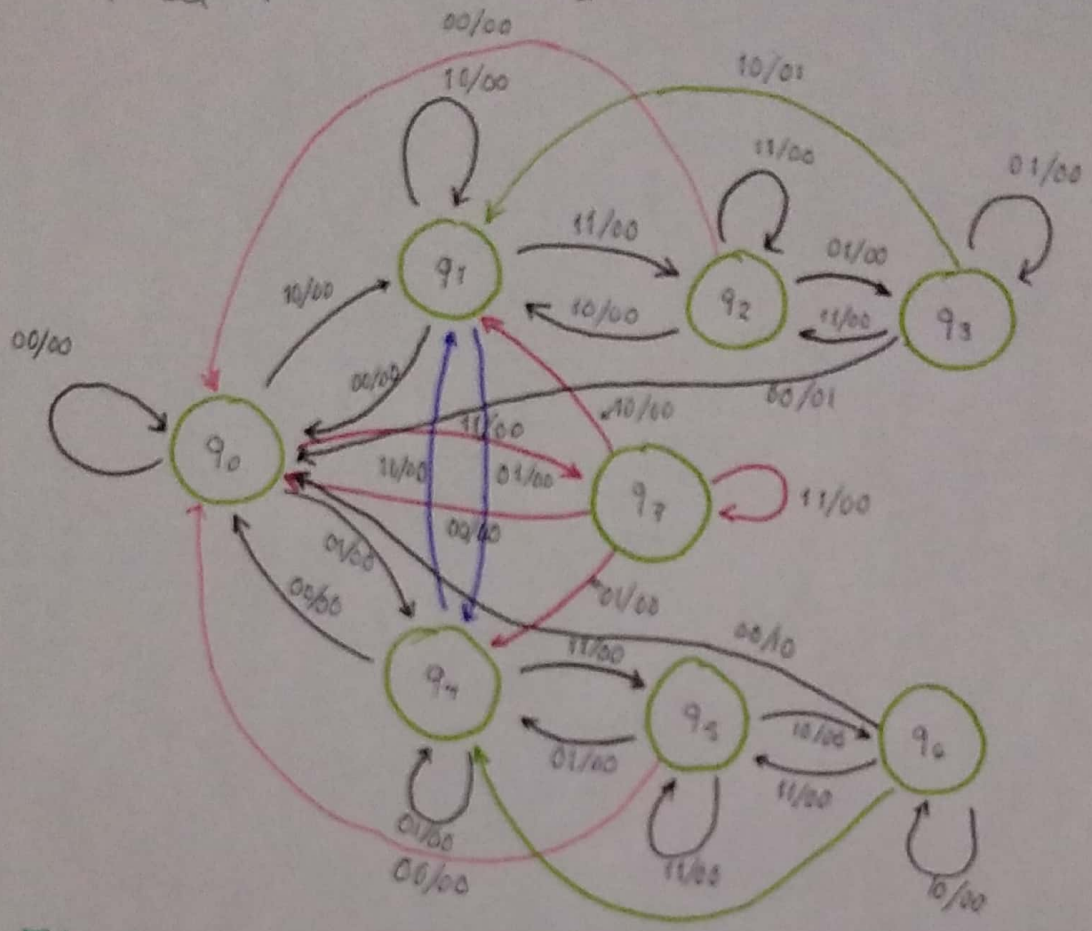
Practica 9 Córdova Pichardo Francisco Uziel



Edo_Act	E	Edo_sig	salida
q_0	00	q_0	00
q_0	01	q_4	00
q_0	10	q_1	00
q_0	11	q_7	00
q_1	00	q_0	00
q_1	01	q_4	00
q_1	10	q_1	00
q_1	11	q_2	00
q_2	00	q_0	00
q_2	01	q_5	00
q_2	10	q_1	00
q_2	11	q_2	00

Edo_Act	E	Edo_sig	Salida
q_3	00	q_0	01
q_3	01	q_3	00
q_3	10	q_1	01
q_3	11	q_2	00
q_4	00	q_0	00
q_4	01	q_4	00
q_4	10	q_1	00
q_4	11	q_5	00
q_5	00	q_0	00
q_5	01	q_4	00
q_5	10	q_6	00
q_5	11	q_5	00
q_6	00	q_0	10
q_6	01	q_4	10
q_6	10	q_6	00
q_6	11	q_5	00
q_7	00	q_0	00
q_7	01	q_4	00
q_7	10	q_1	00
q_7	11	q_7	00

	Q2	Q1	Q0	E1	E0	Q2+	Q1+	Q0+	Sal1	Sal2	S2	S1	S0	R2	R1	R0
q_0	0	0	0	0	0	0	0	0	0	0	0	0	0	X	X	X
	0	0	0	0	1	1	0	0	0	0	1	0	0	0	X	X
	0	0	0	1	0	0	0	1	0	0	0	0	1	X	X	0
	0	0	0	1	1	1	1	1	0	0	1	1	1	0	0	0
q_1	0	0	1	0	0	0	0	0	0	0	0	0	0	X	X	1
	0	0	1	0	1	1	0	0	0	0	1	0	0	0	X	1
	0	0	1	1	0	0	0	1	0	0	0	0	X	X	X	0
	0	0	1	1	1	0	1	0	0	0	0	1	0	X	0	1
q_2	0	1	0	0	0	0	0	0	0	0	0	0	0	X	1	X
	0	1	0	0	1	0	1	1	0	0	0	X	1	X	0	0
	0	1	0	1	0	0	0	1	0	0	0	0	1	X	1	0
	0	1	0	1	1	0	1	0	0	0	0	X	0	X	0	X
q_3	0	1	1	0	0	0	0	0	0	1	0	0	0	X	1	1
	0	1	1	0	1	0	1	1	0	0	0	X	X	X	0	0
	0	1	1	1	0	0	0	1	0	1	0	0	X	X	1	0
	0	1	1	1	1	0	1	0	0	0	0	X	0	X	0	1
q_4	1	0	0	0	0	0	0	0	0	0	0	0	0	X	X	X
	1	0	0	0	1	1	0	0	0	0	X	0	0	0	X	X
	1	0	0	1	0	0	0	1	0	0	0	0	1	1	X	0
	1	0	0	1	1	1	0	1	0	0	X	0	1	0	X	0
q_5	1	0	1	0	0	0	0	0	0	0	0	0	0	1	X	1
	1	0	1	0	1	1	0	0	0	0	X	0	0	0	X	1
	1	0	1	1	0	1	1	0	0	0	X	1	0	0	0	1
	1	0	1	1	1	1	0	1	0	0	X	0	X	0	X	0
q_6	1	1	0	0	0	0	0	0	1	0	0	0	0	1	1	X
	1	1	0	0	1	1	0	0	1	0	X	0	0	0	1	X
	1	1	0	1	0	1	1	0	0	0	X	X	0	0	0	X
	1	1	0	1	1	1	0	1	0	0	X	0	1	0	1	0
q_7	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1
	1	1	1	0	1	1	0	0	0	0	X	0	0	0	1	1
	1	1	1	1	0	0	0	1	0	0	0	0	X	1	1	0
	1	1	1	1	1	1	1	1	0	0	X	X	X	0	0	0

$Q_0 E_1 E_0$

$Q_2 Q_1$

S_2	000	001	011	010	110	111	101	100
00		1	1				1	
01								
11		X	X		X	X	X	
10		X	X		X	X	X	

$$S_2 = \overline{Q_1}\,\overline{Q_0}\,E_0 + \overline{Q_1}\,Q_0\,\overline{E_1}\,E_0$$

S_1	000	001	011	010	110	111	101	100
00			1			1		
01		X	X			X	X	
11				X		X		
10					1			

$$S_1 = \overline{Q_2}\,\overline{Q_0}\,E_1 E_0 + \overline{Q_2}\,Q_0 E_1 E_0 + Q_2\,\overline{Q_1}\,Q_0\,E_1\,\overline{E_0}$$

S_0	000	001	011	010	110	111	101	100
00			1	1	X			
01		1		1	X		X	
11			1		X	X		
10			1	1		X		

$$S_0 = \overline{Q_2}\,E_1\,\overline{E_0} + \overline{Q_1}\,\overline{Q_0}\,E_1 + Q_2\,\overline{Q_0}\,E_1 E_0 + \overline{Q_2}\,Q_1\,\overline{Q_0}\,\overline{E_1}\,E_0$$

R_2	000	001	011	010	110	111	101	100
00	X			X	X	X		X
01	X	X	X	X	X	X	X	X
11	1				1			1
10	X			1				1

$$R_2 = \overline{E_1}\,\overline{E_0} + \overline{Q_1}\,\overline{Q_0}\,E_1\,\overline{E_0} + Q_1\,Q_0\,E_1\,\overline{E_0}$$

R_1	000	001	011	010	110	111	101	100
00	X	X		X	X		X	X
01	1			1	1			1
11	1	1	1		1		1	1
10	X	X	X	X		X	X	X

$$R_1 = \overline{E_1}\,\overline{E_0} + Q_2 + Q_2\,\overline{E_1} + Q_1\,Q_0\,E_1\,\overline{E_0} + \overline{Q_2}\,E_1\,\overline{E_0}$$

R_0	000	001	011	010	110	111	101	100
00	X	X				1	1	1
01	X		X			1		1
11	X	X		X			1	1
10	X	X			1		1	1

$$R_0 = \overline{E_1}\,\overline{E_0} + \overline{Q_2}\,\overline{Q_1} + Q_2\,\overline{E_1} + \overline{Q_2}\,Q_0\,E_1\,E_0 + Q_2\,\overline{Q_1}\,Q_0\,E_1\,\overline{E_0}$$

Practica 9

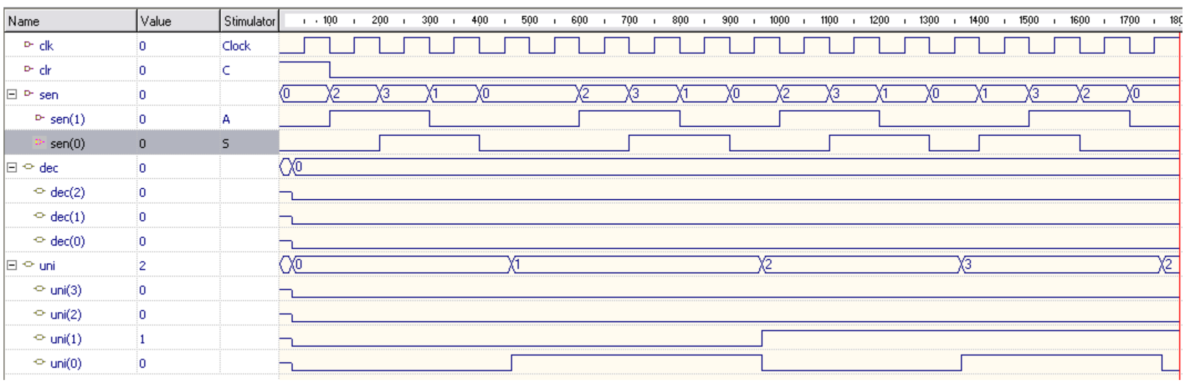
```
library ieee;
use ieee.std_logic_1164.all;
use ieee.std_logic_arith.all;
use ieee.std_logic_unsigned.all;

entity Contador is port
(
    clk, clr : in std_logic;
    sen : in std_logic_vector(1 downto 0);
    uni : out std_logic_vector(3 downto 0);
    dec : out std_logic_vector(2 downto 0)
);
end Contador;

architecture AContador of Contador is
type estados is (q0,q1,q2,q3,q4,q5,q6,q7);
signal act, sig : estados;
signal sal : std_logic_vector(1 downto 0);
begin
--proceso de cambio de estado para estado actual
    process(clk, clr)
    begin
        if(clr = '1') then
            act <= q0;
        elsif (rising_edge(clk)) then
            act <= sig;
        end if;
    end process;
--proceso para determinar el estado siguiente
    process(sen, act)
    begin
        case act is
            when q0 =>
            --espacio para salidas moore
                if(sen = "00")then --evaluacion de la transicion
                    sal <= "00"; --salidas mealy
                    sig <= q0;
                elsif(sen = "10")then
                    sal <= "00";
                    sig <= q1;
                elsif(sen = "01") then
                    sal<="00";
                    sig <= q4;
```

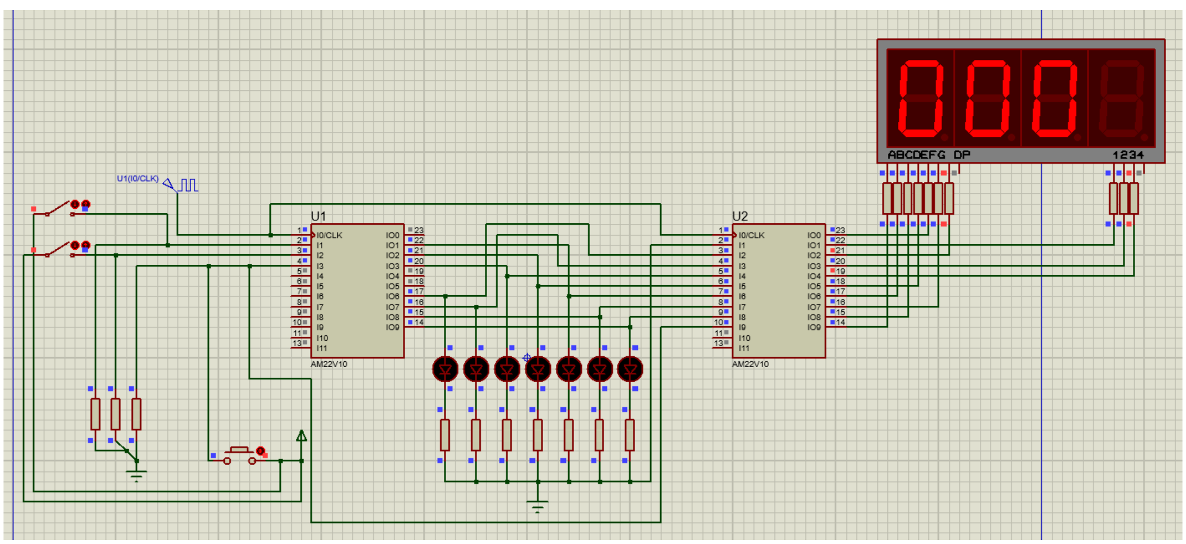
```
44                  else
45                      sal<="00";
46                      sig<=q7;
47                  end if;
48              when q1=>
49                  if(sen = "00")then
50                      sal <= "00";
51                      sig <= q0;
52                  elsif(sen = "10")then
53                      sal <= "00";
54                      sig <= q1;
55                  elsif(sen = "01") then
56                      sal<="00";
57                      sig <= q4;
58                  else
59                      sal<="00";
60                      sig<=q2;
61                  end if;
62              when q2=>
63                  if(sen = "00")then
64                      sal <= "00";
65                      sig <= q0;
66                  elsif(sen = "10")then
67                      sal <= "00";
68                      sig <= q1;
69                  elsif(sen = "01") then
70                      sal<="00";
71                      sig <= q3;
72                  else
73                      sal<="00";
74                      sig<=q2;
75                  end if;
76              when q3=>
77                  if(sen = "00")then
78                      sal <= "01";
79                      sig <= q0;
80                  elsif(sen = "10")then
81                      sal <= "01";
82                      sig <= q1;
83                  elsif(sen = "01") then
84                      sal<="00";
85                      sig <= q3;
```

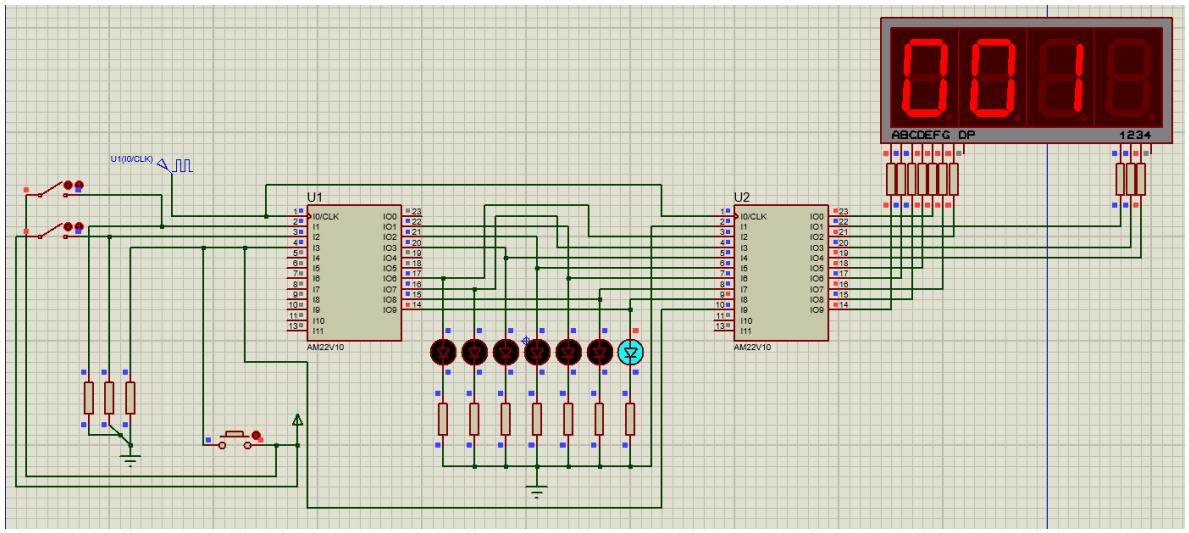
```
                else
                    sal<="00";
                    sig<=q2;
                end if;
            when q4=>
                if(sen = "00")then
                    sal <= "00";
                    sig <= q0;
                elsif(sen = "10")then
                    sal <= "00";
                    sig <= q1;
                elsif(sen = "01") then
                    sal<="00";
                    sig <= q4;
                else
                    sal<="00";
                    sig<=q5;
                end if;
            when q5=>
                if(sen = "00")then
                    sal <= "00";
                    sig <= q0;
                elsif(sen = "10")then
                    sal <= "00";
                    sig <= q6;
                elsif(sen = "01") then
                    sal<="00";
                    sig <= q4;
                else
                    sal<="00";
                    sig<=q5;
                end if;
            when q6=>
                if(sen = "00")then
                    sal <= "10";
                    sig <= q0;
                elsif(sen = "10")then
                    sal <= "00";
                    sig <= q6;
                elsif(sen = "01") then
                    sal<="10";
                    sig <= q4;
```

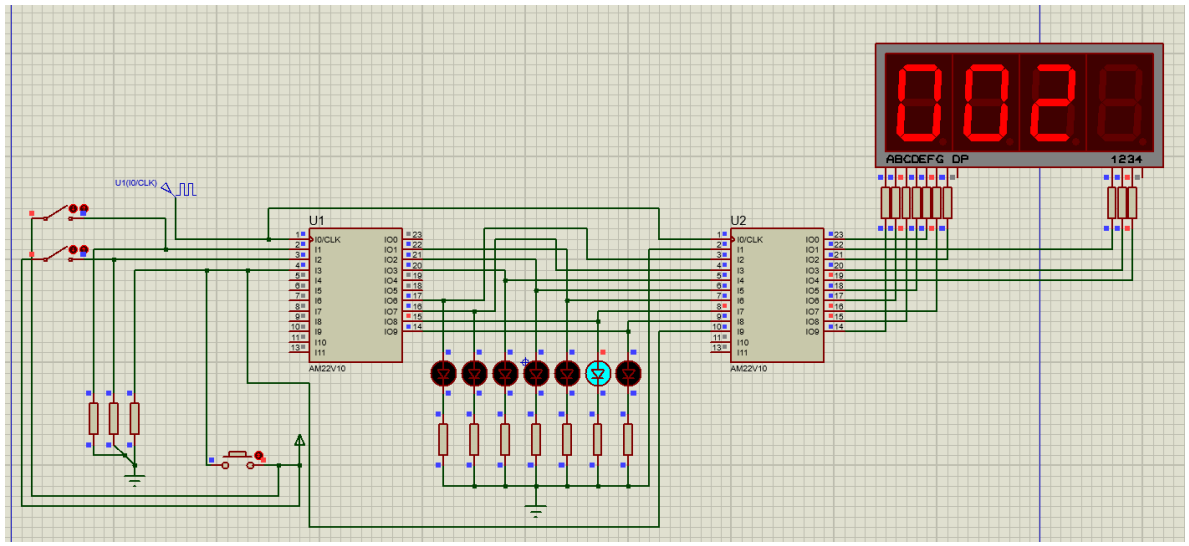
```
                    sig <= q4;
                else
                    sal<="00";
                    sig<=q5;
                end if;
            when q7=>
                if(sen = "00")then
                    sal <= "00";
                    sig <= q0;
                elsif(sen = "10")then
                    sal <= "00";
                    sig <= q1;
                elsif(sen = "01") then
                    sal<="00";
                    sig <= q4;
                else
                    sal<="00";
                    sig<=q7;
                end if;
        end case;
    end process;
    --proceso de contador de decada
    process(clk, clr)
    begin
        if(clr = '1') then
            uni<="0000";
            dec<="000";
        elsif (rising_edge(clk)) then
            if(sal="00")then
                uni<=uni;
                dec<=dec;
            elsif(sal="01")then
                uni<=uni+1;
                if(uni="1001")then
                    uni<="0000";
                    dec<=dec+1;
                end if;
            elsif(sal="10")then
                uni<=uni-1;
                if(uni="0000")then
                    uni<="1001";
                    dec<=dec-1;
                end if;

            end if;
        end if;
    end process;
end AContador;
```

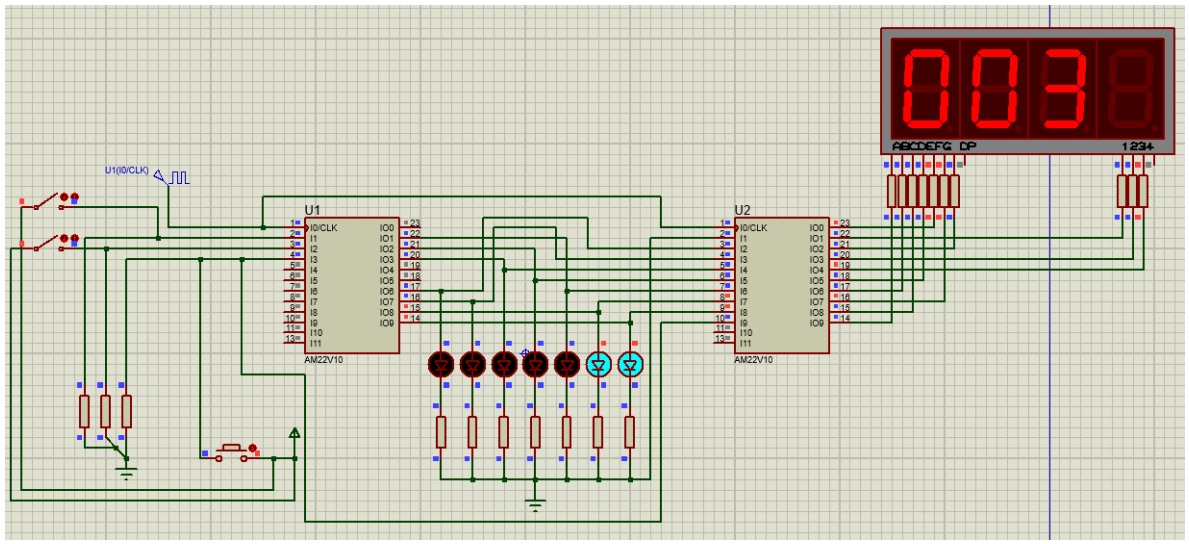
```
                         c22v10
               __________________________________________
         clk  =| 1|                                    |24|* not used
      sen(1)  =| 2|                                    |23|= (actSBV_2)
      sen(0)  =| 3|                                    |22|= uni(2)
         clr  =| 4|                                    |21|= uni(3)
    not used  *| 5|                                    |20|= dec(0)
    not used  *| 6|                                    |19|= (actSBV_0)
    not used  *| 7|                                    |18|= (actSBV_1)
    not used  *| 8|                                    |17|= dec(2)
    not used  *| 9|                                    |16|= dec(1)
    not used  *|10|                                    |15|= uni(1)
    not used  *|11|                                    |14|= uni(0)
    not used  *|12|                                    |13|* not used
               __________________________________________
```

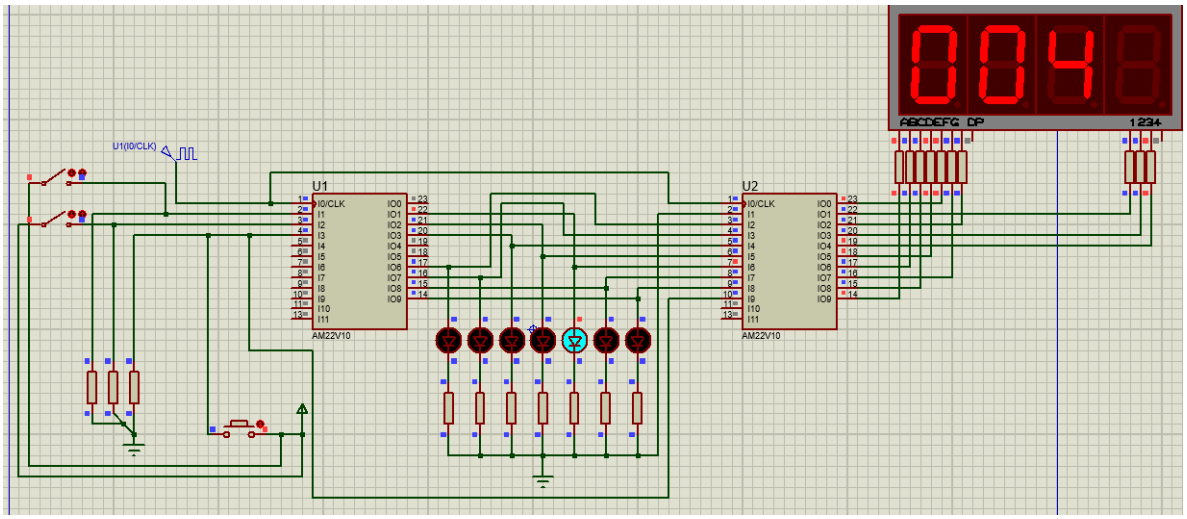


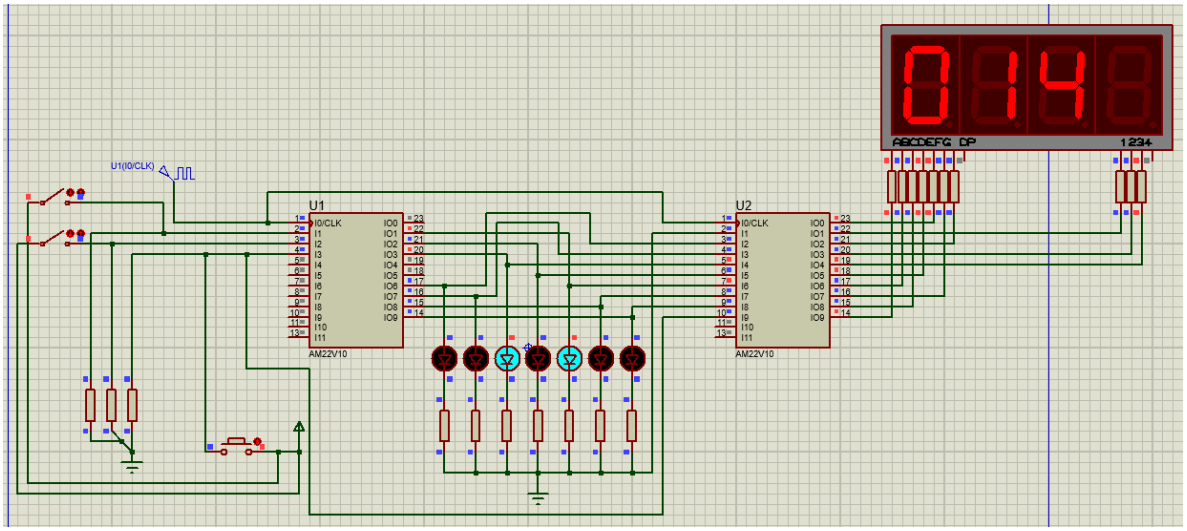



U1(I0/CLK)
U1
U2
AM22V10
ABCDEFG DP
1234


U1(I0/CLK)
U1
U2
AM22V10
ABCDEFG DP
1234


U1(I0/CLK)
U1
U2
AM22V10
ABCDEFG DP
1234


0048
ABCDEFG DP
1234
U1(I0/CLK)
U1
I0/CLK
I1
I2
I3
I4
I5
I6
I7
I8
I9
I10
I11
IO0
IO1
IO2
IO3
IO4
IO5
IO6
IO7
IO8
IO9
AM22V10
U2
I0/CLK
I1
I2
I3
I4
I5
I6
I7
I8
I9
I10
I11
IO0
IO1
IO2
IO3
IO4
IO5
IO6
IO7
IO8
IO9
AM22V10


0014
ABCDEFG DP
1234
U1(I0/CLK)
U1
I0/CLK
I1
I2
I3
I4
I5
I6
I7
I8
I9
I10
I11
IO0
IO1
IO2
IO3
IO4
IO5
IO6
IO7
IO8
IO9
AM22V10
U2
I0/CLK
I1
I2
I3
I4
I5
I6
I7
I8
I9
I10
I11
IO0
IO1
IO2
IO3
IO4
IO5
IO6
IO7
IO8
IO9
AM22V10