Microprocessors and Microcontrollers (EE-231)
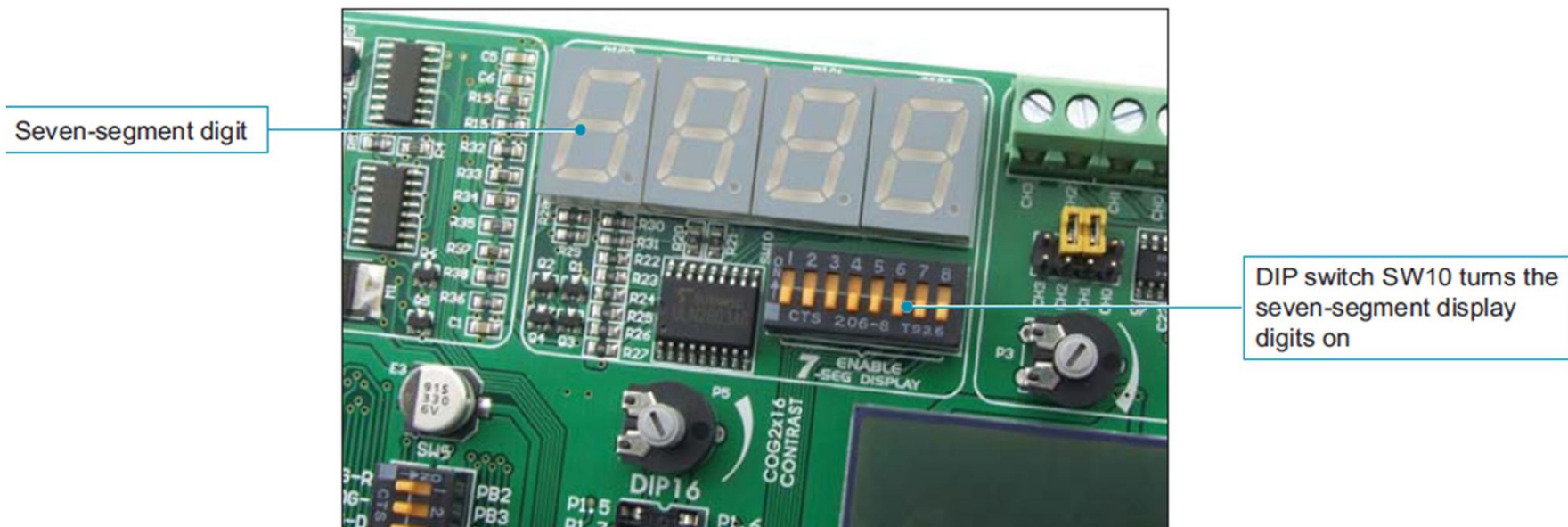
Lab-3

# Main Objectives

- Driving Seven Segment Display

The seven Segment

- Easy 8051 has 4 SS displays attached to its port 0 through multiplexing scheme.

- ULN 2803 is used for driving the LEDs of SS.

Seven-segment digit

DIP switch SW10 turns the seven-segment display digits on

The seven Segment

- Four Seven Segments are connected as shown below.
- Each seven segment is selected through P1 (0 to 3rd) bit
- SW-8's first 4 bit should be enabled as well as all the 8 bits of SW-10
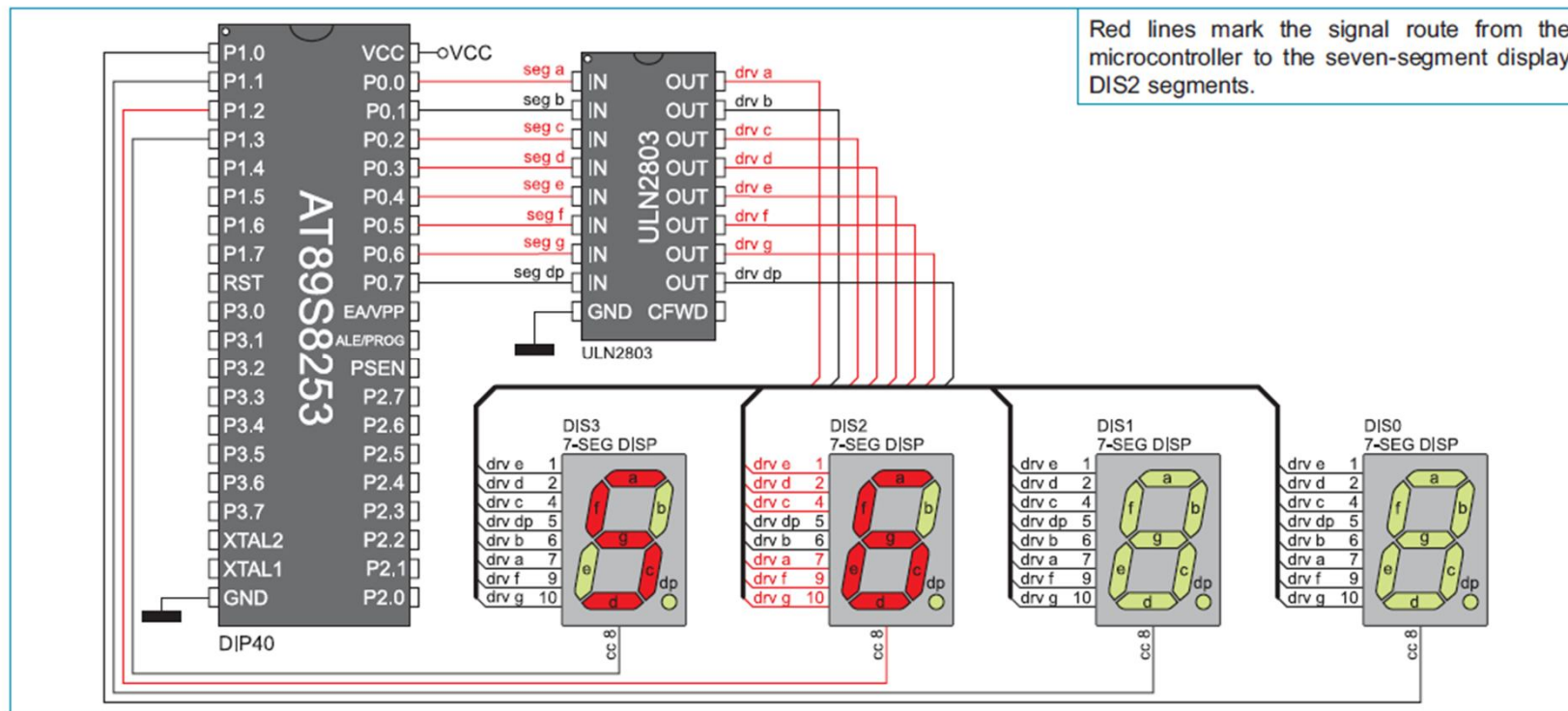
The seven Segment

- A seven segment is driven by sending 0 to its pin, because of inversion logic of ULN2803.
- E.g., to write '3' we would light a,b,c,d,g.
- P0=1011 0000 = B0H

7-SEG DISP

P0.0	a	1
P0.1	b	2
P0.2	c	4
P0.3	d	5
P0.4	e	6
P0.5	f	7
P0.6	g	9
P0.7	dp	10
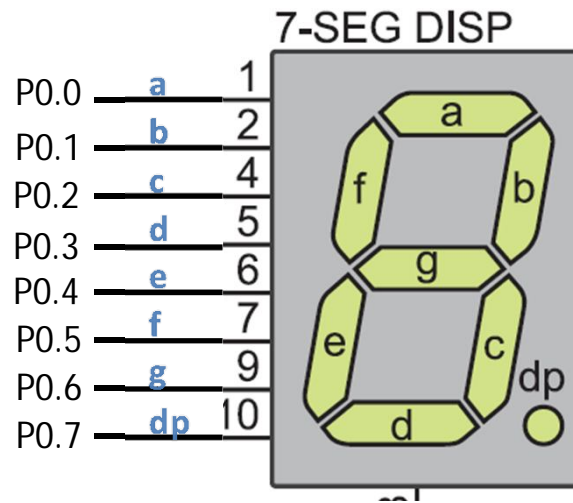
HEX to Seven Segment

Number	(. g f e d c b a)
0	1100 0000=C0H
1	1111 1001=F9H
2	1010 0100=A4H
3	1011 0000=B0H
4	1001 1001=99H
5	1001 0010=92H
6	1000 0010=82H
7	1111 1000=F8H
8	1000 0000=80H
9	1001 0000=90H
a	1010 0000=A0H
b	1000 0011=83H
c	1010 0111=A7H
d	1010 0001=A1H
e	1000 0100=84H
f	1000 1110=8EH

Task 1

1. Write the code in assembly that Displays the number 0 to F on Seven Segments after some delay.

2. Modify the logic so that the delay is exactly 1 sec.

HEX to Seven Segment

```
org 0                    MOV P0,#0F8H;7           SJMP HERE
HERE:                    ACALL DELAY
MOV P0,#0C0H;0           MOV P0,#80H;8            DELAY:
MOV P1,#00H              ACALL DELAY
SETB P1.0                MOV P0,#90H;9            MOV       R3,#10
ACALL DELAY              ACALL DELAY              L3:MOV    R2,#255
MOV P0,#0F9H;1           MOV P0,#0A0H;a           L2:MOV    R1,#255
ACALL DELAY              ACALL DELAY              L1:DJNZ R1,L1
MOV P0,#0A4H;2           MOV P0,#83H;b            DJNZ R2,L2
ACALL DELAY              ACALL DELAY              DJNZ R3,L3
MOV P0,#0B0H;3           MOV P0,#0A7H;c           RET
ACALL DELAY              ACALL DELAY              end
MOV P0,#99H;4            MOV P0,#0A1H;d
ACALL DELAY              ACALL DELAY
MOV P0,#92H;5            MOV P0,#84H;e
ACALL DELAY              ACALL DELAY
MOV P0,#82H;6            MOV P0,#8EH;f
ACALL DELAY              ACALL DELAY
```
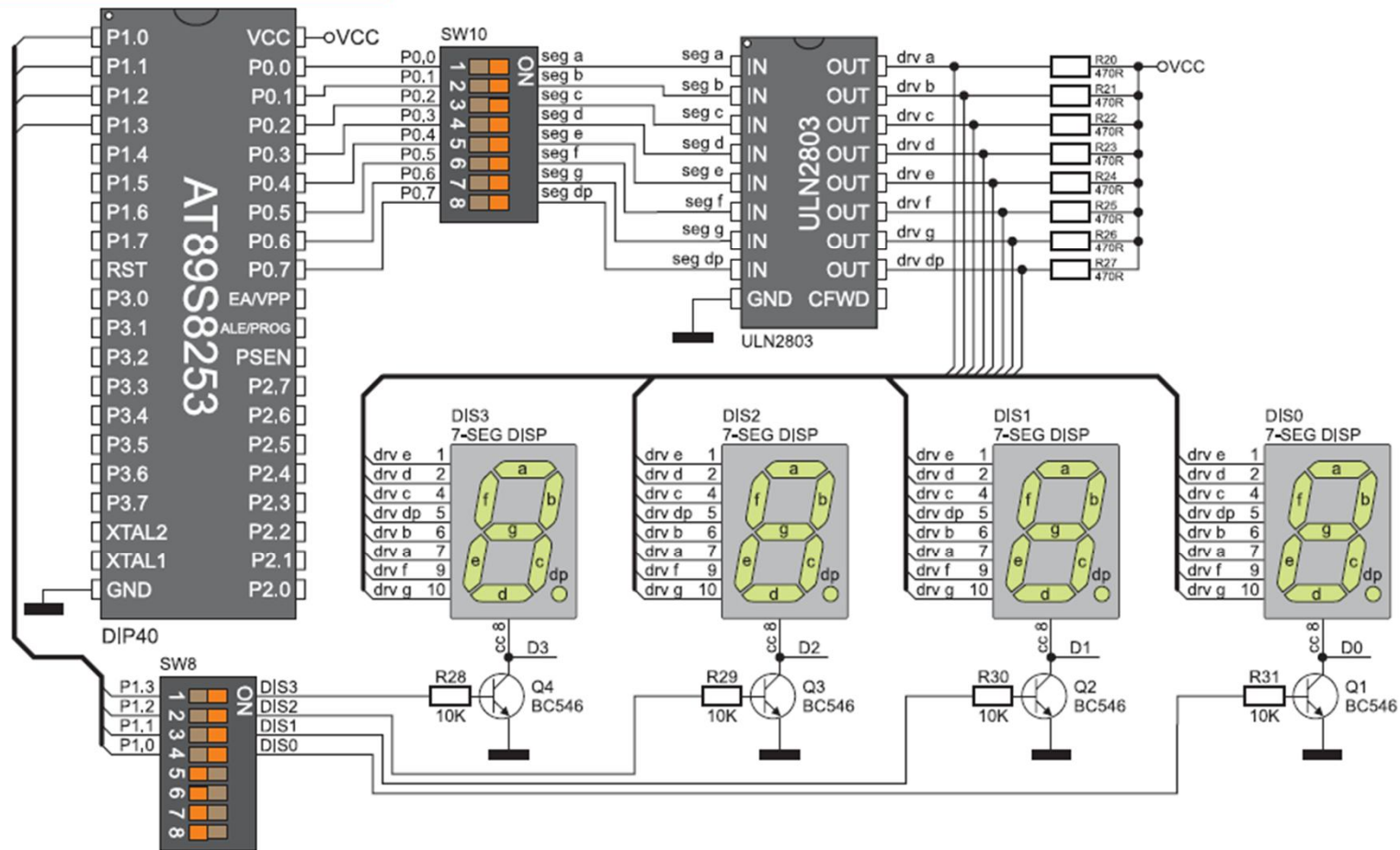
Multiplexing

- How can we light all the Seven Segments at a time using one port?

- The answer is multiplexing. 'or' illusion

- In multiplexing we use the concept of persistence of vision i.e., human brain cannot differentiate between two events occurring at a time difference of less than .04 sec.

- In this case the four digits are displayed one after the other so fast that the human brain cannot detect the difference.

- Although only one digit is displayed at a time it appears as a four digit number.

Multiplexing

Seven-segment display is enabled

Task

- Using Multiplexing display "1234" on Seven Segment.

Multiplexing

```
org 0

MOV A,#11H
HERE:
MOV P0,#0C0H;0
ACALL DELAY
RL A
MOV P1,A
MOV P0,#0F9H;1
ACALL DELAY
RL A
MOV P1,A
MOV P0,#0A4H;2
ACALL DELAY
RL A
MOV P1,A
MOV P0,#0B0H;3
ACALL DELAY

RL A
MOV P1,A

SJMP HERE ; short jump to start

DELAY:


MOV R2,#255
L2:
MOV       R1,#255
L1:DJNZ R1,L1
;DJNZ R2,L2

RET
end
```