Unit IV

Introduction to Sequential Logic Circuits

by

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FLIP FLOP CONVERSIONS

- SR to D
- SR to JK
- SR to T
- JK to T
- JK to D
- JK to SR
- D to T
- D to SR
- T to D

PROCEDURE FOR CONVERSION

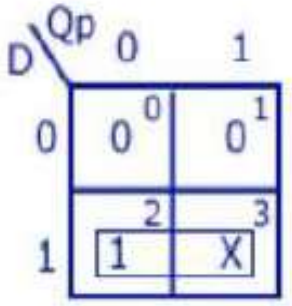
1. Draw the block diagram of the target flip flop from the given problem.
2. Write truth table for the target flip-flop.
3. Write excitation table for the available flipflop.
4. Draw k-map for target flip-flop.
5. Draw the block diagram.

SR to D Flip flop Conversion

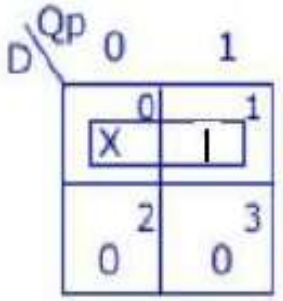
Conversion Table

Input	Present state	Next state	Flip flop Inputs	
D	Q n	Qn+1	S	R
0	0	0	0	X
0	1	0	0	1
1	0	1	1	0
1	1	1	X	0

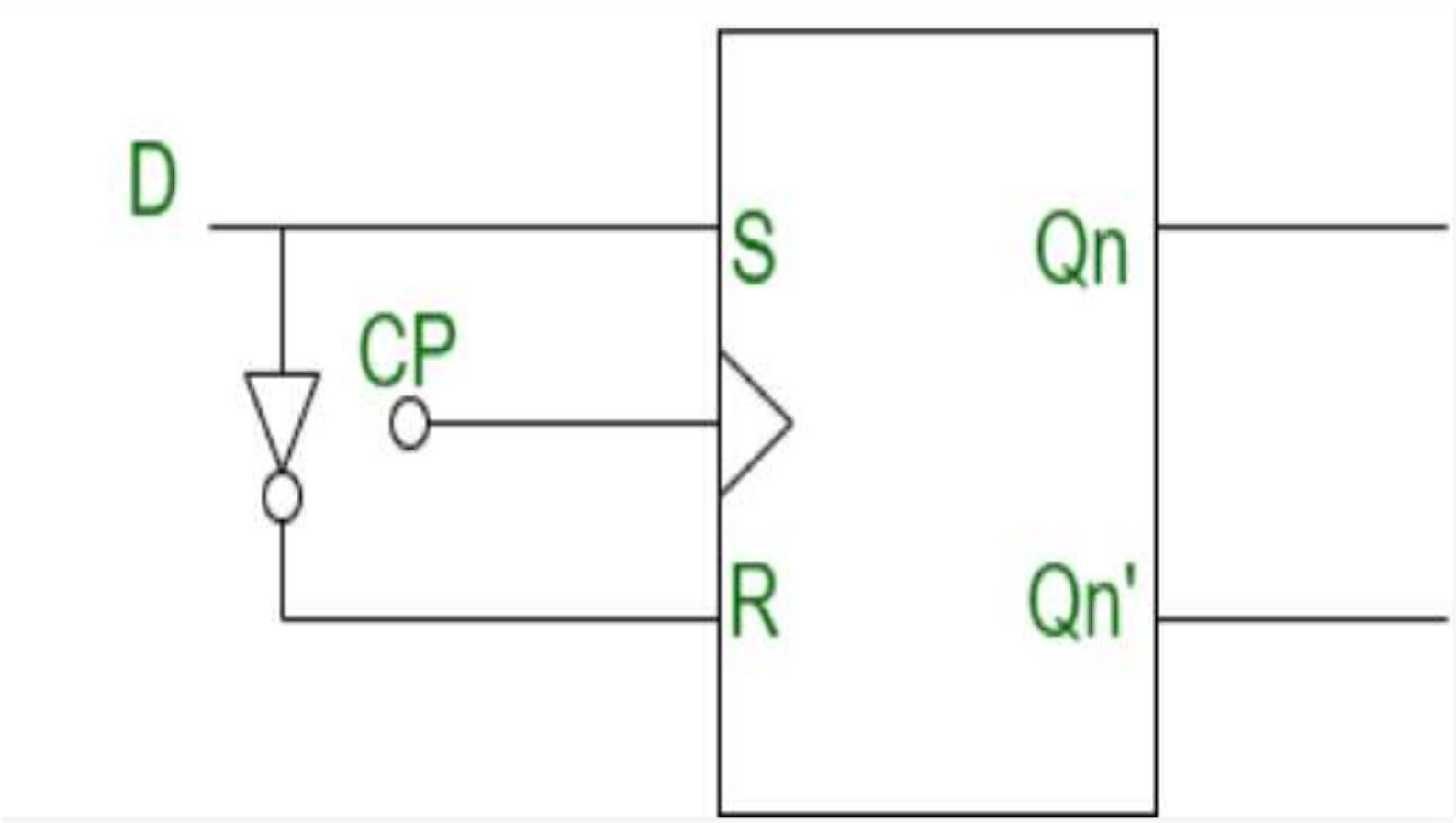
K- MAP SIMPLIFICATIO N



S = D



R = $\overline{D}$


D
S
Qn
CP
R
Qn'

Truth Table

CLK	S	R	Q	$\overline{Q}$
0	x	x	Memory state	
1	0	0	Memory state	
1	0	1	0	1
1	1	0	1	0
1	1	1	Invalid	

Characteristics Table

S	R	Q_n	Q_{n+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	×

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

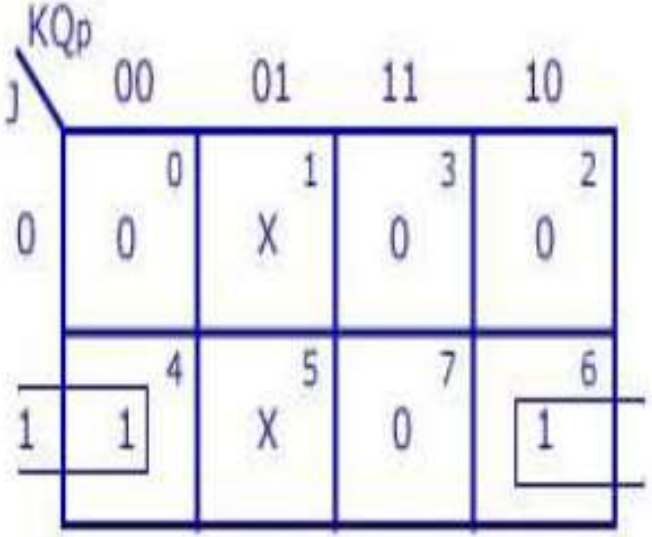
SR(Available) to JK(Target) Flip-Flop

Conversion Table

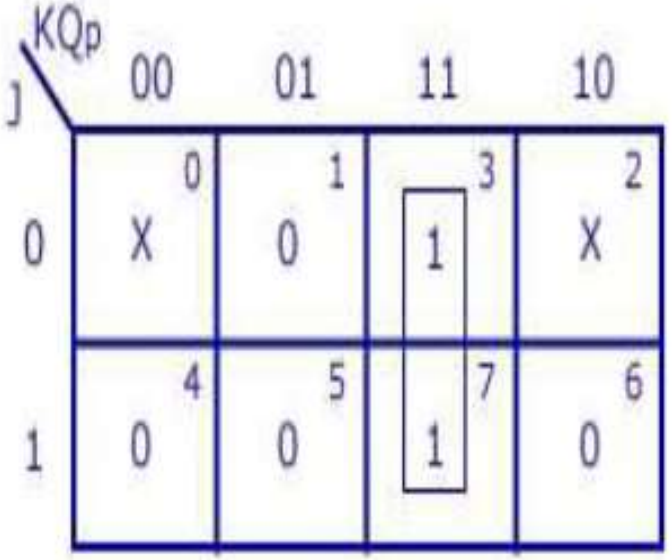
Input		Present State	Next State	Flip-Flop Inputs	
J	K	Q n	Qn+1	S	R
0	0	0	0	0	X
0	0	1	1	X	0
0	1	0	0	0	X
0	1	1	0	0	1
1	0	0	1	1	0
1	0	1	1	X	0
1	1	0	1	1	0
1	1	1	0	0	1

SR to JK

- K-map Simplification

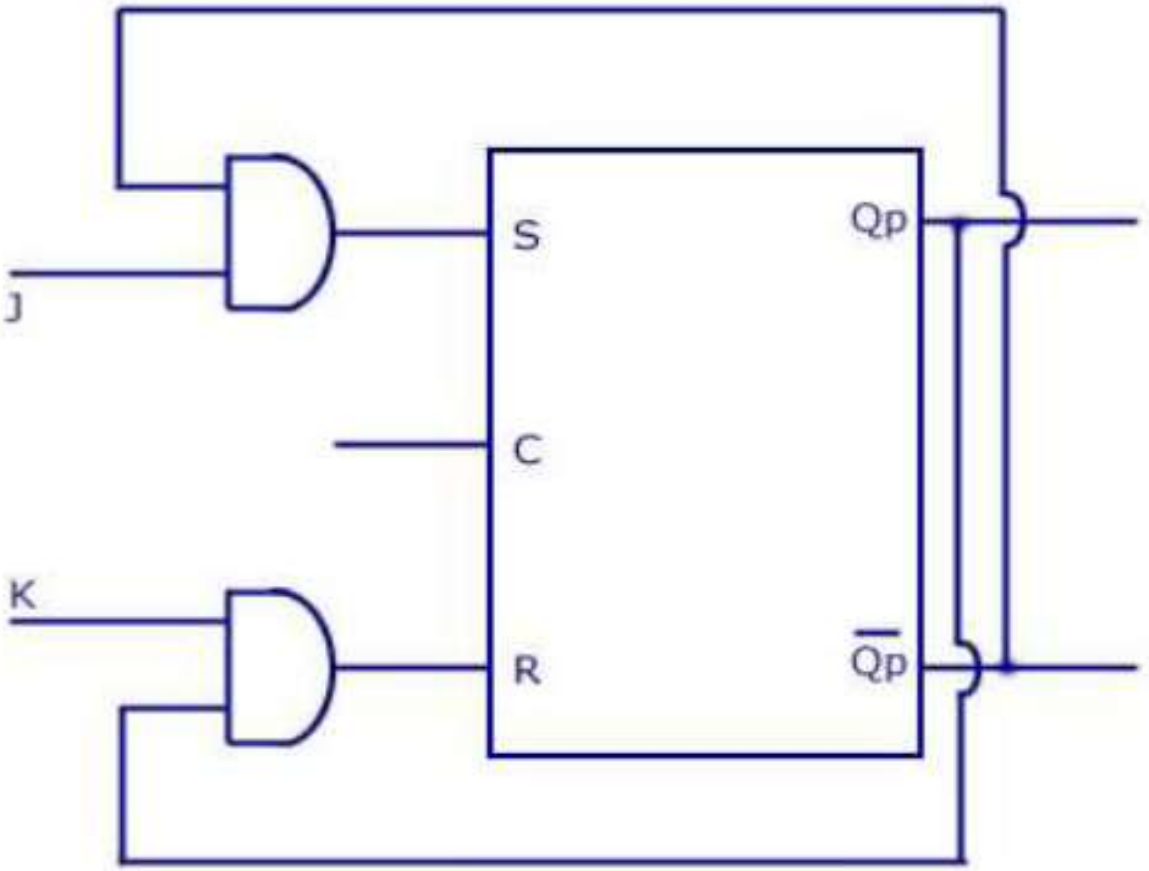


$S = \bar{J}Q_p$



$R = KQ_p$

Logic Diagram (SR to JK)

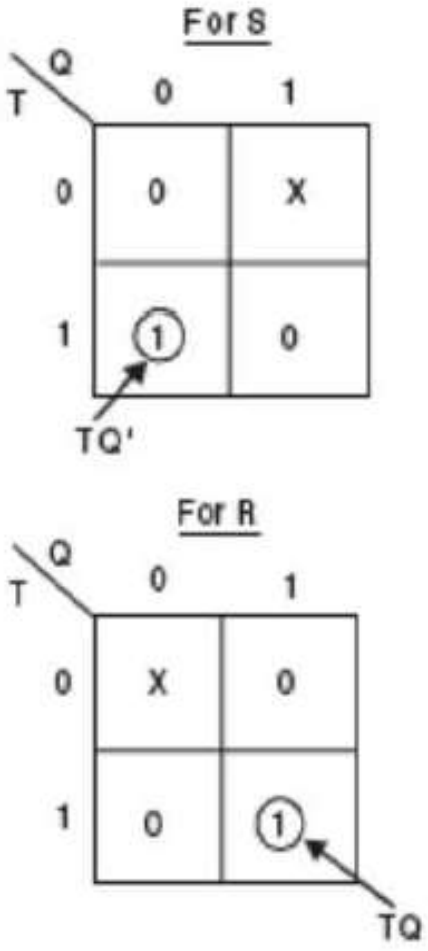


SR(Available) to T(Target)

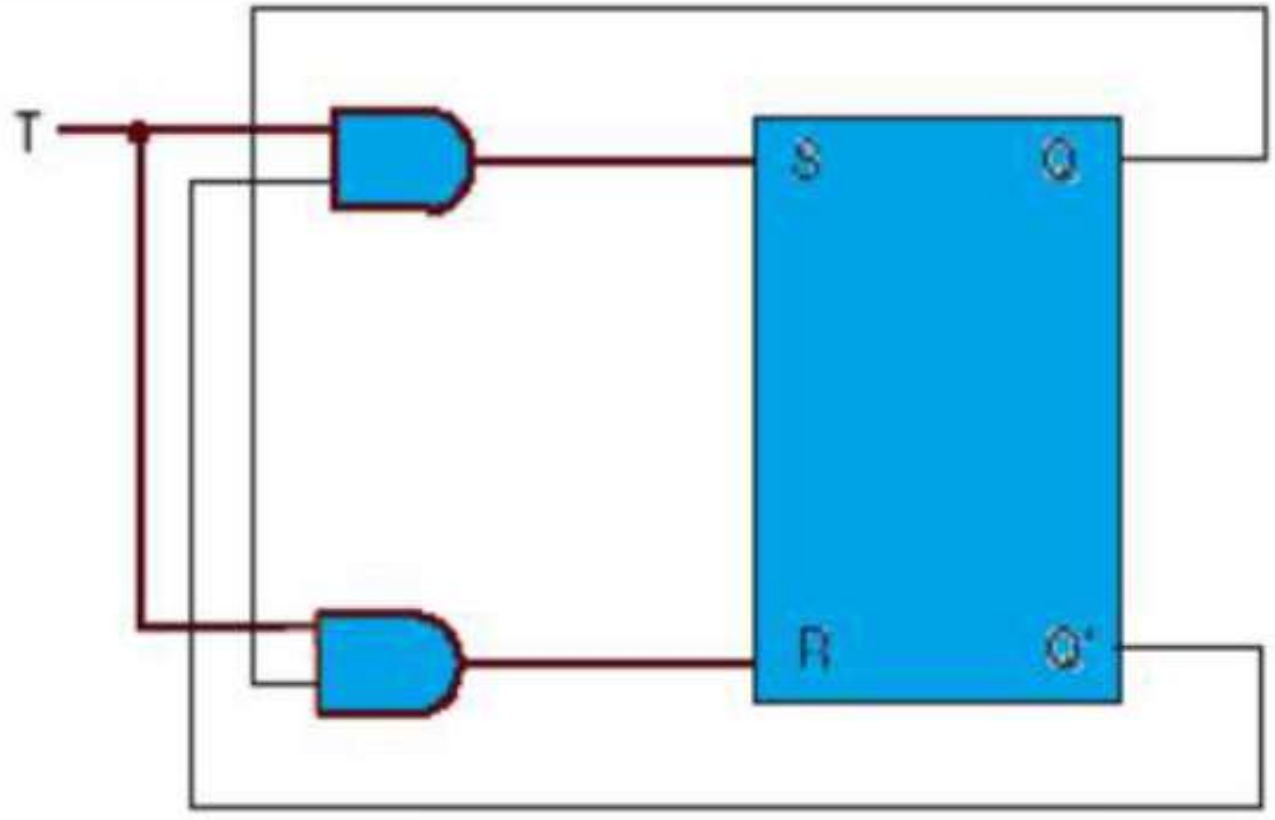
Conversion Table

Input	Present state	Next state	Flip flop Inputs	
T	Q n	Qn+1	S	R
0	0	0	0	X
0	1	1	X	0
1	0	1	1	0
1	1	0	0	1

K- MAP SIMPLIFICATION



Logic Diagram (SR to T)



A T flip-flop using S-R flip-flop.

Quick Quiz

- Whose operations are more faster among the following?

  a) Combinational circuits
  b) Sequential circuits
  c) Latches
  d) Flip-flops

Quick Quiz

- In S-R flip-flop, if Q = 0 the output is said to be _____

  a) Set
  b) Reset
  c) Previous state
  d) Current state

Quick Quiz

- What does the triangle on the clock input of a J-K flip-flop mean?

  a) Level enabled
  b) Edge triggered
  c) Both Level enabled & Edge triggered
  d) Level triggered