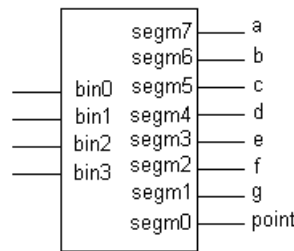
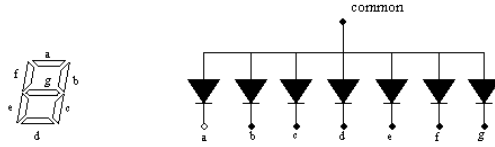


การทดลองที่ 3 การใช้คำสั่ง Concurrent statements และ Sequential Statement

จุดประสงค์

วงจรถอดรหัส 7 – segment สำหรับ LED 7 Segment แบบ Common Anode



รูปที่ 1 7-Segment Decoder

```

library IEEE;
use IEEE.STD_LOGIC_1164.ALL;

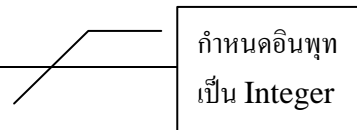
entity segdec is
    port (bin : in std_logic_vector(3 downto 0);
          segm : out std_logic_vector(7 downto 0));
end segdec;

architecture Behavioral of segdec is
begin
    with bin select
        segm <= "00000011" when "0000",
                "10011111" when "0001",
                "00100101" when "0010",
                "00001101" when "0011",
                "10011001" when "0100",
                "01001001" when "0101",
                "01000001" when "0110",
                "00011111" when "0111",
                "00000001" when "1000",
                "00001001" when "1001",
                "00010001" when "1010",
                "11000001" when "1011",
                "01100011" when "1100",
                "10000101" when "1101",
                "01100001" when "1110",
                "01110001" when others;
end Behavioral;
    
```

วงจรถอดรหัส 7 – segment สำหรับ LED 7 Segment แบบ Common Anode แบบที่ 2

```

library IEEE;
use IEEE.STD_LOGIC_1164.ALL;
    
```



```

entity dec2seg2 is
  port (bin : in INTEGER range 15 downto 0;
        segm : out std_logic_vector(7 downto 0));
end dec2seg2;

architecture Behavioral of dec2seg2 is
begin
  with bin select
    segm <= "00000011" when 0,
            "10011111" when 1,
            "00100101" when 2,
            "00001101" when 3,
            "10011001" when 4,
            "01001001" when 5,
            "01000001" when 6,
            "00011111" when 7,
            "00000001" when 8,
            "00001001" when others;
end Behavioral;

```

วงจรถอดรหัสแบบ 2-to-4 Line Decoder มีการทำงานตามตารางที่ 1

ตารางที่ 1

Input			Output			
g	s1	s0	y3	y2	y1	y0
1	x	x	1	1	1	1
0	0	0	1	1	1	0
0	0	1	1	1	0	1
0	1	0	1	0	1	1
0	1	1	0	1	1	1

```

library IEEE;
use IEEE.STD_LOGIC_1164.ALL;

entity dec2to4 is
  Port ( g : in std_logic;
        s : in std_logic_vector(1 downto 0);
        y : out std_logic_vector(3 downto 0));
end dec2to4;

architecture Behavioral of dec2to4 is
begin
  process (g,s)
  begin
    case s is
      when "00" =>
        y(0) <= g;
        y(1) <= '1';
        y(2) <= '1';
        y(3) <= '1';
      when "01" =>
        y(0) <= '1';

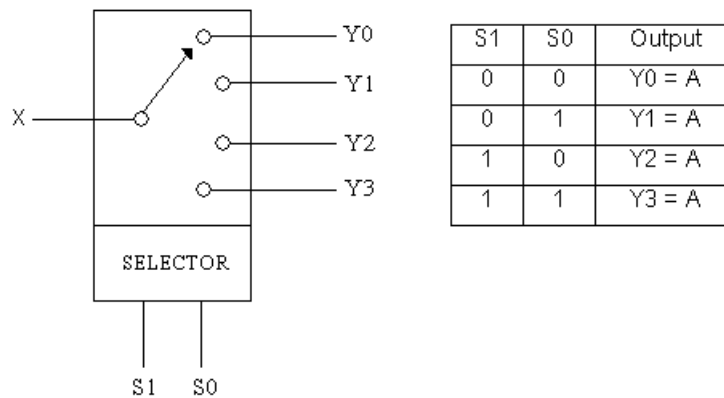
```

```

        y(1) <= g;
        y(2) <= '1';
        y(3) <= '1';
    when "10" =>
        y(0) <= '1';
        y(1) <= '1';
        y(2) <= g;
        y(3) <= '1';
    when others =>
        y(0) <= '1';
        y(1) <= '1';
        y(2) <= '1';
        y(3) <= g;
    end case;
end process;
end Behavioral;

```

วงจรมัลติเพล็กซ์แบบ 4-line multiplexer การทำงานตามรูปที่ 2



รูปที่ 2 4-line multiplexer

```

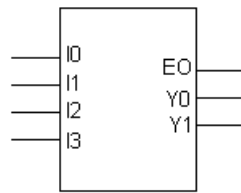
library IEEE;
use IEEE.STD_LOGIC_1164.ALL;

entity mux4 is
    Port ( x : in std_logic_vector(3 downto 0);
          s : in std_logic_vector(1 downto 0);
          y : out std_logic);
end mux4;

architecture Behavioral of mux4 is
begin
    process (x,s)
    begin
        case s is
            when "00" => y <= x(0);
            when "01" => y <= x(1);
            when "10" => y <= x(2);
            when others => y <= x(3);
        end case;
    end process;
end Behavioral;

```

วงจรเข้ารหัส 4 Line Priority Encoder การทำงานตามรูปที่ 3



Input				Output		
I3	I2	I1	I0	EO	Y1	Y0
1	1	1	0	1	0	0
1	1	0	X	1	0	1
1	0	X	X	1	1	0
0	X	X	X	1	1	1
X	X	X	X	0	1	1

```

library IEEE;
use IEEE.STD_LOGIC_1164.ALL;

entity encode4 is
    Port ( xi : in std_logic_vector(3 downto 0);
          y : out std_logic_vector(1 downto 0);
          eo : out std_logic);
end encode4;

architecture Behavioral of encode4 is

begin
    process (xi)
    begin
        if xi(3) = '0' then
            y <= "11";
            eo <= '1';
        elsif xi(2) = '0' then
            y <= "10";
            eo <= '1';
        elsif xi(1) = '0' then
            y <= "01";
            eo <= '1';
        elsif xi(0) = '0' then
            y <= "00";
            eo <= '1';
        else
            y <= "11";
            eo <= '0';
        end if;
    end process;
end Behavioral;
    
```