Flop Characteristic Equation

$$Q(t+1) = JQ(t)' + K'Q(t)$$

JK Flip Flop Excitation Table

JK flip-flop			
Q(t)	Q(t+1)	J	K
0	0	0	x
0	1	1	x
1	0	x	1
1	1	x	0

T Flip-Flop

T flip-flop is the simplified version of JK flip-flop. It is obtained by connecting the same input 'T' to both inputs of JK flip-flop. It operates with only positive clock transitions or negative clock transitions.

Flip Flops/ 19ECB231/ DIGITAL ELECTRONICS/K.SURIYA /AP/ECE/SNSCT
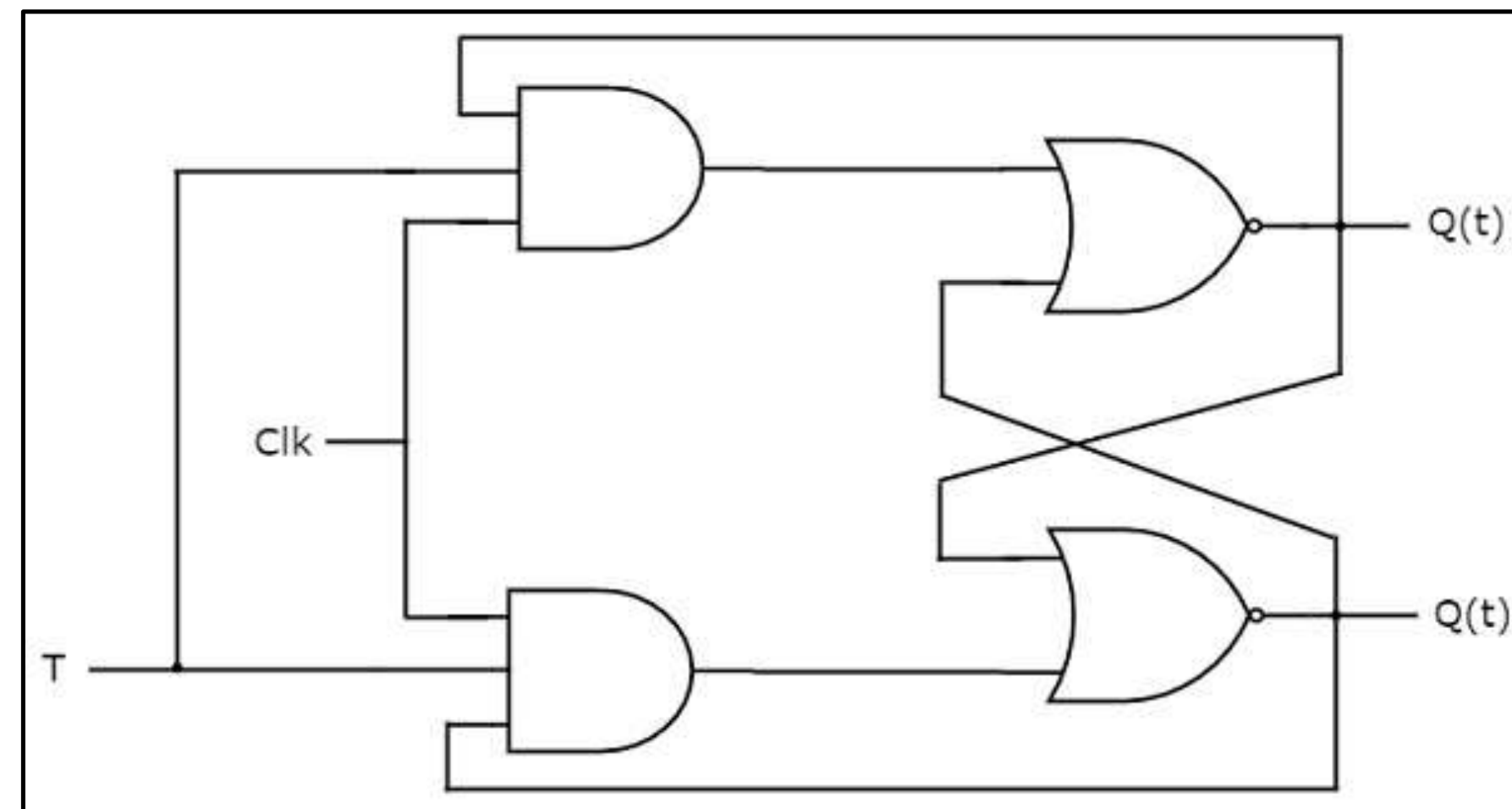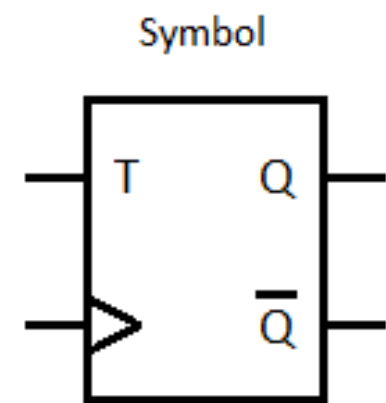
T Flip-Flop- Truth Table

T Flip-flop

Symbol

Table of truth:

T	Q	$\overline{Q}$
0	Q	$\overline{Q}$
1	$\overline{Q}$	Q
0	$\overline{Q}$	Q
1	Q	$\overline{Q}$

Inputs	Present State	Next State
T	$\mathbf{Q}\ t$	$\mathbf{Q}\ t+1$
0	0	0
0	1	1
1	0	1
1	1	0

$$Q(t+1) = T'Q(t) + TQ(t)'$$

$$\Rightarrow Q(t+1) = T \oplus Q(t)$$

T Flip-Flop- Characteristic Table & Equation

T flip-flop		
Q(t)	Q(t+1)	DR
0	0	0
0	1	1
1	0	1
1	1	0

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Excitation Tables

SR Flip-flop

Q(t)	Q(t+1)	S	R
0	0	0	X
0	1	1	0
1	0	0	1
1	1	X	0

D Flip-flop

Q(t)	Q(t+1)	DR
0	0	0
0	1	1
1	0	0
1	1	1

JK flip-flop

Q(t)	Q(t+1)	J	K
0	0	0	x
0	1	1	x
1	0	x	1
1	1	x	0

T flip-flop

Q(t)	Q(t+1)	DR
0	0	0
0	1	1
1	0	1
1	1	0

ASSESSMENTS

1. What is JK flip flop?
2. Tflip flop excitation table
3. Difference between latch and flip flop.

THANK YOU