作业 4

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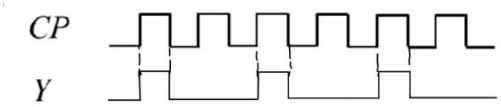
1.



2.

(1) $Q_0^{n+1} = \overline{Q_0^n}$

$Q_1^{n+1} = J_1\overline{Q_1^n} + \overline{K_1}Q_1^n = Q_0^nQ_2^n\overline{Q_1^n} + \overline{Q_0^nQ_2^n}Q_1^n$

$= Q_0^nQ_2^n\overline{Q_1^n} + (\overline{Q_0^n}+\overline{Q_2^n})Q_1^n$

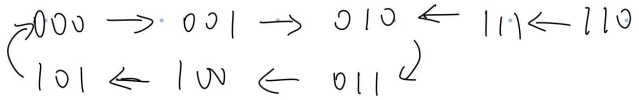
$= Q_0^nQ_2^n\overline{Q_1^n} + \overline{Q_0^n}Q_1^n + \overline{Q_2^n}Q_1^n$

$Q_2^{n+1} = J_2\overline{Q_2} + \overline{K_2}Q_2 = Q_0^nQ_1^n\overline{Q_2^n} + \overline{Q_0^n}Q_2^n$

状态转换表

现态 $Q_2^nQ_1^nQ_0^n$	次态 $Q_2^{n+1}Q_1^{n+1}Q_0^{n+1}$	时钟 CP
0 0 0	0 0 1	↓
0 0 1	0 1 0	↓
0 1 0	0 1 1	↓
0 1 1	1 0 0	↓
1 0 0	1 0 1	↓
1 0 1	0 0 0	↓
1 1 0	1 1 1	↓
1 1 1	0 1 0	↓

状态转换图



(2) 该电路为一同步模6加法计数器

3.

输入	现态	次态	输出	触发器状态
x	$Y_3^n Y_2^n Y_1^n$	$Y_3^{n+1} Y_2^{n+1} Y_1^{n+1}$	z	$D_3 D_2 D_1$
0	000	000	0	000
1	000	001	0	001
0	001	000	0	000
1	001	010	0	010
0	010	000	0	000
1	010	011	0	011
0	011	000	0	000
1	011	100	1	100
0	100	000	0	000
1	100	100	1	100
0	101	xxx	x	xxx
1	101	xxx	x	xxx
0	110	xxx	x	xxx
1	110	xxx	x	xxx
0	111	xxx	x	xxx
1	111	xxx	x	xxx

对于触发器 D_3：

xY_3 \ Y_2Y_1	00	01	11	10
00	0	0	0	0
01	0	x	x	x
11	1	x	x	x
10	0	0	1	0

$D_3 = xY_3 + xY_2Y_1$

对于触发器 D_2：

xY_3 \ Y_2Y_1	00	01	11	10
00	0	0	0	0
01	0	x	x	x
11	0	1	x	1
10	0	1	0	1

$D_2 = x\overline{Y_2}Y_1 + xY_2\overline{Y_1}$

$= x(Y_2 \oplus Y_1)$

对于触发器 D_1：

xY_3 \ Y_2Y_1	00	01	11	10
00	0	0	0	0
01	0	x	x	x
11	0	x	x	x
10	1	0	0	1

$D_1 = x\overline{Y_3}\overline{Y_1}$

对于输出Z：

XY_3 \ Y_2Y_1	00	01	11	10
00	0	0	0	0
01	0	X	X	X
11		X	X	X
10	0	0		0

$$Z = XY_3 + XY_2Y_1$$

电路设计如下：