

Ex 8 Convert a JK flip-flop to SR flip-flop.

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Soln:

$Q(t)$	$Q(t+1)$	S	R	J	K
0	0	0	X	0	X
0	1	1	0	1	X
1	0	0	1	X	1
1	1	X	0	X	0

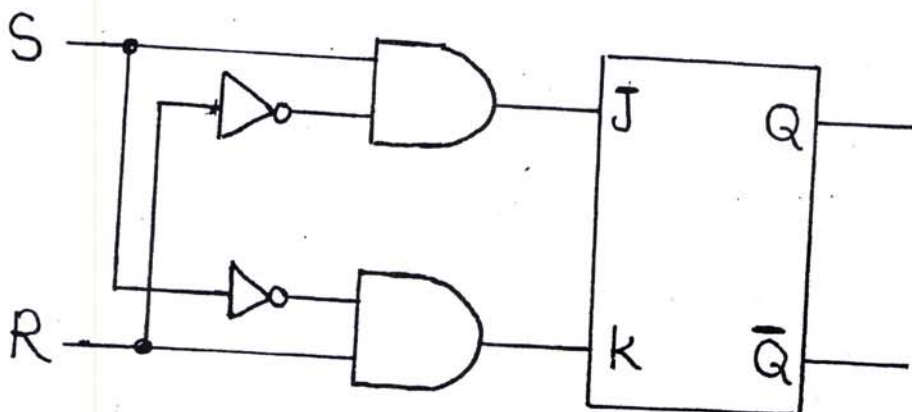
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SR	00	01	11	10
Q				
0				1
1	X	X		X

$$J = S\bar{R}$$

SR	00	01	11	10
Q				
0	X	X		X
1		1		

$$K = \bar{S}R$$

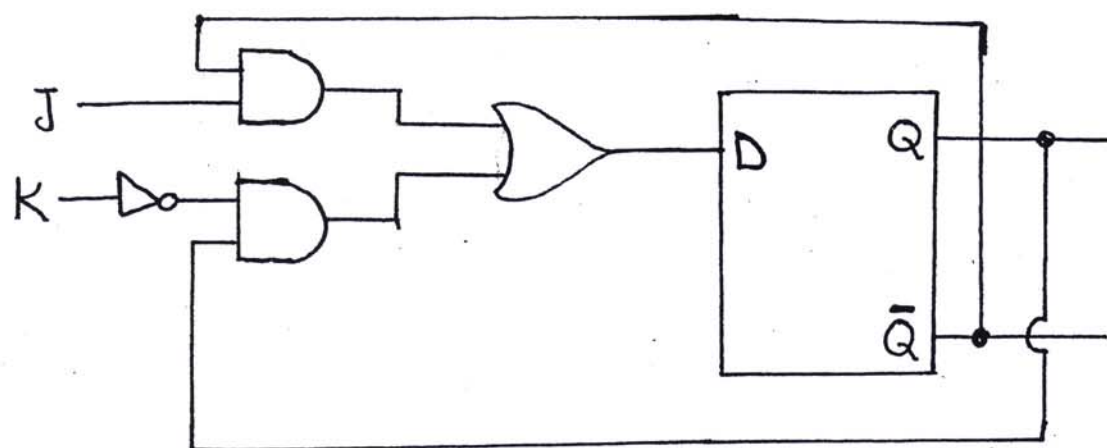


Ex: Convert a D flip-flop to JK flip-flop.

$Q(t)$	$Q(t+1)$	J	K	D
0	0	0	X	0
0	1	1	X	1
1	0	X	1	0
1	1	X	0	1

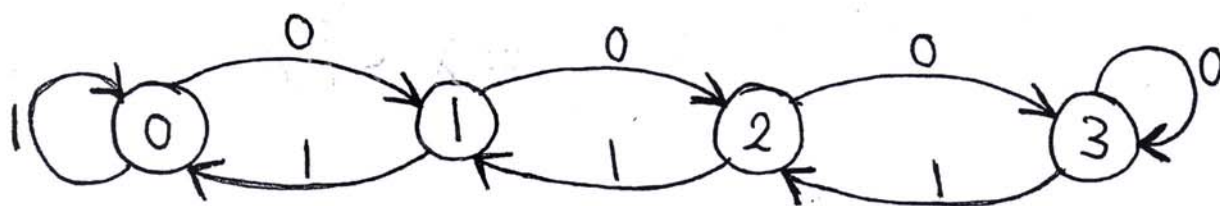
JK	00	01	11	10
$Q(t)$				
0			1	1
1	1			1

$$D = \bar{Q}J + Q\bar{K}$$



Ex: Design a counter with JK flip-flops, A and B, and one input, x. If $x=0$, it counts 0, 1, 2, 3, 3, ...; If $x=1$, it counts 3, 2, 1, 0, 0, ...

Soln: This is an up/down saturating counter. The truth table is shown below:



i/p X	Present State A B		Next State A B		Flip-Flop i/p			
	A	B	A	B	J _A	K _A	J _B	K _B
0	0	0	0	1	0	X	1	X
0	0	1	1	0	1	X	X	1
0	1	0	1	1	X	0	1	X
0	1	1	1	1	X	0	X	0
1	0	0	0	0	0	X	0	X
1	0	1	0	0	0	X	X	1
1	1	0	0	1	X	1	1	X
1	1	1	1	0	X	0	X	1

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AB X	00	01	11	10
0		1	X	X
1			X	X

$$J_A = \bar{X}B$$

AB X	00	01	11	10
0	X	X		
1	X	X		1

$$K_A = X\bar{B}$$

AB X	00	01	11	10
0	1	X	X	1
1		X	X	1

$$J_B = \bar{X} + A$$

AB X	00	01	11	10
0	X	1		X
1	X	1	1	X

$$K_B = X + \bar{A}$$

H.W: Draw the circuit diagram

West Virginia: De

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West Virginia: De

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السعر / ٥ -

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٦-١-لاخيرة

Logic Desing

منطق

قسم هندسة الحاسبات و البرمجيات
المرحلة الأولى

النسخة الاصلية في

مكتب الفيس 1 داخل كلية الهندسة

بإدارة / عادل الكناني

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Registers and Counters

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Registers: Is a group of flip-flops and gates, each flip flop is capable of storing one bit of information, an n -bit register consists of a group of n flip-flops, and the gates determine how the information is transferred into the register.

Shift Registers: A register capable of shifting its binary information in one or both directions.

The logical configuration of a shift register consists of a chain of flip-flops in cascade, with the output of one flip-flop connected to the input of the next flip-flop. All flip-flops receive common clock pulses, which activate the shift from one stage to the next.

The simplest possible shift register is that uses only flip-flops, as shown below. Each clock pulse shifts the contents of the register one bit position to the right.

