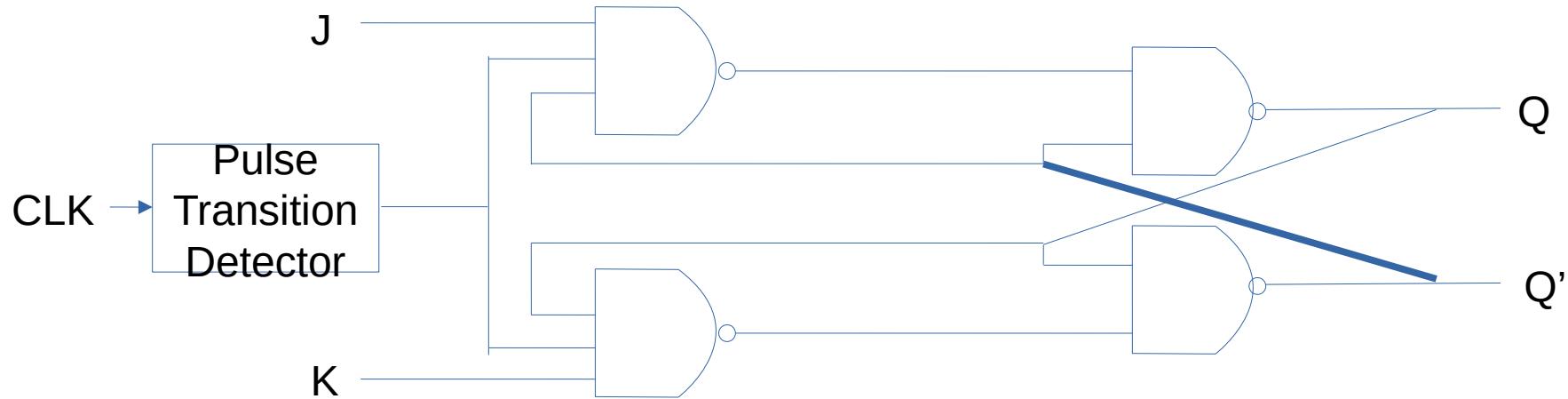


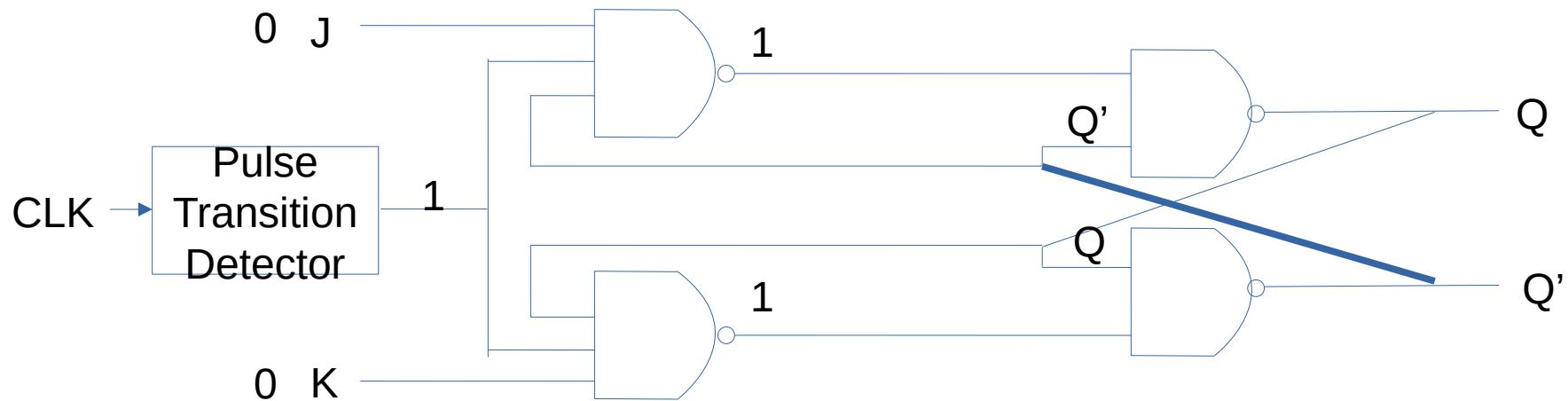
# Switching Circuit & Logic Design

Lecture 22 : Flip-Flop

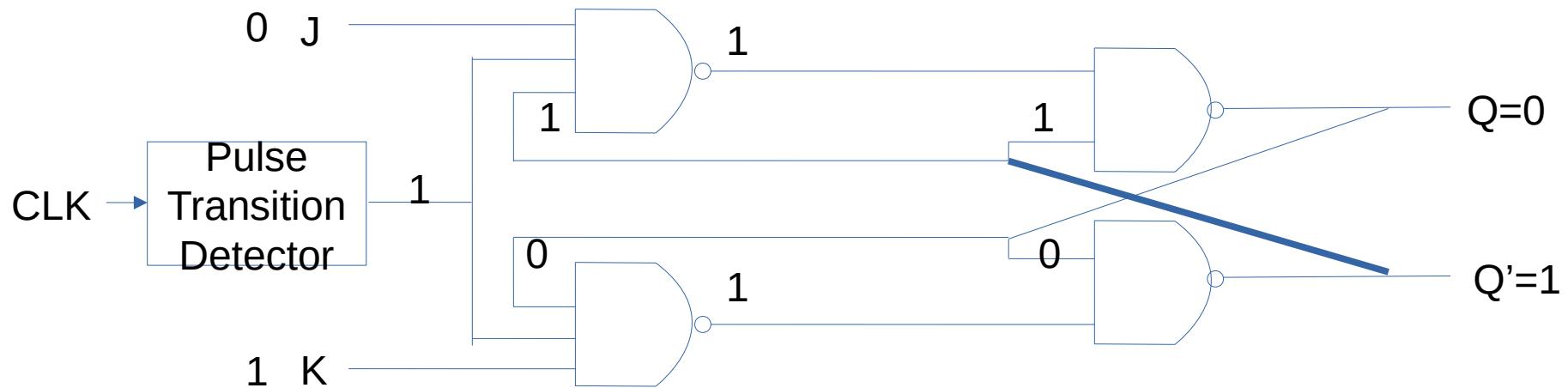
# J-K Flip Flop



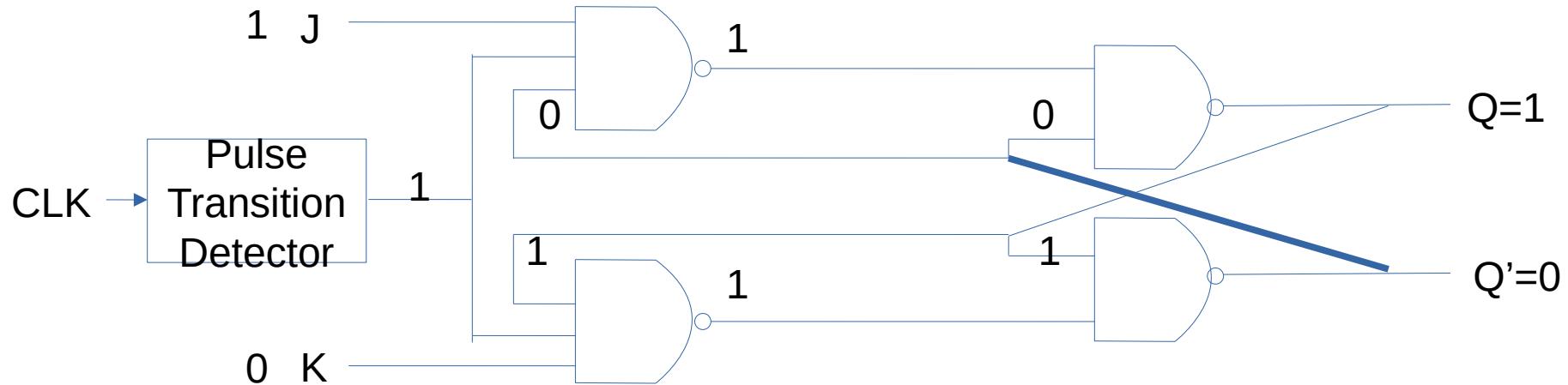
# J-K Flip Flop



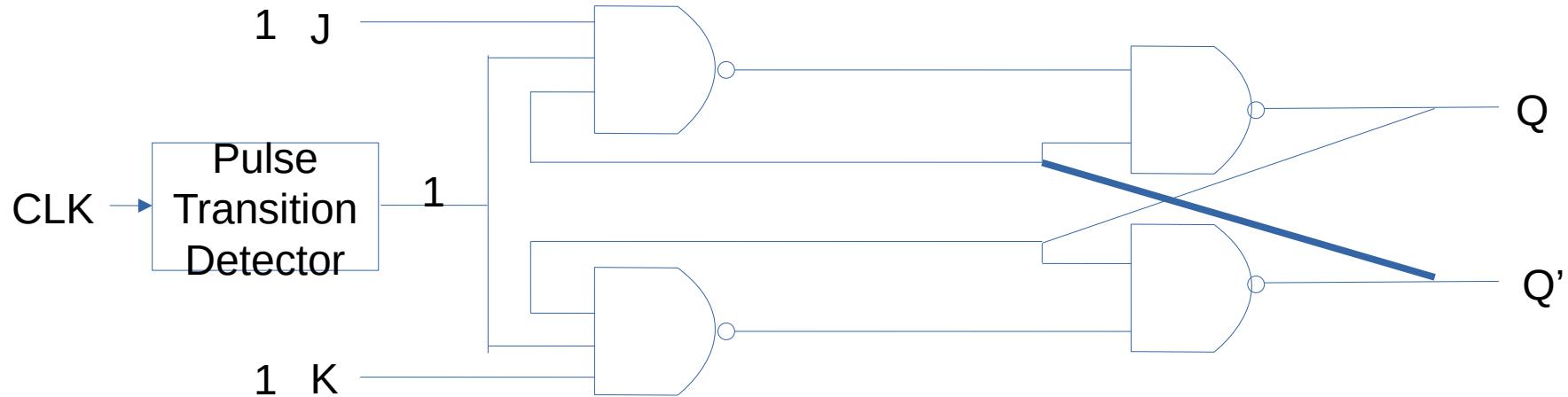
# J-K Flip Flop



# J-K Flip Flop

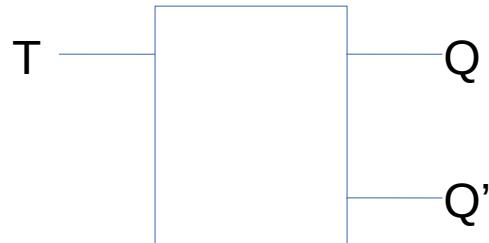


# J-K Flip Flop



# T Flip-Flop

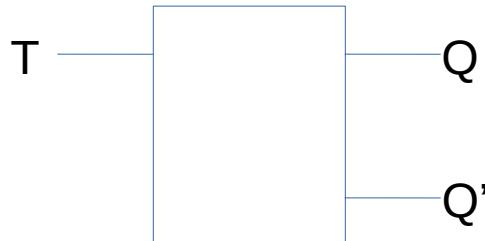
# Convert T Flip-Flop to JK FF



T	Q <sub>n</sub>	Q <sub>n+1</sub>
0	0	0
0	1	1
1	0	1
1	1	0

J	K	Q <sub>n</sub>	Q <sub>n+1</sub>
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

# Convert T Flip-Flop to JK FF



T	$Q_n$	$Q_{n+1}$
0	0	0
0	1	1
1	0	1
1	1	0

$Q_n \backslash JK$	00	01	11	10	
0			1	1	$JQ_{n'}$
1			1	1	

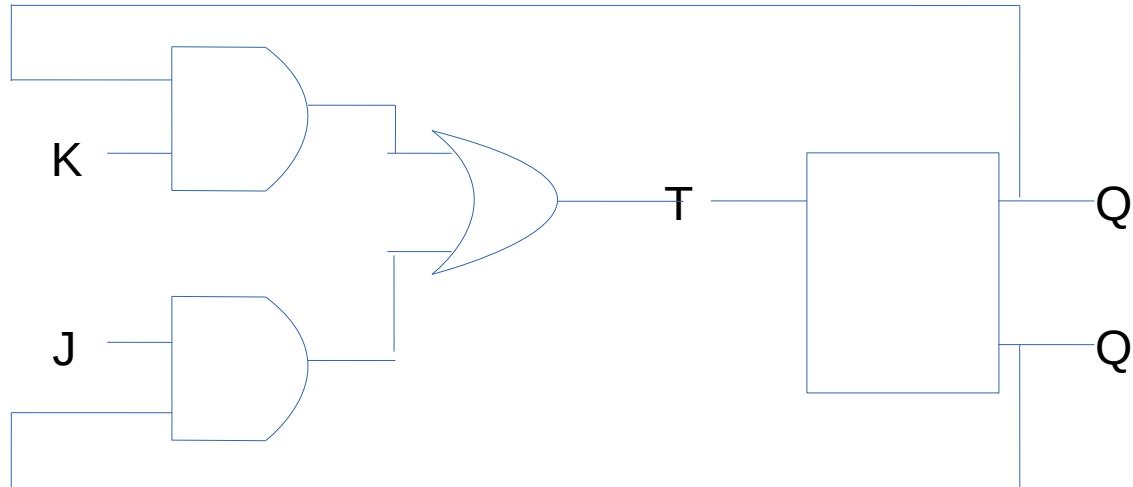
↓

$KQ_n$



J	K	$Q_n$	$Q_{n+1}$	T
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	1	1
1	1	1	0	1

# Convert T Flip-Flop to JK FF



# Steps For conversion: A FF to B FF

Write Truth tables like this for both A & B Flip-flops.

A	$Q_n$	$Q_{n+1}$

B	$Q_n$	$Q_{n+1}$

# Steps For conversion: A FF to B FF

Now insert another column(s)  
at B FF Truth table

A	$Q_n$	$Q_{n+1}$
	0	1

B	$Q_n$	$Q_{n+1}$	A
	0	1	

Fill up this column(s) as above.

1. Look at the transition from  $Q_n$  to  $Q_{n+1}$ .
2. Find the A input(s) for this required transition.
3. Place this input(s) at column A of B FF.

# Steps For conversion: A FF to B FF

Now build a K-map to realize  
 $A = f(B, Q_n)$

B	$Q_n$	$Q_{n+1}$	A