填空题

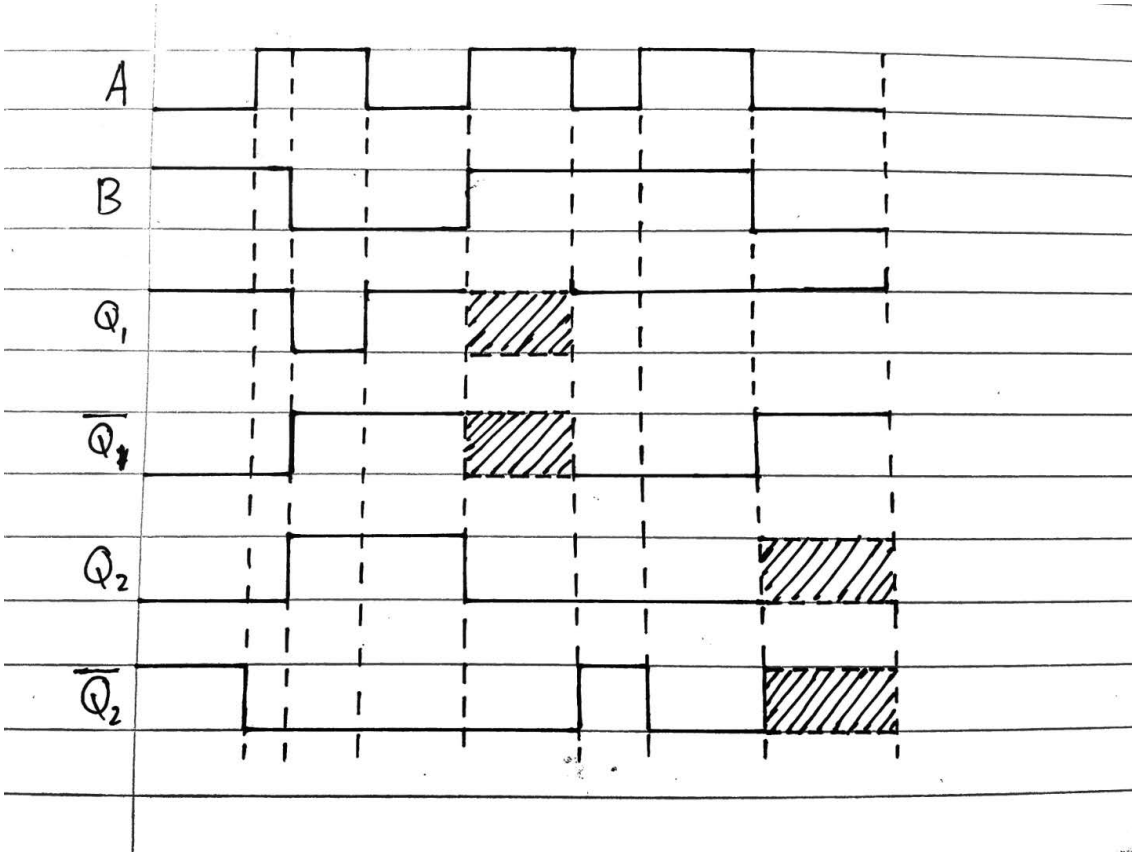
1. D, JK, RS
2. $\overline{R}_D + \overline{S}_D = 1$
3. $J\overline{Q}^n + \overline{K}Q^n$
4. 同步时序逻辑，异步时序逻辑
5. n
6. 反馈复位法，预置法
7. 100
8. 256

选择题

1. C
2. D
3. B
4. D
5. ②
6. ④
7. ②
8. ②
9. ④
10. ②
11. ④
12. ①

分析与设计题

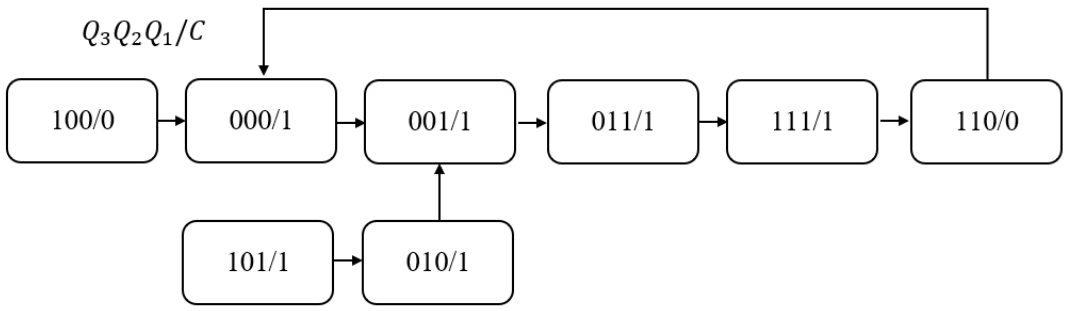
1.



2. (1) 驱动方程：$D_1=\overline{Q}_3^n, D_2=Q_1^n, D_3=Q_1^nQ_2^n$

状态方程：$Q_1^{n+1}=\overline{Q}_3^n, Q_2^{n+1}=Q_1^n, Q_3^{n+1}=Q_1^nQ_2^n, C=\overline{\overline{Q}_1^nQ_3^n}$

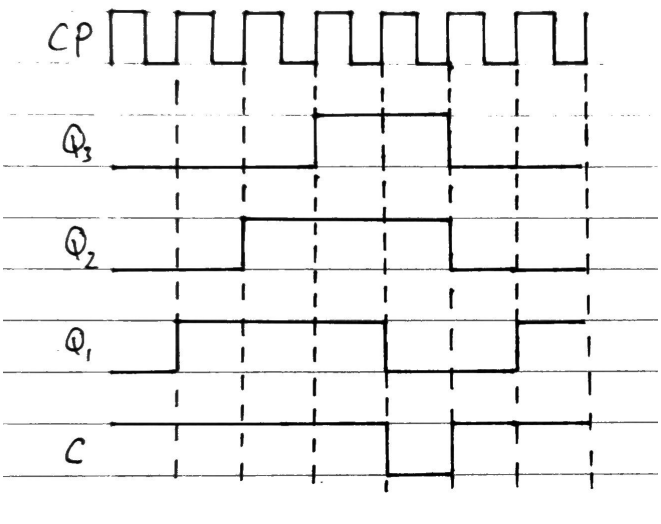
(2) 状态转换图



状态转换表

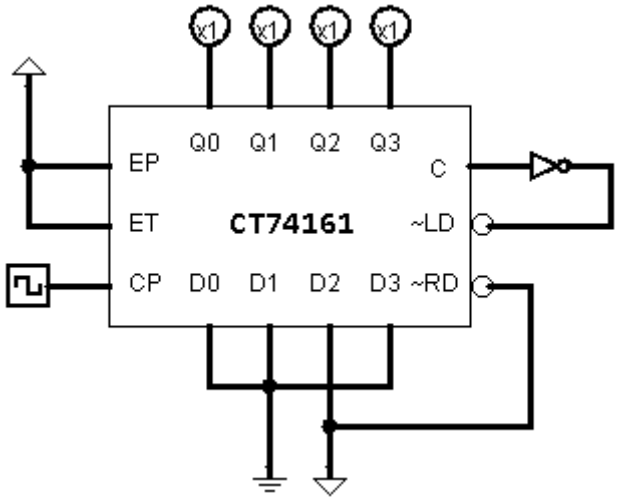
Q_3^n	Q_2^n	Q_1^n	Q_3^{n+1}	Q_2^{n+1}	Q_1^{n+1}	C
0	0	0	0	0	1	1
0	0	1	0	1	1	1
0	1	0	0	0	1	1
0	1	1	1	1	1	1
1	0	0	0	0	0	0
1	0	1	0	1	0	1
1	1	0	0	0	0	0
1	1	1	1	1	0	1

时序图



(3) 具有自启动特性的同步五进制加法计数器

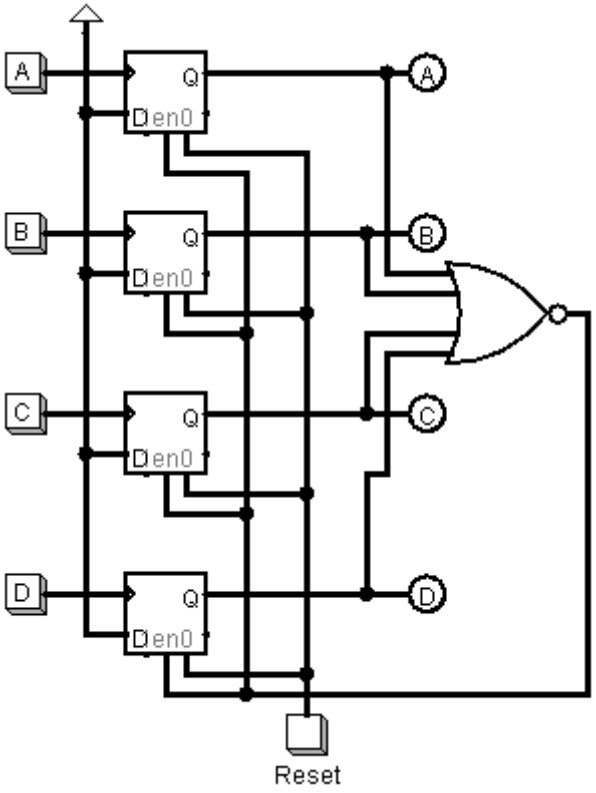
3.



4.

```
module cnt6 (clk, q, cout);
    input clk;
    output reg [2:0] q = 0; // 初始化q
    output reg cout = 0; // 初始化cout
    parameter [2:0] st0 = 3'b010,
                    st1 = 3'b011,
                    st2 = 3'b111,
                    st3 = 3'b110,
                    st4 = 3'b100,
                    st5 = 3'b000; // parameter 声明位宽
    always @ (posedge clk) begin
        case (q)// 状态的转移
        st0 : q = st1;
        st1 : q = st2;
        st2 : q = st3;
        st3 : q = st4;
        st4 : q = st5;
        st5 : q = st0;
        default : q = st0;
        endcase
        cout = q == st5; // cout的输出
    end
endmodule
```

5.



6. (1)

状态机定义：

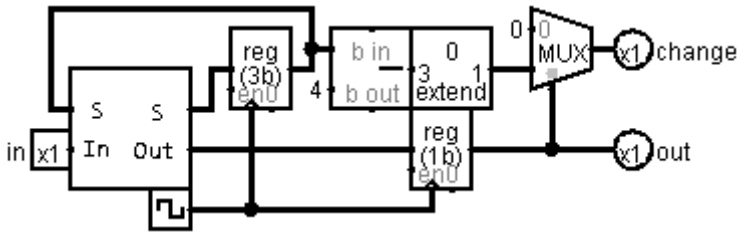
- $s=0$(未投入硬币)
- $s=1$(已投入5分)
- $s=2$(已投入1角)
- $s=3$(已投入1角5分)
- $s=4$(已投入2角)
- $s=5$(已投入2角5分)

输入定义：

- $in=0$(投入5分)
- $in=1$(投入1角)

输出定义：

- $out=0$(不吐出货物)
- $out=1$(吐出货物)
- $change=0$(不找钱)
- $change=1$(找5分)



(2)

状态转换表

S_{20}	S_{10}	S_{00}	in	S_{21}	S_{11}	S_{01}
0	0	0	0	0	0	1
0	0	0	1	0	1	0
0	0	1	0	0	1	0
0	0	1	1	0	1	1
0	1	0	0	0	1	1
0	1	0	1	1	0	0
0	1	1	0	1	0	0
0	1	1	1	1	0	1
1	0	0	0	0	0	0
1	0	0	1	0	0	0
1	0	1	0	0	0	0
1	0	1	1	0	0	0

输出逻辑真值表

S_{20}	S_{10}	S_{00}	out	change
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	0	0
1	0	0	1	0
1	0	1	1	1

次态逻辑表达式

$$
\begin{aligned}
S_{01} &= m_0 + m_3 + m_4 \\
&= \overline{S_{20}}\,\overline{S_{10}}\,\overline{S_{00}}\,\overline{in} + \overline{S_{20}}\,\overline{S_{10}}\,S_{00}in + \overline{S_{20}}\,S_{10}\,\overline{S_{00}}\,\overline{in} \\
&= \overline{S_{20}}\,\overline{S_{00}}\,\overline{in} + \overline{S_{20}}\,\overline{S_{10}}\,S_{00}in \\
S_{11} &= m_1 + m_2 + m_3 + m_4 \\
&= \overline{S_{20}}\,\overline{S_{10}}\,\overline{S_{00}}\,in + \overline{S_{20}}\,\overline{S_{10}}\,S_{00}\,\overline{in} + \overline{S_{20}}\,\overline{S_{10}}\,S_{00}in + \overline{S_{20}}\,S_{10}\,\overline{S_{00}}\,\overline{in} \\
&= \overline{S_{20}}\,\overline{S_{10}}in + \overline{S_{20}\,S_{10}}\,S_{00}\,\overline{in} + \overline{S_{20}}\,S_{10}\,\overline{S_{00}}\,\overline{in} \\
&= \overline{S_{20}}\,\overline{S_{10}}in + \overline{S_{20}\,S_{10}}\,S_{00} + \overline{S_{20}}\,S_{10}\,\overline{S_{00}}\,\overline{in} \\
S_{21} &= m_5 + m_6 + m_7 \\
&= \overline{S_{20}}\,S_{10}\,\overline{S_{00}}\,in + \overline{S_{20}}\,S_{10}\,S_{00}\,\overline{in} + \overline{S_{20}}\,S_{10}\,S_{00}in \\
&= \overline{S_{20}}\,S_{10}in + \overline{S_{20}}\,S_{10}\,S_{00}\,\overline{in} \\
&= \overline{S_{20}}\,S_{10}in + \overline{S_{20}}\,S_{10}\,S_{00}
\end{aligned}
$$

输出逻辑表达式

$$
\begin{aligned}
out &= S_{20} \\
change &= S_{20}\,\overline{S_{10}}\,S_{00}
\end{aligned}
$$