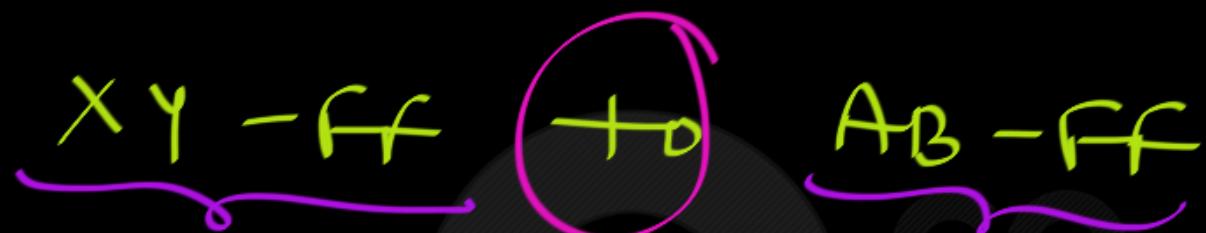




Recap :

Flipflop Conversion

Algorithm for flip flop conversion:



- ① Given FF : $XY - \text{FF}$ } Desired FF : $AB - \text{FF}$
- ② Idea : $X = f(A, B, Q)$; $Y = f(A, B, Q)$
-

③ $X = f(A, B, \bar{Q})$; $Y = f(A, B, Q)$

A	B	\bar{Q}	Q_n	X	Y
?	?	?	?	?	?

Truth Table of AB - FF

Excitation Table of XY - FF

③ Given-ff input $X = f(A, B, \Phi)$; $Y = f(A, B, \Phi)$

desired - ff

Truth Table of Desired - ff

Excitation Table of Given - ff

Side by Side



Q Using k-map,
find equation for Given ff inputs
in terms of Desired ff inputs
and φ .

Conversion of Flipflops

- Steps for the conversions
 - Step 1: Write the Truth Table of the Desired Flip-Flop
 - Step 2: Obtain the Excitation Table for the given Flip-Flop from its Truth Table
 - Step 3: Append the Excitation Table of the given Flip-Flop to the Truth Table of the Desired Flip-Flop Appropriately to obtain Conversion Table
 - Step 4: Simplify the Expressions for the Inputs of the given Flip-Flop
 - Step 5: Design the Necessary Circuit and make the Connections accordingly



PROCEDURE FOR CONVERSION

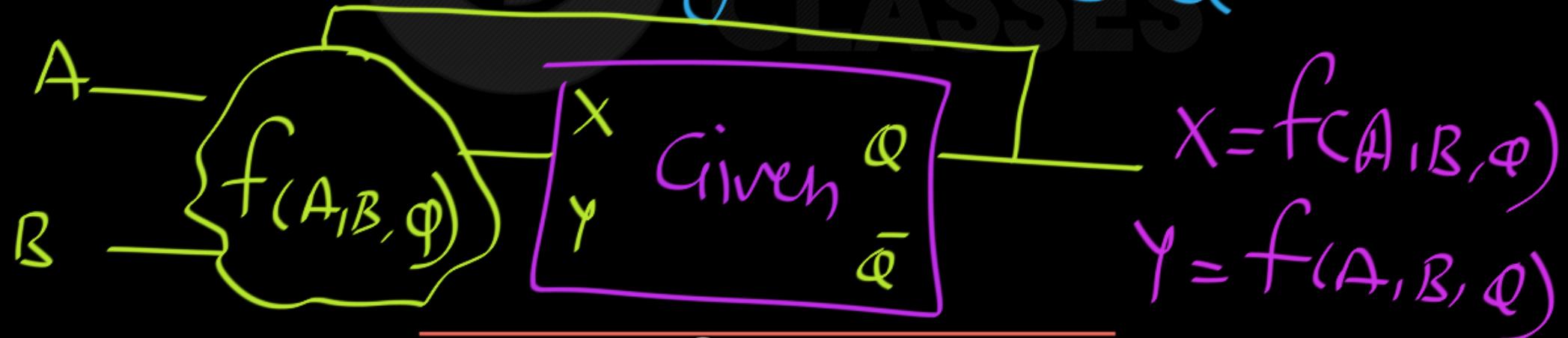
1. Draw the block diagram of the target flip flop from the given problem.
2. Write truth table for the target flip-flop.
3. Write excitation table for the available flip-flop.
4. Draw k-map for target flip-flop.
5. Draw the block diagram.



Algorithm : You can forget after some-time.

Suggestion:

Apply the Idea ✓





Exercise :

1. Show the Conversion of SR Flip Flop to T Flip Flop

(1b) $T \rightarrow SR$ ✓

2. Show the Conversion of D Flip Flop to JK Flip Flop

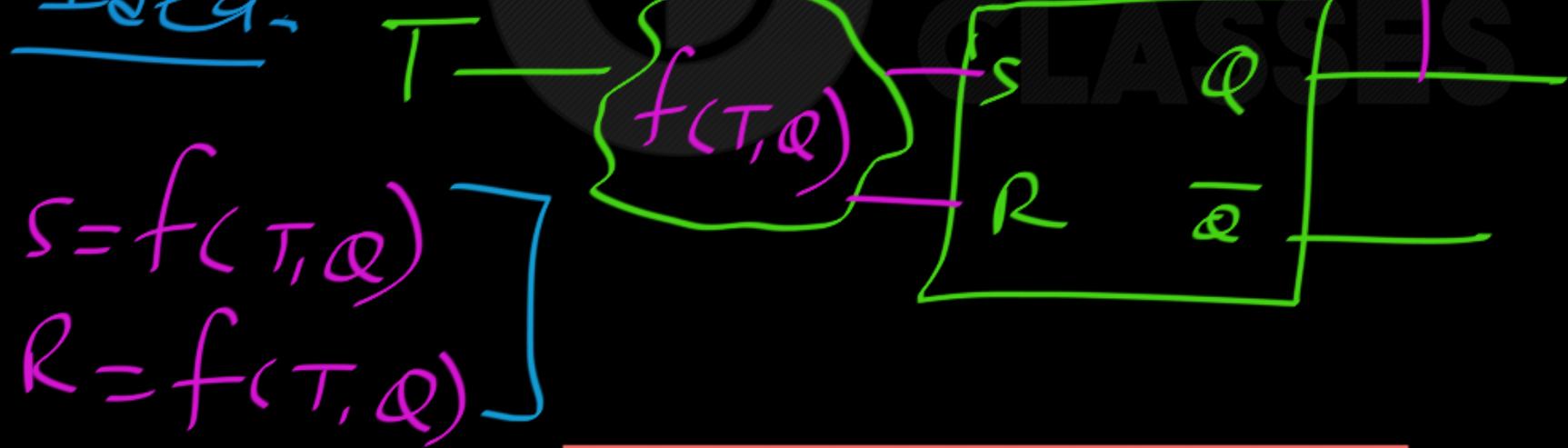
(2b) $JK \rightarrow D$ ✓

① ~~S R - FF~~ to ~~T - FF~~ :

Given - FF

Desired - FF

Idea:

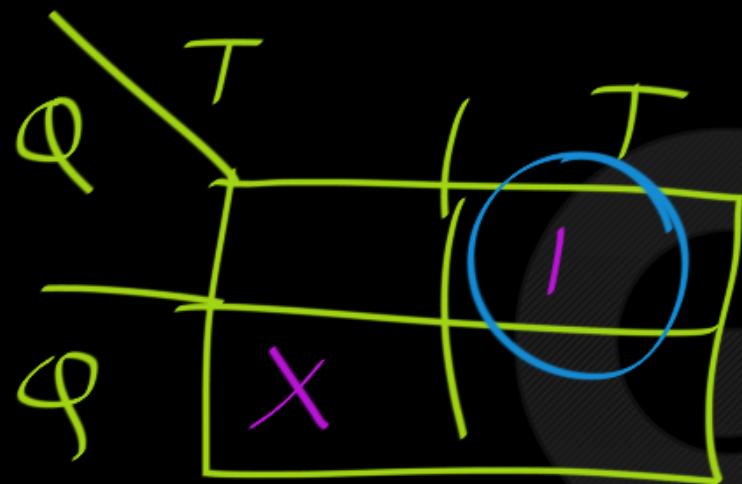


T	Q	Q_n	$S = f(T, Q)$	$R = f(T, Q)$
0	0	0	0	X
0	1	1	X	0
1	0	1	0	1
1	1	0		

Note: In SR-ff, No Toggle Condition (Comb. invalid)

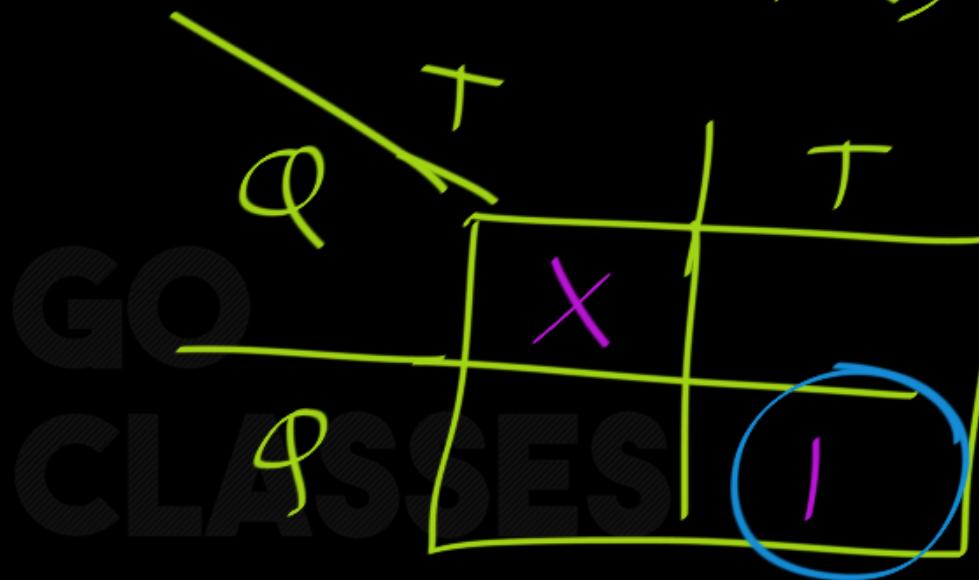


$$\underline{S} = f(T, Q)$$

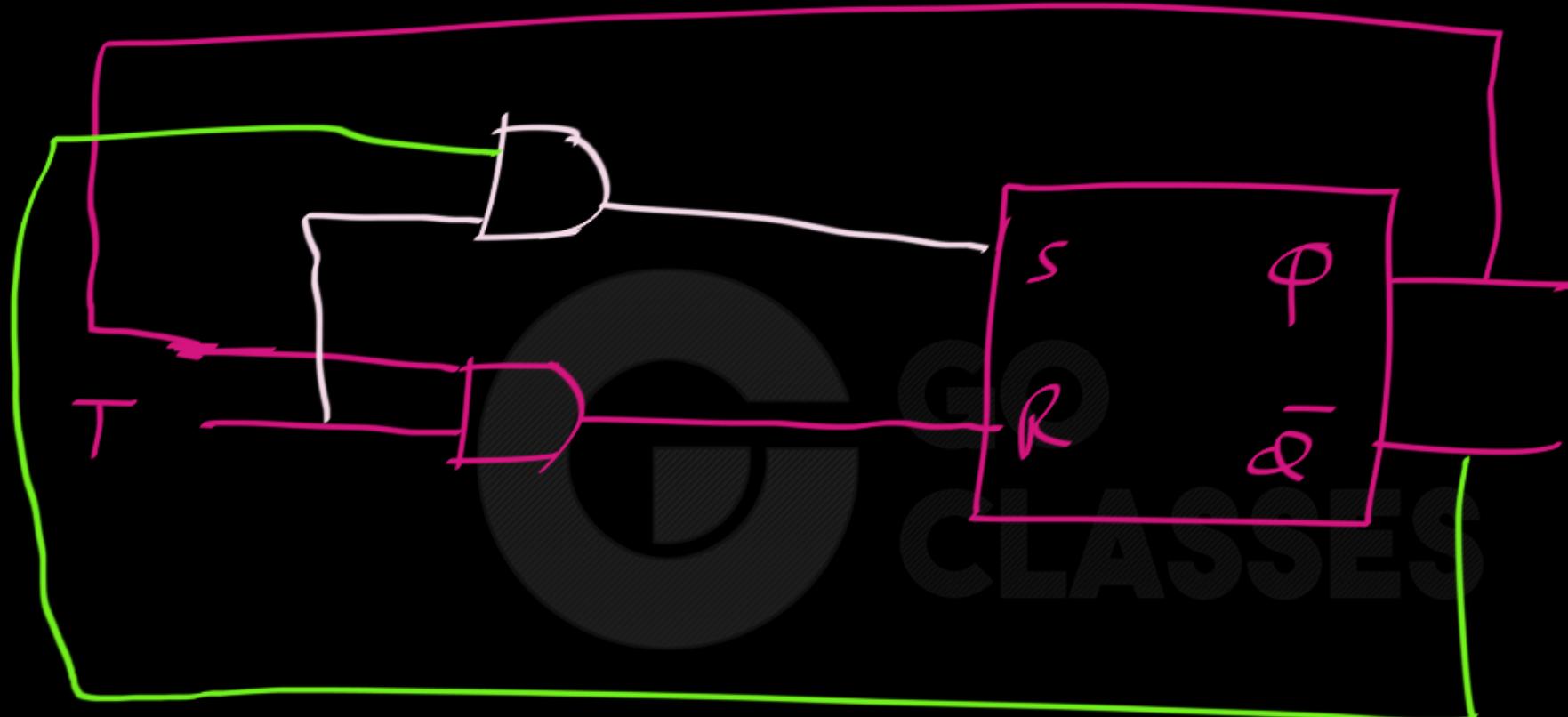


$$\underline{S} = T \bar{Q}$$

$$R = f(T, Q)$$

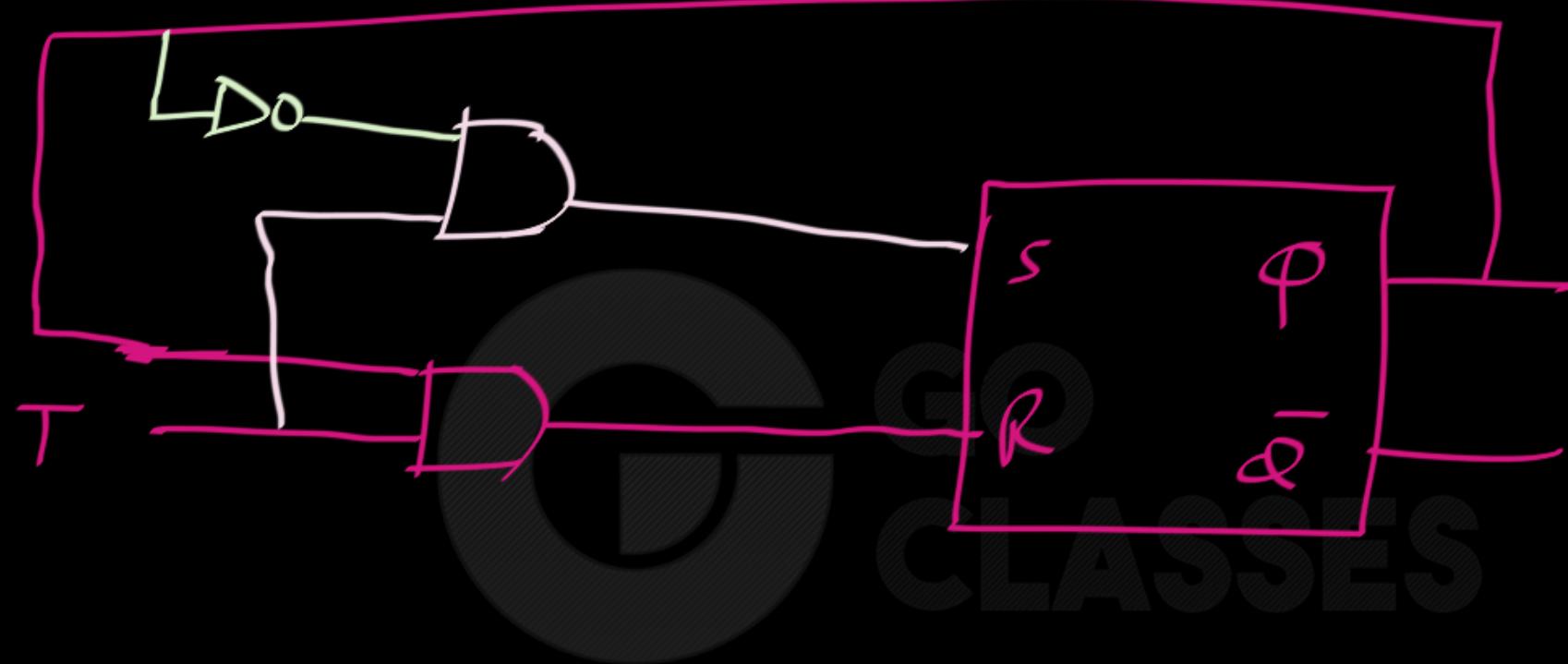


$$\underline{R} = T Q$$





Digital Logic



② $T \rightarrow SR$

Given

Desires

Idea:



$SR - FF$

$$SR = 11$$

Combination

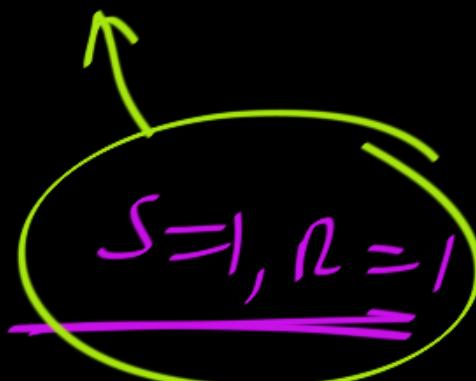
NEVER occurs.

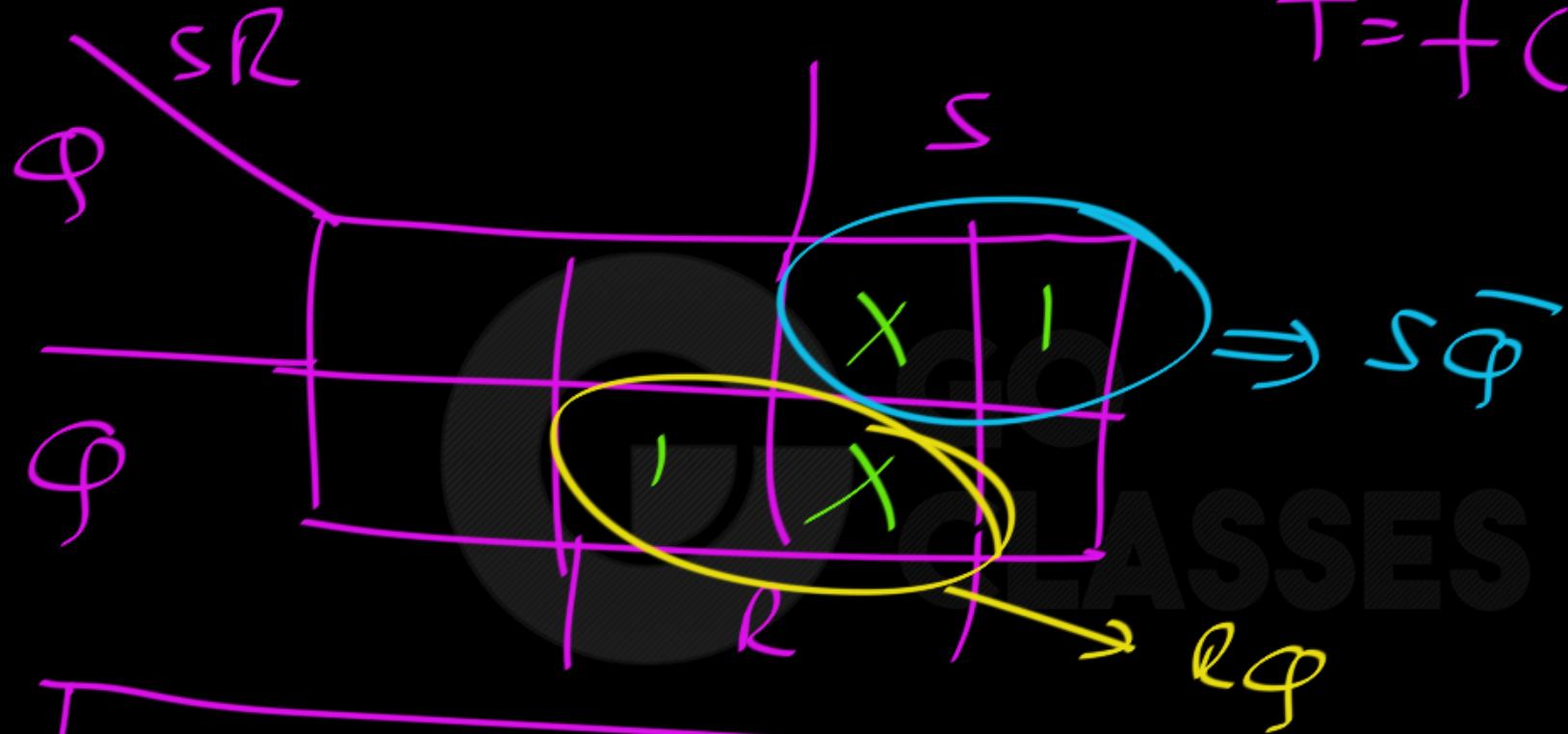
Don't
occurs. \Rightarrow Gx
Combinatu

$$T = f(S, R, Q)$$

Set S	Reset R	Q	Q_n	$T = f(S, R, Q)$
0	0	0	0	0
0	0	1	1	0
0	1	0	0	0
0	1	1	0	1
1	0	0	1	1
1	0	1	1	0
1	1	0	X	X
1	1	1	X	X

Never occurs



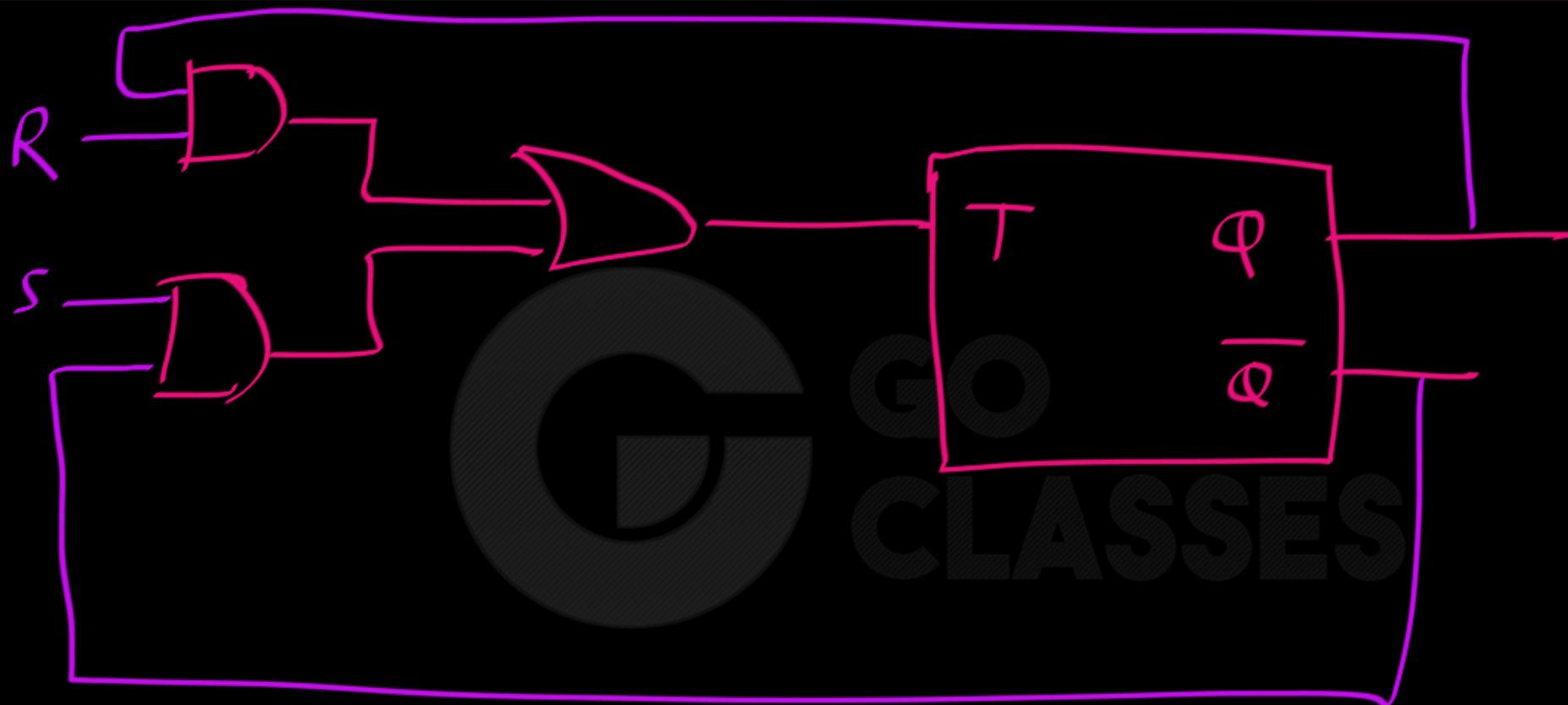


$$T = f(S, R, Q)$$

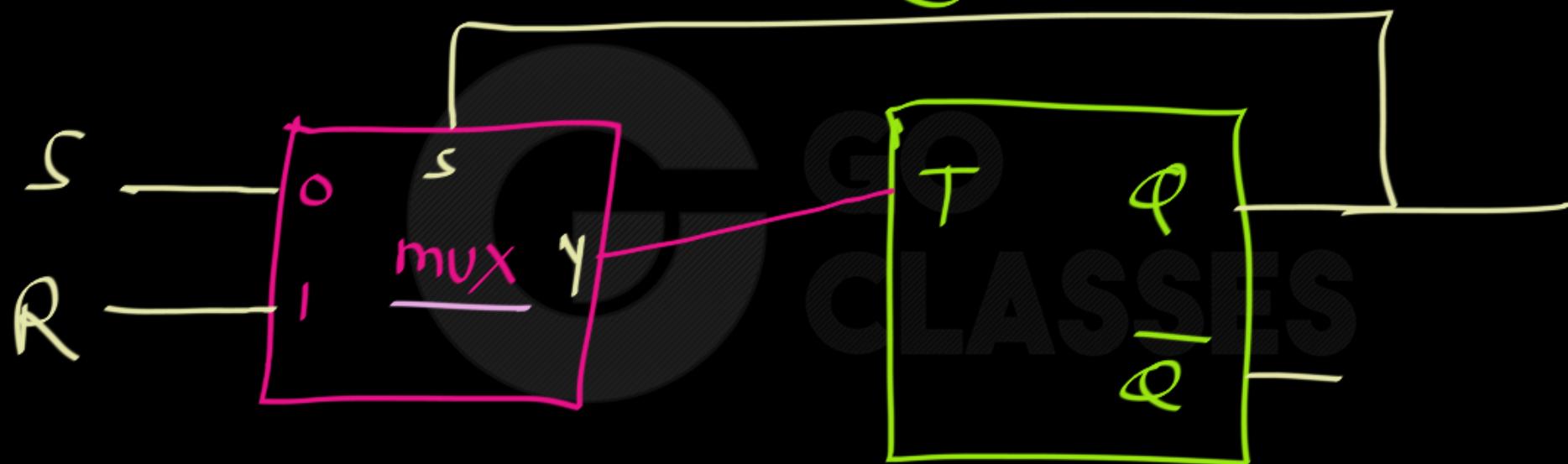
$$T = S\bar{Q} + RQ$$



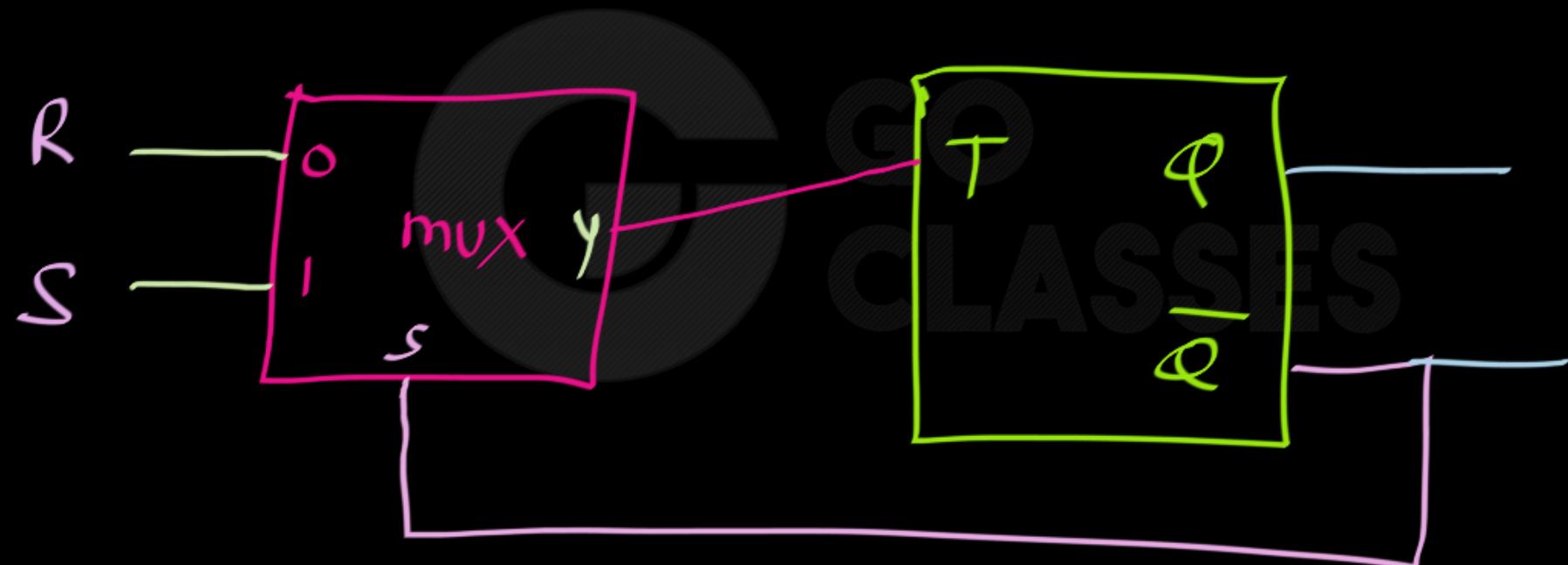
Digital Logic



$$T = S \overline{Q} + R P \quad (\text{mux equation})$$



$$T = S \overline{Q} + R P \quad (\text{mux equation})$$



$$S = \overline{Q}$$