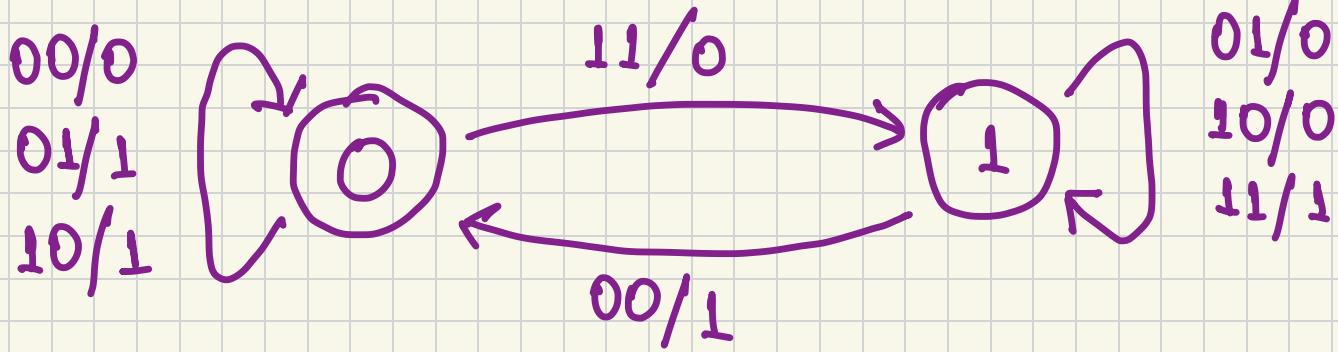


Quiz 4 (Solution)

1.	Present State	Inputs	Next State	Output
	Q	x y	Q	S
	0	0 0	0	0
	0	0 1	0	1
	0	1 0	0	1
	0	1 1	1	0
	1	0 0	0	1
	1	0 1	1	0
	1	1 0	1	0
	1	1 1	1	1



2.

We know, from the characteristic equation of JK flip-flops, that

$$A(t+1) = J_A A' + K_A' A$$

$$B(t+1) = J_B B' + K_B' B$$

Given that $J_A = \alpha'$, $K_A = B'$, $J_B = A$,
and $K_B = \alpha$,

We obtain

$$A(t+1) = \alpha' A' + BA$$

$$B(t+1) = AB' + \alpha' B$$

Present State

A	B
---	---

0	0
---	---

0	0
---	---

0	1
---	---

0	1
---	---

1	0
---	---

1	0
---	---

1	1
---	---

1	1
---	---

Input

a

0

1

0

1

0

1

0

1

Next State

A	B
---	---

1	0
---	---

0	0
---	---

1	1
---	---

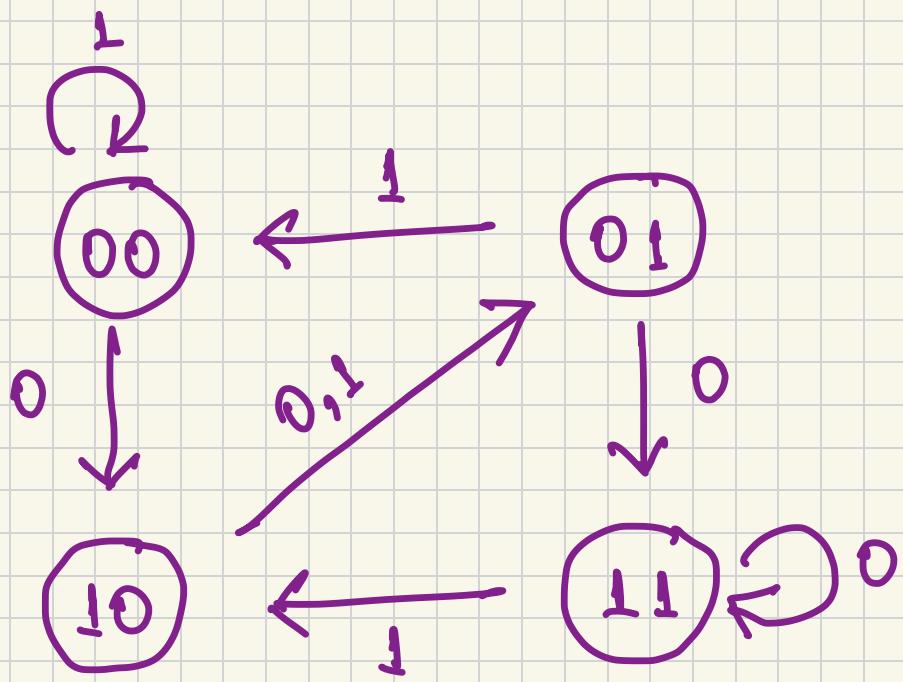
0	0
---	---

0	1
---	---

0	1
---	---

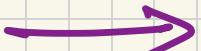
1	1
---	---

1	0
---	---



3.

1011001



Serial input



After the first right shift : 1010

—	Second	—	:	0101
—	third	—	:	0010
—	fourth	—	:	1001
—	fifth	—	:	1100

4. Present State Input Next State Output Flip flop inputs

A	B	C	\bar{m}	A	B	C	y	J_A	K_A	J_B	K_B	J_C	K_C
0	0	0	0	0	1	1	0	0	x	1	x	1	x
0	0	0	1	1	0	0	1	1	x	0	x	0	x
0	0	1	0	0	0	1	0	0	x	0	x	x	0
0	0	1	1	1	0	0	1	1	x	0	x	x	1
0	1	0	0	0	1	0	0	0	x	x	0	0	x
0	1	0	1	0	0	0	1	0	x	x	1	0	x
0	1	1	0	0	0	1	0	0	x	x	1	x	0
0	1	1	1	0	1	0	1	0	x	x	0	x	1
1	0	0	0	0	1	0	0	1	x	1	x	0	x
1	0	0	1	0	1	1	0	0	x	1	x	1	x

unused states

x	x	x	x	x
x	x	x	x	x
.	.	.	.	-
x	x	x	x	x

J_A

K_A

C^n

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

1

$$J_A = B' \alpha$$

J_B

CN

AB

	00	01	11	10
00	1	0	0	0
01	x	x	x	x
11	x	x	x	x
10	1	1	x	x

$$J_B = A + C'x'$$

K_B

CN

AB

	00	01	11	10
00	x	x	x	x
01	0	1	0	1
11	x	x	x	x
10	x	x	x	x

$$K_B = C'x + Cx'$$

$$= C \oplus x$$

J_C

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

$$J_C = Ax + A'B'x'$$

K_C

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

$$K_C = x$$

A
 B
 Cx

	00	01	11	10
00	0	1	1	0
01	0	1	1	0
11	x	x	x	x
10	0	0	x	x

$$y = A'x$$

