Assam Textile Institute
Empowering Textile Education

COURSE TITLE = TEXTRONICS

# COURSE CODE= TT-603

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: Latch, Flip Flop and It's Types :

➢ 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.

➢ Flip-flops and latches are used as data storage elements. It is the basic storage element in *sequential* logic.

➢ Both **Latches and flip flops** are circuit elements where the output not only depends on the current inputs, but also depends on the previous input and outputs.

➢ The main *difference* between the latch and flip flop is that a flip flop has a *clock signal*, whereas a latch does not have clock signals.
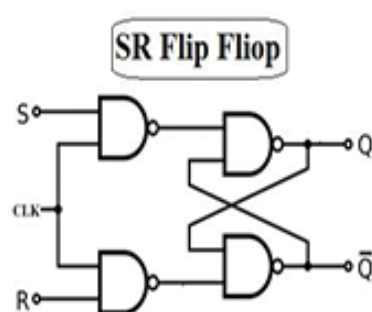

SR Latch
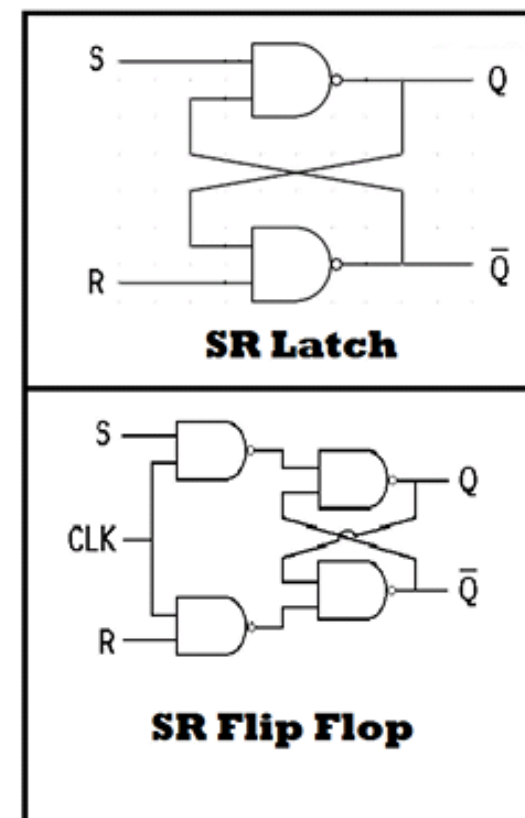
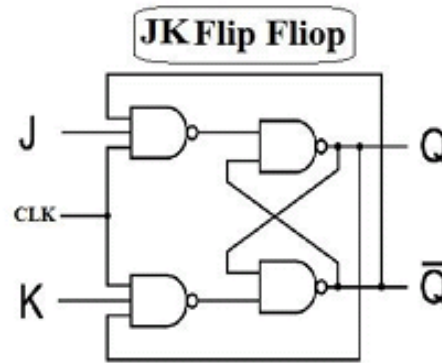**SR Flip Flop**

:Types of Flip Flop and Truth Tables:

➢ Flip-flops can be divided into common types: the **SR** ("set-reset"), **D** ("data" or "delay"), **T** ("toggle"), and **JK**.

➢ The behavior of a particular type can be described by what is termed the characteristic equation, which derives the "next" (i.e., after the next clock pulse) output, Q_{next} in terms of the input signal(s) and/or the current output.
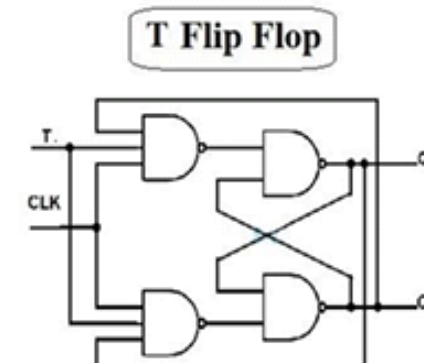
SR Flip Fliop

S	R	Q_{next}	Action
0	0	Q	Hold state
0	1	0	Reset
1	0	1	Set
1	1	X	Not allowed

D Flip Flop

D	Q(Next)
0	0
1	1

JK Flip Fliop
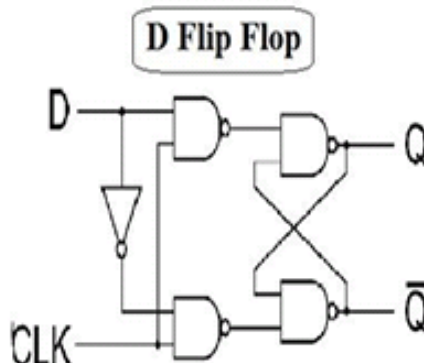
J	K	Q_{next}	Comment
0	0	Q	No change
0	1	0	Reset
1	0	1	Set
1	1	$\overline{Q}$	Toggle

T Flip Flop

T	Q(Next)
0	Q
1	$\overline{Q}$

:Types of Flip Flop and Truth Tables:

S	R	Q_{next}	Action
0	0	Q	Hold state
0	1	0	Reset
1	0	1	Set
1	1	X	Not allowed

D	Q(Next)
0	0
1	1

D	Q	Q(Next)
0	0	0
0	1	0
1	0	1
1	1	1

J	K	Q_{next}	Comment
0	0	Q	No change
0	1	0	Reset
1	0	1	Set
1	1	$\overline{Q}$	Toggle

S	R	Q	Q(Next)
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	X
1	1	1	X

T	Q(Next)
0	Q
1	$\overline{Q}$

T	Q	Q(Next)
0	0	0
0	1	1
1	0	1
1	1	0

J	K	Q	Q(Next)
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

LOGIC GATES PROBLEM

Q) Find out the value of Y=?
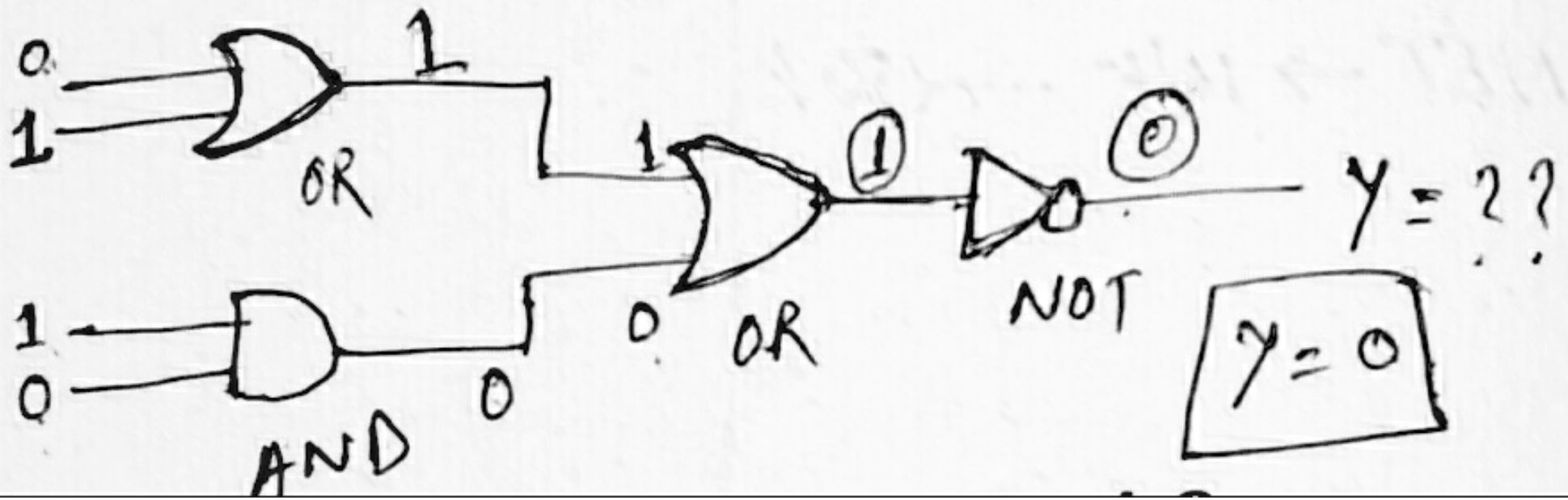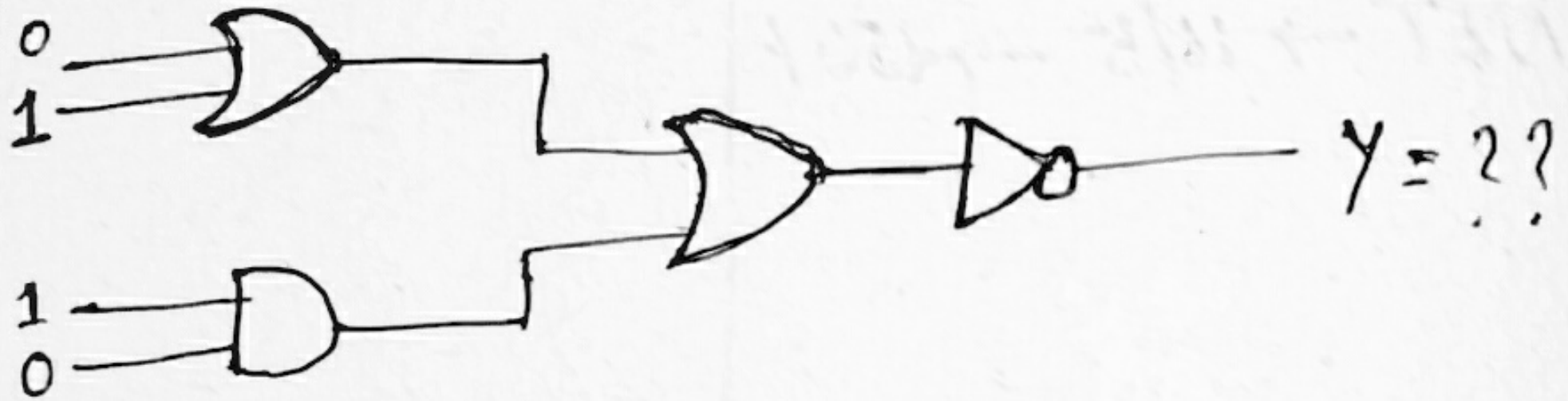
LOGIC GATES PROBLEM
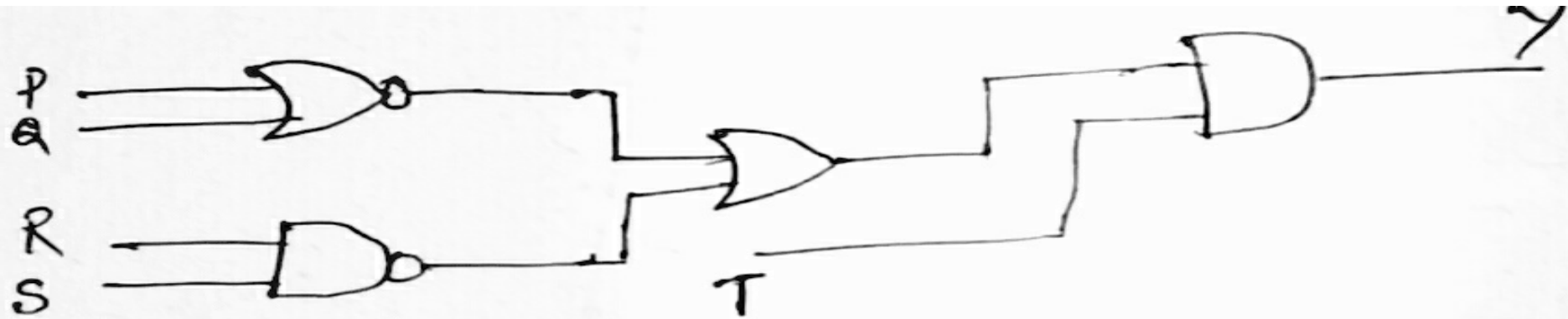
Ⓢ find the value of Y = ?? [for P = 0, Q = 1, R = 0, S = 0]

Y = 1

NOR

NAND

OR ①

AND

T

1·1 = 1
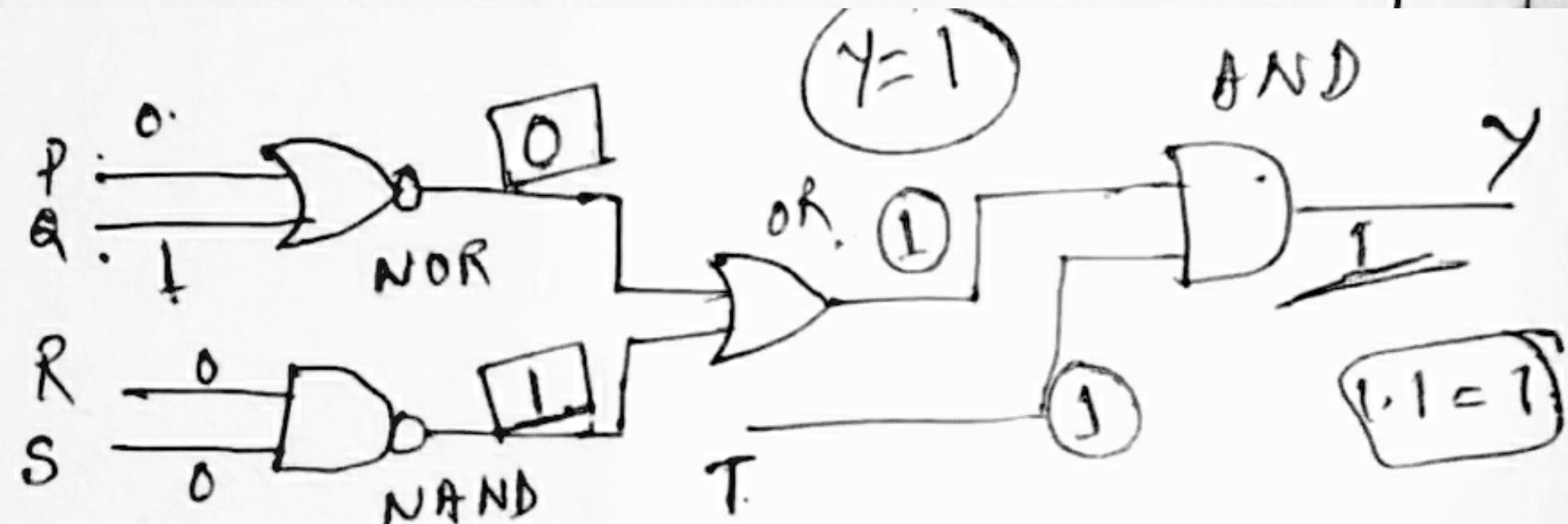
Construction of NOT gate by using NOR and NAND gate

NAND $\longrightarrow$ Inv (NOT)

NOR $\longrightarrow$ Inv (NOT)

$0 \rightarrow 1$

$1 \rightarrow 0$

$0 \rightarrow 1$

$1 \rightarrow 0$