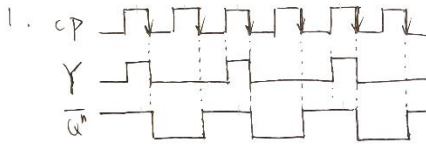


作业四



$$Q^n = JQ^n + \bar{K}Q^n$$

$$= Q^n Q^n + \bar{K}Q^n$$

$$= Q^n, CP \downarrow$$

$$Y = Q^n \cdot CP, Q^n \text{ 初态为 } 0$$

2. (1) 初态: $Q_2 Q_1 Q_0 = 000$

① 输入方程

$$J_0 = K_0 = 1$$

$$J_1 = K_1 = Q_2 \cdot Q_0$$

$$J_2 = Q_1 \cdot Q_0, K_2 = Q_0$$

② 状态方程

$$Q_0^{n+1} = J_0 Q_0^n + \bar{K}_0 Q_0^n = Q_0^n, CP \downarrow$$

$$Q_1^{n+1} = J_1 Q_1^n + \bar{K}_1 Q_1^n = Q_2^n \cdot Q_0^n \cdot Q_1^n + Q_1^n \cdot Q_0^n \cdot \bar{Q}_1^n$$

$$= Q_2^n \cdot Q_0^n \cdot Q_1^n + (Q_2^n + \bar{Q}_2^n) Q_1^n \cdot Q_0^n, CP \downarrow$$

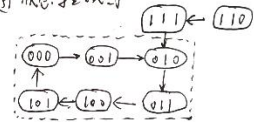
$$Q_2^{n+1} = J_2 Q_2^n + \bar{K}_2 Q_2^n = Q_1^n \cdot Q_0^n \cdot Q_2^n + \bar{Q}_2^n \cdot Q_2^n, CP \downarrow$$

③ 状态转换表

④ 状态转换表

现态	次态	序号
$Q_2 Q_1 Q_0$	$Q_2^n Q_1^n Q_0^n$	
0 0 0	0 0 1	①
0 0 1	0 1 0	②
0 1 0	0 1 1	③
0 1 1	1 0 0	④
1 0 0	1 0 1	⑤
1 0 1	0 0 0	⑥
1 1 0	1 1 1	
1 1 1	0 1 0	

⑤ 状态转换图



(1) 该电路是 可自启动的同步模6加法计数器。

3. 解: (1) 输入输出及功能

X - 检测连续9次

CP - 时钟

(2) 状态设定

S_0 - 初态, 检测列"0"

S_1 - 检测到"1"

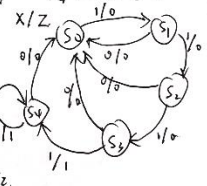
S_2 - 检测到"11"

S_3 - 检测到"111"

S_4 - 检测到"1111" (需要4)

(3) 原始状态表和状态图

现态	Q^n	Z
Q^n	$X=0$	$X=1$
S_0	$S_0/0$	$S_1/0$
S_1	$S_0/0$	$S_2/0$
S_2	$S_0/0$	$S_3/0$
S_3	$S_0/0$	$S_4/1$
S_4	$S_0/0$	$S_4/1$



(4) 化简状态表

现态	Q^n	Z
Q^n	$X=0$	$X=1$
S_0	$S_0/0$	$S_1/0$
S_1	$S_0/0$	$S_2/0$
S_2	$S_0/0$	$S_3/0$
S_3	$S_0/0$	$S_4/1$
S_4	$S_0/0$	$S_4/1$

(5) 状态分配

共有4个状态, 需要2个触发器。

$S_0 - 00$

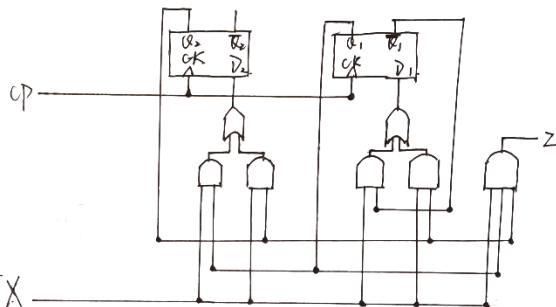
$S_1 - 01$

$S_2 - 10$

$S_3 - 11$

现态	次态	输出
$Q_2^n Q_1^n Q_0^n$	$Q_2^{n+1} Q_1^{n+1} Q_0^{n+1}$	Z
0 0 0	0 0 0	0
0 0 1	0 0 1	0
0 1 0	0 1 0	0
0 1 1	0 1 1	0
1 0 0	1 0 0	0
1 0 1	1 0 1	0
1 1 0	1 1 0	0
1 1 1	1 1 1	1

(8) 电路图



(7) 卡诺图化简

Q_2^{n+1}

Q_1^{n+1}

Q_0^{n+1}

$D_2 = X Q_1^n + X \cdot Q_2^n$

$D_1 = X Q_1^n + X \cdot Q_2^n$

$Z = X Q_2^n Q_1^n Q_0^n$

① 无关项检查

由于输出函数有2个, 最多出现状态数为2²=4, 即为

电路已有状态数, 故没有无关项, 该电路可以自启动