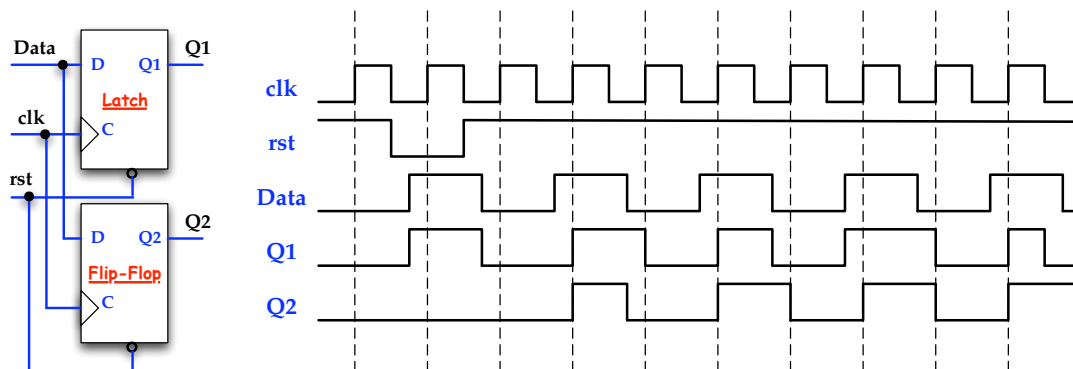
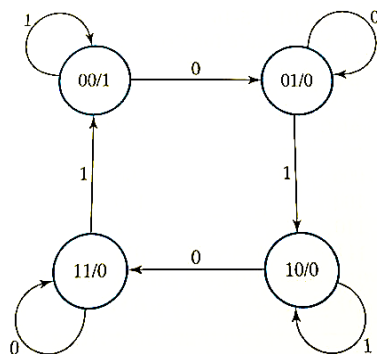


HW6

1. For the D-type positive edge-triggered flip-flop and D-type positive level-sensitive (level-triggered) latch with the same clock (clk), asynchronous reset signal (rst), and input (Data) below. Assume the initial state of both the flip-flop and latch are '0', and both devices are with 0 D-to-Q delay. Point out the incorrect parts for Q1 and Q2 in the timing diagram and redraw the correct timing diagram.



2. A sequential circuit with two D flip-flops A and B, two inputs X and Y, and one output Z is specified by the following input equations:
- $$D_A = XA + X'Y, D_B = XB' + Y'A, Z = Y'B'$$
- Draw the logic diagram of the circuit.
 - Derive the state table.
 - Derive the state diagram.
3. Design a sequential circuit with two D flip-flops A and B and one input X. When $X = 1$, the state of the circuit remains the same. When $X = 0$, the circuit goes through the state transitions from 00 to 10 to 11 to 01, back to 00, and then repeats.
4. A sequential circuit has two flip-flops A and B, one input X, and one output Y. The state diagram is shown in Figure 5-44. Design the circuit with D flip-flops using a 1-hot state assignment.



□ FIGURE 5-44

State Diagram for Problem 5-26

5. Draw the state diagram of the sequential circuit specified by the following state table.

Present State		Inputs		Next State		Output
A	B	X	Y	A	B	Z
0	0	0	0	0	0	0
0	0	0	1	0	1	0
0	0	1	0	1	0	1
0	0	1	1	1	1	1
0	1	0	0	0	1	1
0	1	0	1	1	0	1
0	1	1	0	1	0	0
0	1	1	1	0	0	0
1	0	0	0	1	1	1
1	0	0	1	1	1	0
1	0	1	0	1	1	1
1	0	1	1	1	0	0
1	1	0	0	0	0	0
1	1	0	1	0	0	1
1	1	1	0	0	0	0
1	1	1	1	0	1	1

6. Reduce the number of states in the following state table and tabulate the reduced state table.

Present State	Next State		Output	
	x=0	X=1	x=0	x=1
a	f	b	0	0
b	d	c	0	0
c	f	e	0	0
d	g	a	1	0
e	d	c	0	0
f	f	b	1	1
g	g	h	0	1
h	g	a	1	0

Show that the same output sequences are obtained for both the state table of the previous problem and the reduced state table from the previous problem. The state-circuit starts from state a, and the input sequence is 01110010011.