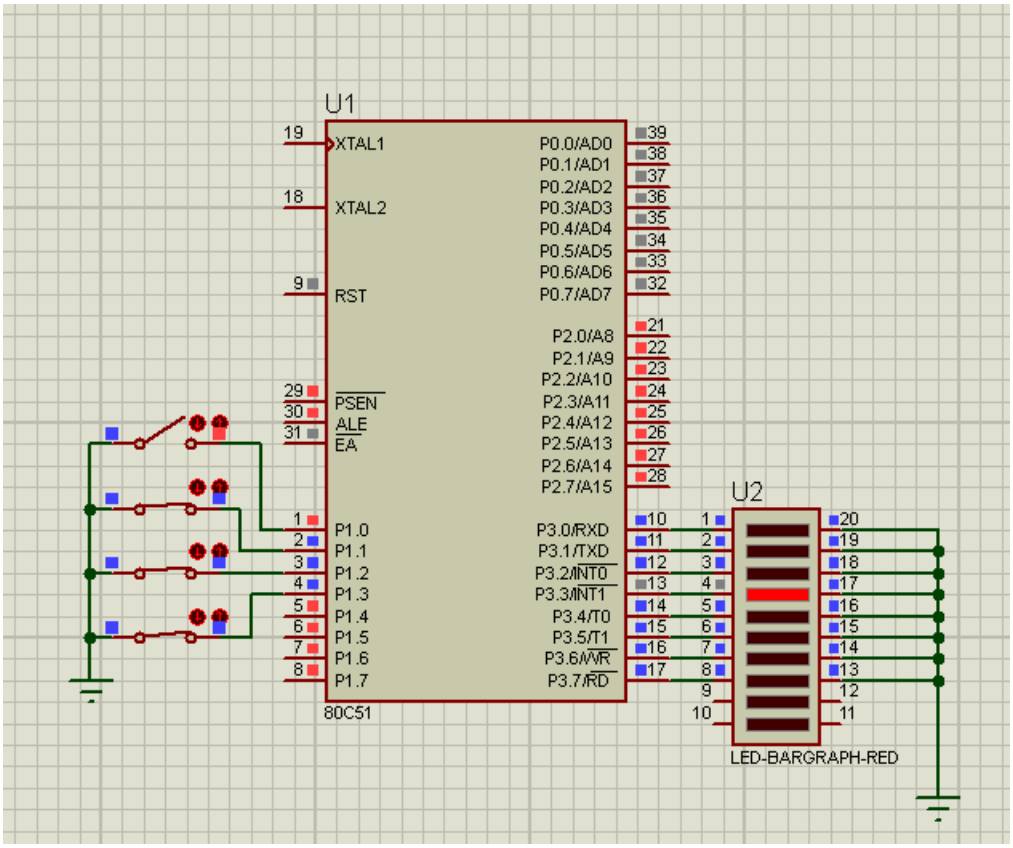
Problem 5

In this problem we compute an input logical expression, and if it true, we will produce a LED scanning pattern from LED1 to LED 8 with a delay of 250ms.

The condition is

$$Y = A.B' + C.D$$

It is computed like the condition in problem 1 except that we invert the input 'B'.



Section 1 Variables

```
;=========================
; VARIABLES
X1 EQU P1.0
X2 EQU P1.1
X3 EQU P1.2
X4 EQU P1.3

LEDs EQU P3

TERM1 EQU 20H

```

Definitions of A,B,C,D as X1,X2,X3,X4

LEDs are connected to port 3

Again, we will need a temporary storage for the first term computation "TERM1"

Section 2 Main Code

```
27  Loop:
28      MOV LEDS,#00000000B
29      MOV C,X1
30      ANL C,/X2
31      MOV TERM1,C
32      MOV C,X3
33      ANL C,X4
34      ORL C,TERM1
35      JNC LOOP
```

First we blank all LEDs (OFF) as in line 28

Next we compute the logical expression as in problem 1 with the exception that we will complement X2 as in line 30

In line 35, if the carry flag is zero, we will restart the computation process.

The following code will be executed if the condition is valid "C=1"

```
36      MOV LEDS,#00000001B
37      MOV R4,#25
38      CALL DELAY_10MS
39      MOV LEDS,#00000010B
40      MOV R4,#25
41      CALL DELAY_10MS
42      MOV LEDS,#00000100B
43      MOV R4,#25
44      CALL DELAY_10MS
45      MOV LEDS,#00001000B
46      MOV R4,#25
47      CALL DELAY_10MS
48      MOV LEDS,#00010000B
49      MOV R4,#25
50      CALL DELAY_10MS
51      MOV LEDS,#00100000B
52      MOV R4,#25
53      CALL DELAY_10MS
54      MOV LEDS,#01000000B
55      MOV R4,#25
56      CALL DELAY 10MS
```

```
57      MOV LEDS,#10000000B
58      MOV R4,#25
59      CALL DELAY_10MS
60      JMP LOOP
61
62  ; SUBROUTINE TO MAKE A DELAY TIME
63  DELAY_10MS:
64  L3:
65      MOV R6,#25
66  L2:
67      MOV R7,#200
68  L1:
69      DJNZ R7,L1
70      DJNZ R6,L2
71      DJNZ R4,L3
72  RET
```

Each LED's pattern is sent followed by a delay of 250ms

We have 8 LEDs Pattern that activate LEDs one by one starting from LED 1 till LED8 then repeats.

Section 3 Delay function

This is another delay function that will make 10ms delay multiplied by R4

So, if R4 is 25 before calling this function, the delay will be 25*10ms = 250ms

To produce 10ms delay, we need 10ms/2us = 5000 iteration loop. We divide 5000 into two nested loops 25*20 = 5000 as in lines 64-70.