2015级数电 A. 王子瀚 1120210946

1、 $(53.5)_{10} = (65.4)_8 = (35.8)_{16}$

2、 (1010 格雷 = (1100) 二进制

1100

3、 110000.01

4、 1111 1011

5、 216+393 =609 = 0110 0000 1001

6、 1

7、 $F=(A+B)(B+C)$

8、 ① $F=\overline{C}D+\overline{A}B\overline{D}$

9、 20

10、 0.4V 0.5V

11、 B 10型

12、 上拉电阻

13、 RS=0

14、 Q_A 15、 4

~~15、31、16.~~

16、 31、16

17、不考

18、不考

19、高电平、低电平、高阻

20、5

21、并行比较ADC.

22、 10.

1

2.

(1) $F_1 = \overline{\Pi M(4,8,9,12,13,14)}$

$= \Sigma m(4,8,9,12,13,14)$

$F_2 = \overline{\Pi M(0,5,10,15)}$

$= \Sigma m(0,5,10,15)$

$F_3 = \overline{\Pi M(1,2,3,6,7,11)}$

$= \Sigma m(1,2,3,6,7,11)$

(2)

F_1 B_1B_0

A_1A_0	00	01	11	10
00	0	0	0	0
01	1	0	0	0
11	1	1	0	1
10	1	1	0	0

F_3 B_1B_0

A_1A_0	00	01	11	10
00	0	1	1	1
01	0	0	1	1
11	0	0	0	0
10	0	0	0	0

(3) $F_1 = A_1\overline{B_1} + A_0\overline{B_1}\,\overline{B_0} + A_1A_0\overline{B_0}$

$F_3 = \overline{A_1}B_1 + \overline{A_0}B_1B_0 + \overline{A_1}\,\overline{A_0}B_0$

(4)

	A_1	A_0	B_1	B_0	F_3	F_2	F_1
0	0	0	0	0	0	1	0
1	0	0	0	1	1	0	0
2	0	0	1	0	1	0	0
3	0	0	1	1	1	0	0
4	0	1	0	0	0	0	1
5	0	1	0	1	0	1	0
6	0	1	1	0	1	0	0
7	0	1	1	1	1	0	0
8	1	0	0	0	0	0	1
9	1	0	0	1	0	0	1
10	1	0	1	0	0	1	0
11	1	0	1	1	1	0	0
12	1	1	0	0	0	0	1
13	1	1	0	1	0	0	1
14	1	1	1	0	0	0	1
15	1	1	1	1	0	1	0

(4)

功能：比較 A_1A_0 與 B_1B_0 大小。

若 $A_1A_0 > B_1B_0$

則 $F_1F_2F_3 = 100$

若 $A_1A_0 = B_1B_0$

則 $F_1F_2F_3 = 010$

若 $A_1A_0 < B_1B_0$

則 $F_1F_2F_3 = 001$

(1)

	A	B	C	X	Y
0	0	0	0	0	0
1	0	0	1	1	1
2	0	1	0	1	1
3	0	1	1	1	0
4	1	0	0	0	1
5	1	0	1	0	0
6	1	1	0	0	0
7	1	1	1	1	1

(2) $X = \Sigma m(1,2,3,7)$

$Y = \Sigma m(1,2,4,7)$

X

A \ BC	00	01	11	10
0	0	1	1	1
1	0	0	1	0

Y

A \ BC	00	01	11	10
0	0	1	0	1
1	1	0	1	0

(3) $X = BC + \bar{A}C + \bar{A}B$

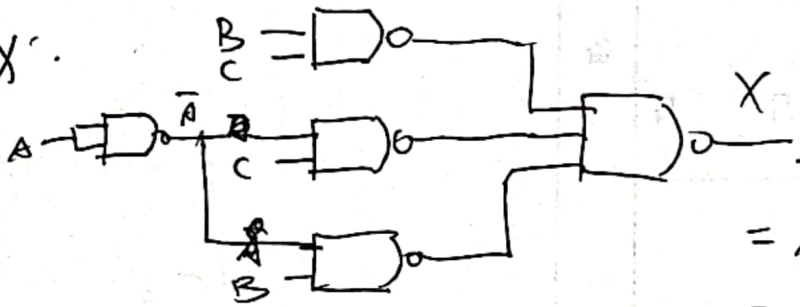
$= \overline{BC + \bar{A}C + \bar{A}B}$

$= \overline{BC} \cdot \overline{\bar{A}C} \cdot \overline{\bar{A}B}$

$Y = A\bar{B}\bar{C} + \bar{A}\bar{B}C + AB\bar{C} + \bar{A}B\bar{C}$

$= A \oplus B \oplus C$.

(3)



(4)

Y:

$= \bar{A}\bar{C} \cdot B + A\bar{C} \cdot 0 + \bar{A}C \cdot 1 + AC \cdot B$

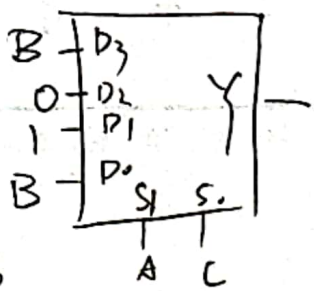
$= m_0 \cdot B + m_2 \cdot 0 + m_1 \cdot 1 + m_3 \cdot B$

(5) $X = BC + \bar{A}C + \bar{A}B$

$= \Sigma m(1,2,3,7)$

$= \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC + ABC$

$= \bar{A}C + \bar{A}\bar{C} \cdot B + AC \cdot B$



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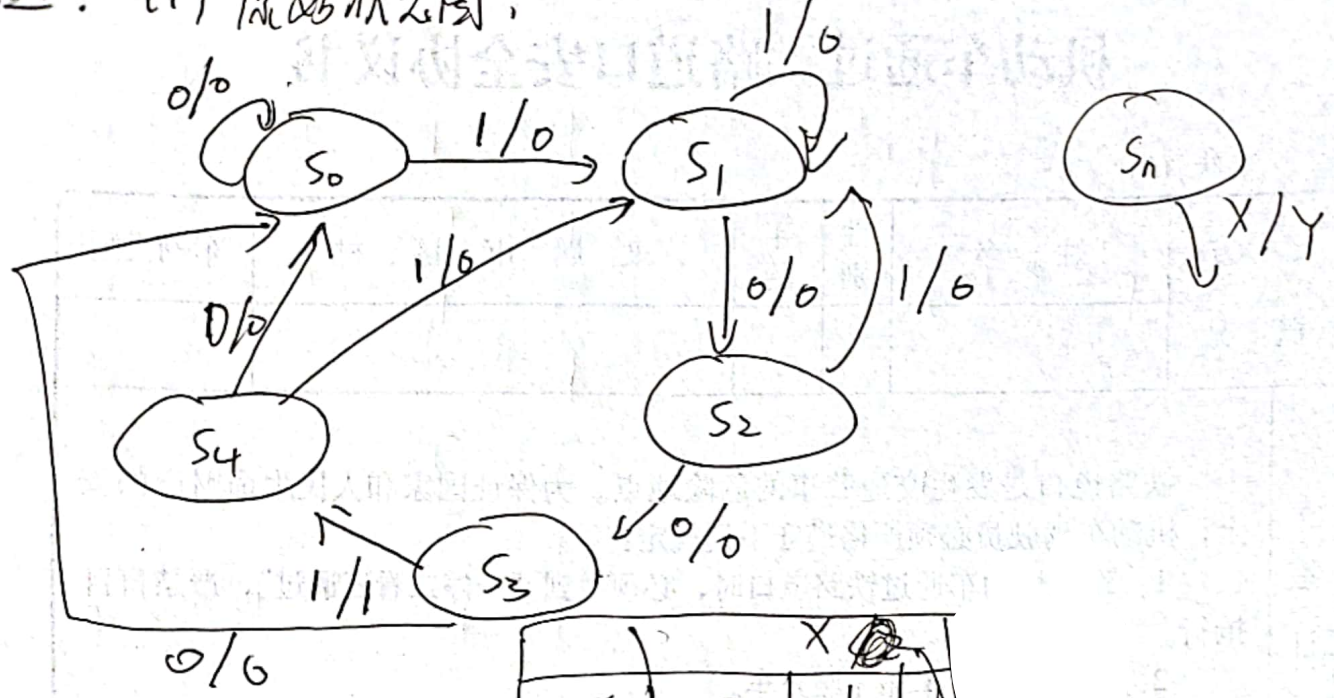
⑪. (1) 原始状态图：



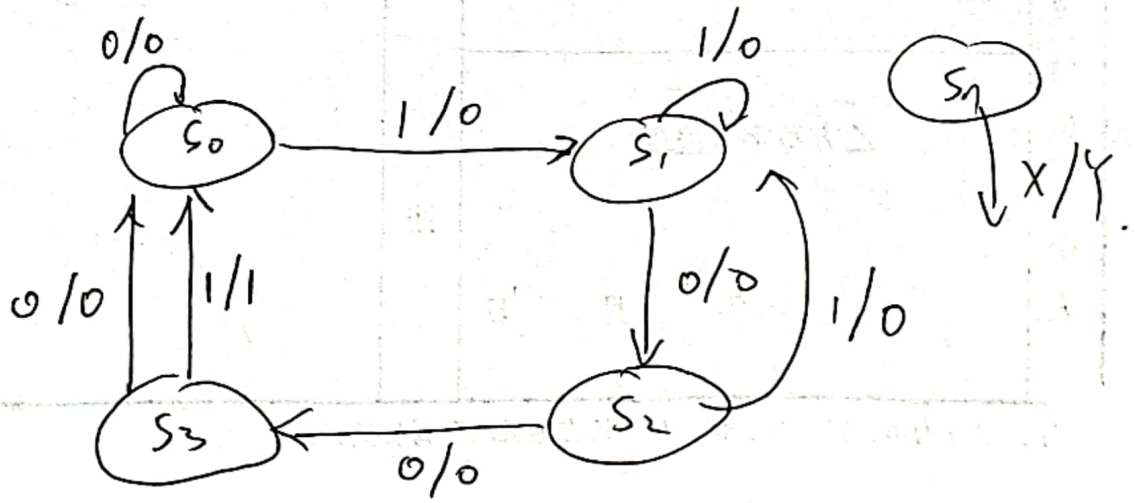
状态转换表

状态	X=0	X=1
S_0	S_0/0	S_1/0
S_1	S_2/0	S_1/0
S_2	S_3/0	S_1/0
S_3	S_0/0	S_4/1
S_4	S_0/0	S_1/0

S^{n+1}/Y

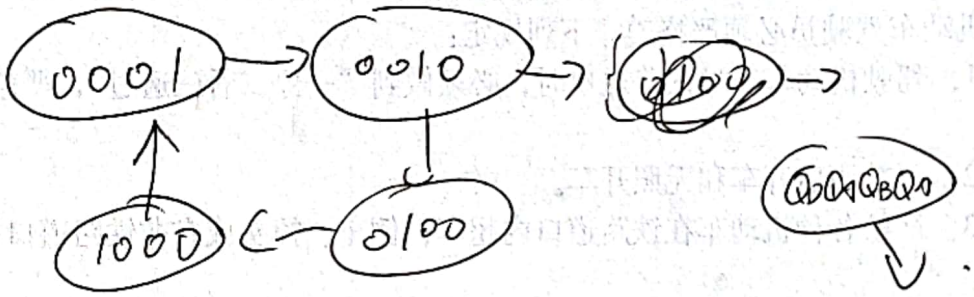
由表可知，S_0，与 S_4 是等价状态，

故最简状态图为

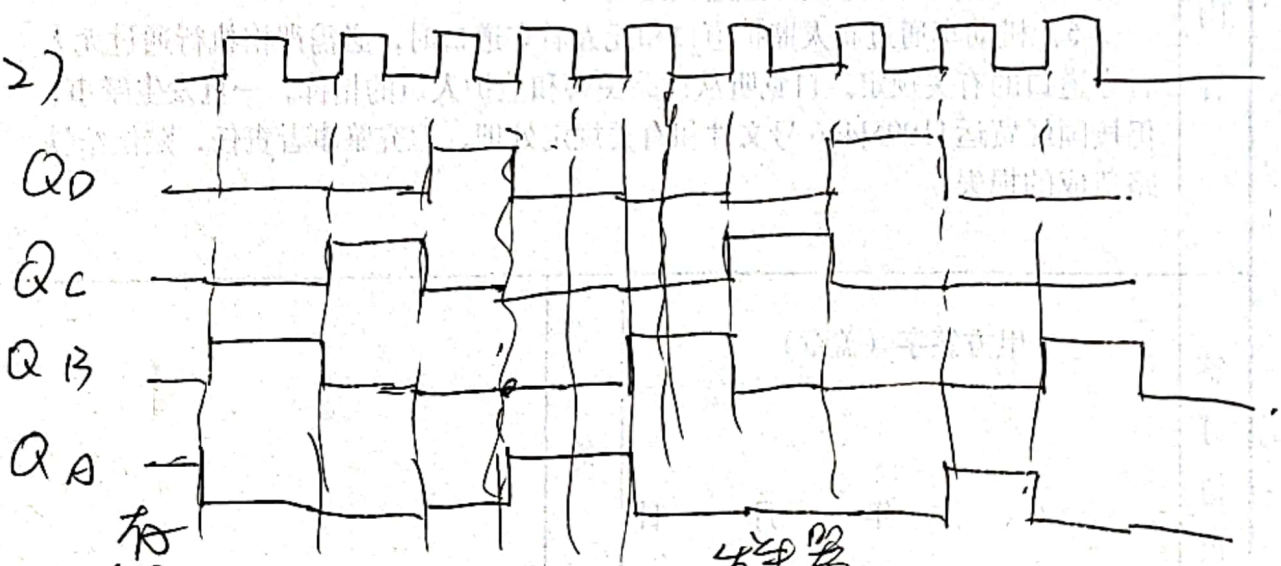


五. (1) 该电路具有移位功能，且Q_D与S_1相连，
当Q_D为0时正常右移，Q_D为1时置位，
故从置位状态开始，四个时钟一个
时钟进行右移，直到$Q_D=1$置位.

故状态图如下所示：



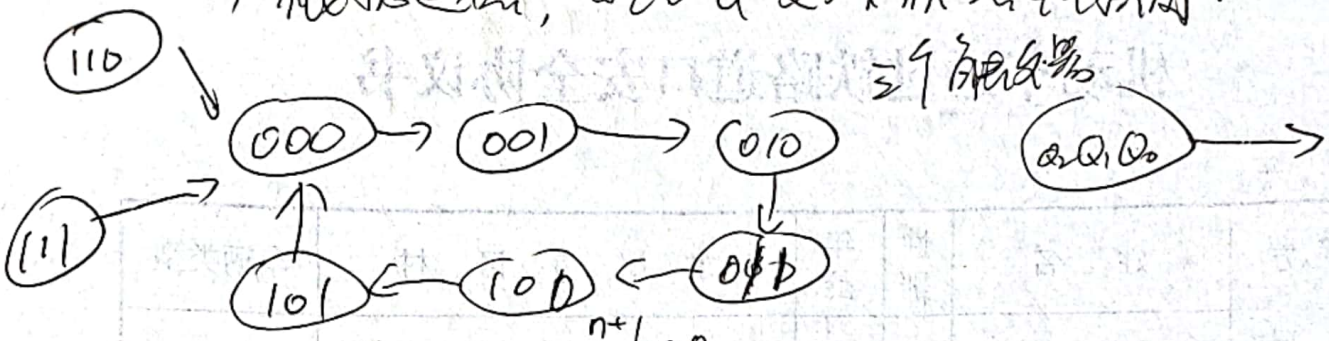
(2)



(3) 移位寄存器 以序脉冲发生器，$N=4$.
也可做 0001 波形产生器

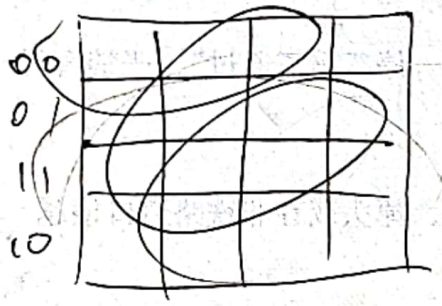
(4) 不能自启动，全零状态无法在有限个时钟
内进入主循环.
0000 一直是 0000，不能自启动.

六. (1) 根据题意，可绘出状态转换图：



三个触发器

再绘出次态卡诺图为



Q_2^{n+1}

Q_2 \ Q_1Q_0	00	01	11	10
0	0	0	1	0
1	1	0	0	0

$$Q_2^{n+1} = Q_2\bar{Q}_1\bar{Q}_0 + \bar{Q}_2Q_1Q_0$$

Q_1^{n+1}

Q_2 \ Q_1Q_0	00	01	11	10
0	0	1	0	1
1	0	0	0	0

$$Q_1^{n+1} = \bar{Q}_2Q_1Q_0 + Q_2Q_1\bar{Q}_0$$

Q_0^{n+1}

Q_2 \ Q_1Q_0	00	01	11	10
0	1	0	0	1
1	1	0	0	0

$$Q_0^{n+1} = Q_1\bar{Q}_0 + \bar{Q}_2\bar{Q}_0$$

Q_2^{n+1}

Q_2 \ Q_1Q_0	00	01	11	10
0	0	0	1	0
1	1	0	0	0

$$J_2 = Q_1Q_0$$

$$\bar{K}_2 = \bar{Q}_1\bar{Q}_0 \qquad K_2 = Q_1 + Q_0$$

Q_1^{n+1}

Q_2 \ Q_1Q_0	00	01	11	10
0	0	1	0	1
1	0	0	0	0

$$J_1 = \bar{Q}_2Q_0$$

$$\bar{K}_1 = \bar{Q}_2\bar{Q}_0 \qquad K_1 = Q_2 + Q_0$$

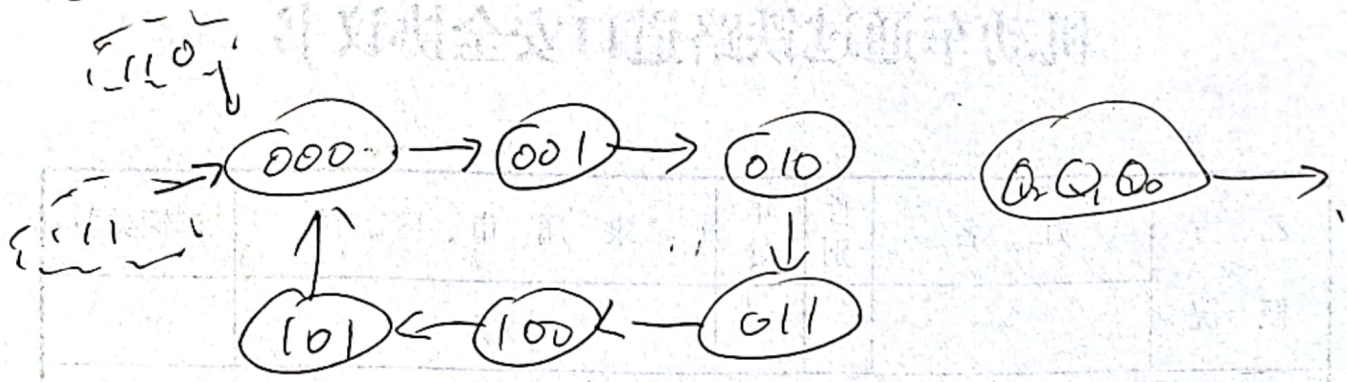
Q_0^{n+1}

Q_2 \ Q_1Q_0	00	01	11	10
0	1	0	0	1
1	1	0	0	0

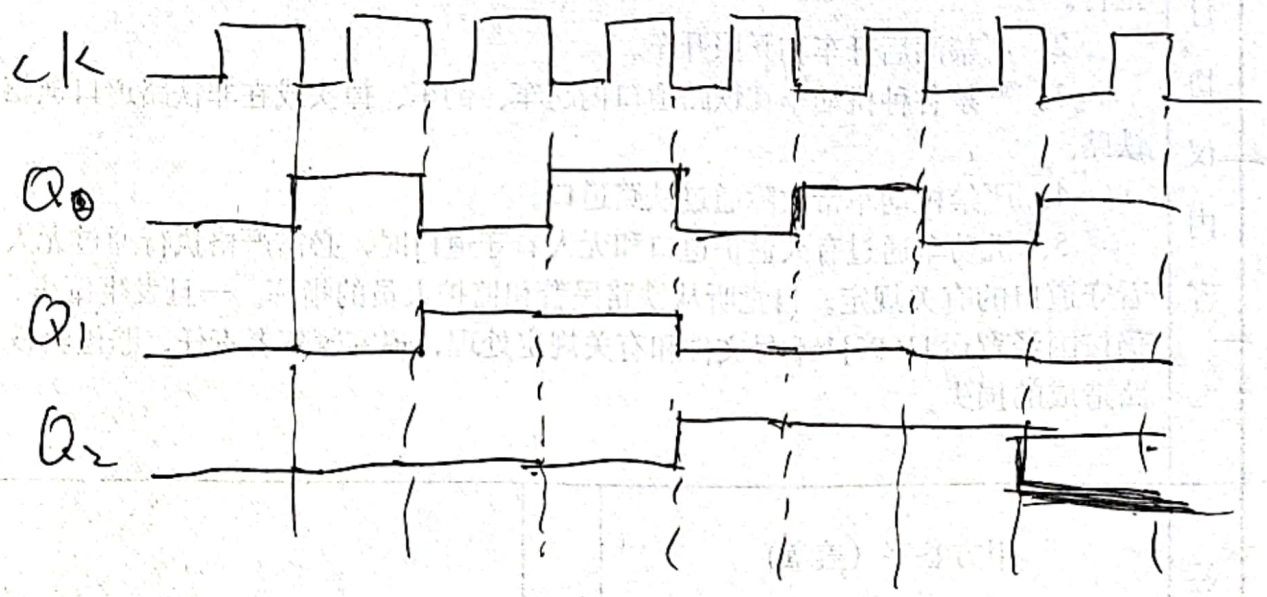
$$J_0 = \bar{Q}_2\bar{Q}_0 \qquad J_0 = \bar{Q}_1 + \bar{Q}_2$$

$$K_0 = 0 \text{ 或 } K_0 = 1$$

(2) 完整状态转换图



(3). 波形图



Q_0 : 二分频.