EXPERIMENT 10

Aim: Write a Program using ALP to Simulate Microcontroller interfacing with 7 segment display using http://vlabs.iitb.ac.in/vlabs-dev/labs/8051-Microcontroller-Lab/labs/exp1/simulation.php. Display your SAP ID using this tool

Submission Sheet

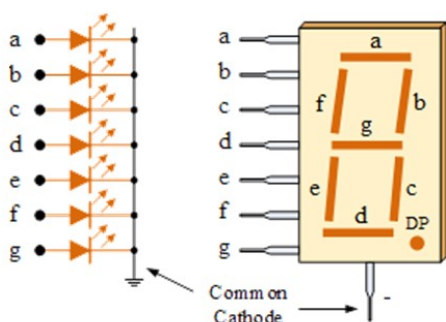| SAP ID	Name of Student	Date of Experiment	Date of Submission	Remarks
60004190057	Junaid Girkar	3-12-2021	10-12-2021	

THEORY:
The 7-segment display consists of seven LEDs arranged in a rectangular fashion. Each of the seven LEDs is called a segment because when illuminated the segment forms part of a numerical digit (both Decimal and Hex) to be displayed. An additional 8th LED is sometimes used within the same package which is the indication of a decimal point(DP), when two or more 7-segment displays are connected together numbers greater than ten can be displayed.
So by forward biasing the appropriate pins of the LED segments in a particular order, some segments will be glowing and others will remain as it is, allowing the desired character pattern of the number to be generated on the display. This then allows us to display each of the ten decimal digits 0 to 9 on the same 7-segment display.

In the common cathode display, all the cathode connections of the LED segments are joined together to logic "0" or ground. The individual segments are illuminated by application of a "HIGH", or logic "1" signal via a current limiting resistor to forward bias the individual Anode terminals (a-g).

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Common Cathode 7-segment Display

Decimal Digit	Commom Cathode Individual Segments Illuminated						
	a	b	c	d	e	f	g
0	1	1	1	1	1	1	
1		1	1				
2	1	1		1	1		1
3	1	1	1	1			1
4		1	1			1	1
5	1		1	1		1	1
6	1		1	1	1	1	1
7	1	1	1				
8	1	1	1	1	1	1	1
9	1	1	1	1		1	1

Common Cathode Decoding Table

CHAR	A	B	C	D	E	F	G	HEX
SAP ID = 60004190057								
6	1		1	1	1	1	1	5F
0	1	1	1	1	1	1		7E
4		1	1			1	1	33
1		1	1					30
9	1	1	1	1		1	1	7B
5	1		1	1		1	1	5B
7	1	1	1					70
HEXADECIMAL = DF8874769								
D	1	1	1	1	1	1		7E
F	1				1	1	1	47
8	1	1	1	1	1	1	1	7F

7	1	1	1					70
4		1	1			1	1	33
6	1		1	1	1	1	1	5F
9	1	1	1	1		1	1	7B
NAME = JUNAID								
J		1	1	1				38
U		1	1	1	1	1		3E
N	1	1	1		1	1		76
A	1	1	1		1	1	1	77
I		1	1					30
D		1	1	1	1		1	3D

CODE:

```
MOV P0,#5Fh     //to display 6
MOV P0,#7Eh     //to display 0
MOV P0,#7Eh     //to display 0
MOV P0,#7Eh     //to display 0
MOV P0,#33h     //to display 4
MOV P0,#30h     //to display 1
MOV P0,#7Bh     //to display 9
MOV P0,#7Eh     //to display 0
MOV P0,#7Eh     //to display 0
MOV P0,#5Bh     //to display 5
MOV P0,#70h     //to display 7

MOV P0,#3Dh     //to display d
MOV P0,#47h     //to display F
MOV P0,#7Fh     //to display 8
MOV P0,#7Fh     //to display 8
MOV P0,#70h     //to display 7
MOV P0,#33h     //to display 4
MOV P0,#70h     //to display 7
MOV P0,#5Fh     //to display 6
MOV P0,#7Bh     //to display 9

MOV P0,#38h     //to display J
```

```
MOV P0,#3Eh      //to display U
MOV P0,#76h      //to display n
MOV P0,#77h      //to display A
MOV P0,#30h      //to display I
MOV P0,#3Dh      //to display d
```

OUTPUT:

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Screenshot 1 (8051 simulator)

Pin Diagram — 8051

Memory

Peripherals — Port 0

Editor
- Current line | Next line (PC)
- Error line

```
1  MOV P0,#5Fh   //to display 6
2  MOV P0,#7Eh   //to display 0
3  MOV P0,#76h   //to display 8
4  MOV P0,#31h   //to display 4
5  MOV P0,#30h   //to display 1
6  MOV P0,#6Bh   //to display 5
7  MOV P0,#7Eh   //to display 0
8  MOV P0,#7Eh   //to display 0
...
13 MOV P0,#3Bh   //to dislay J
14 MOV P0,#3Eh   //to dislay U
15 MOV P0,#76h   //to dislay 8
16 MOV P0,#77h   //to dislay I
17 MOV P0,#30h   //to dislay I
18 MOV P0,#3Ch   //to dislay d
```

Run | Debug | Reset

Screenshot 2 (8051 simulator)

Pin Diagram — 8051 · Memory · Peripherals — Port 0

Editor — Current line | Next line (PC) | Error line

Run | Debug | Reset

Screenshot 3 (8051 simulator)

Pin Diagram — 8051 · Memory · Peripherals — Port 0

Editor — Current line | Next line (PC) | Error line

Run | Debug | Reset

Screenshot 4 (8051 simulator)

Pin Diagram — 8051 · Memory · Peripherals — Port 0

Editor — Current line | Next line (PC) | Error line

Run | Debug | Reset

Screenshot 5 (8051 simulator)

Pin Diagram — 8051 · Memory · Peripherals — Port 0

Editor — Current line | Next line (PC) | Error line

Run | Debug | Reset

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Panel 1

Pin Diagram | Memory | Peripherals | Editor

```
1  MOV P0,#30h    //to display d
2  MOV P0,#27h    //to display F
3  MOV P0,#77h    //to display 7
4  MOV P0,#70h    //to display 7
5  MOV P0,#33h    //to display 4
6  MOV P0,#5Fh    //to display 6
7  MOV P0,#7Bh    //to display 9
8
```

Panel 2

Pin Diagram | Memory | Peripherals | Editor

```
1  MOV P0,#30h    //to display d
2  MOV P0,#67h    //to display F
3  MOV P0,#7Fh    //to display 8
4  MOV P0,#70h    //to display 7
5  MOV P0,#33h    //to display 4
6  MOV P0,#5Fh    //to display 6
7  MOV P0,#7Bh    //to display 9
8
```

Panel 3

Pin Diagram | Memory | Peripherals | Editor

```
1  MOV P0,#30h    //to display d
2  MOV P0,#67h    //to display F
3  MOV P0,#77h    //to display 7
4  MOV P0,#70h    //to display 7
5  MOV P0,#33h    //to display 4
6  MOV P0,#5Fh    //to display 6
7  MOV P0,#7Bh    //to display 9
8
```

Panel 4

Pin Diagram | Memory | Peripherals | Editor

```
1  MOV P0,#30h    //to display d
2  MOV P0,#67h    //to display F
3  MOV P0,#77h    //to display 7
4  MOV P0,#70h    //to display 7
5  MOV P0,#33h    //to display 4
6  MOV P0,#5Fh    //to display 6
7  MOV P0,#7Bh    //to display 9
8
```

Panel 5

Pin Diagram | Memory | Peripherals | Editor

```
1  MOV P0,#30h    //to display d
2  MOV P0,#67h    //to display F
3  MOV P0,#77h    //to display 7
4  MOV P0,#70h    //to display 7
5  MOV P0,#33h    //to display 4
6  MOV P0,#5Fh    //to display 6
7  MOV P0,#7Bh    //to display 9
8
```

Panel 6

Pin Diagram | Memory | Peripherals | Editor

```
1  MOV P0,#30h    //to display d
2  MOV P0,#67h    //to display F
3  MOV P0,#77h    //to display 7
4  MOV P0,#70h    //to display 7
5  MOV P0,#33h    //to display 4
6  MOV P0,#5Fh    //to display 6
7  MOV P0,#7Bh    //to display 9
8
```

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Panel 1

Pin Diagram | **Memory** | **Peripherals** | **Editor**

Current line | Next line (PC) | Error line

8051

SFR / Value:
A 0x00, B 0x00, PSW 0x00, P0 0x70, P1 0x00, P2 0x00, P3 0x00, SP 0x07, DPL 0x00, DPH 0x00, PCON 0x00, TCON 0x00, TMOD 0x00, TL0 0x00, TL1 0x00, TH0 0x00

Location / Value:
0x00 0x00, 0x01 0x00, 0x02 0x00, 0x03 0x00, 0x04 0x00, 0x05 0x00, 0x06 0x00, 0x07 0x00, 0x08 0x00, 0x09 0x00, 0x0a 0x00, 0x0b 0x00, 0x0c 0x00, 0x0d 0x00, 0x0e 0x00

Port 0

```
1  MOV P0,#10h   //to display d
2  MOV P0,#47h   //to display F
3  MOV P0,#77h   //to display 8
4  MOV P0,#    //to display
6  MOV P0,#h    //to display
7  MOV P0,#78h   //to display
```

Run or Debug or Reset

Panel 2

Pin Diagram | **Memory** | **Peripherals** | **Editor**

Current line | Next line (PC) | Error line

8051

SFR / Value:
A 0x00, B 0x00, P0 0x5f, P1 0x00, P2 0x00, P3 0x00, SP 0x07, DPL 0x00, DPH 0x00, PCON 0x00, TCON 0x00, TMOD 0x00, TL0 0x00, TH0 0x00

Location / Value:
0x00 0x00, 0x01 0x00, 0x02 0x00, 0x03 0x00, 0x04 0x00, 0x05 0x00, 0x06 0x00, 0x07 0x00, 0x08 0x00, 0x09 0x00, 0x0a 0x00, 0x0b 0x00, 0x0c 0x00, 0x0e 0x00

Port 0

```
1  MOV P0,#10h   //to display d
2  MOV P0,#47h   //to display F
3  MOV P0,#77h   //to display 8
4  MOV P0,#70h   //to display 7
5  MOV P0,#33h   //to display 4
6  MOV P0,#1Fh   //to display 0
7  MOV P0,#    //to display
8
```

Run or Debug or Reset

Panel 3

Pin Diagram | **Memory** | **Peripherals** | **Editor**

Current line | Next line (PC) | Error line

8051

SFR / Value:
A 0x00, B 0x00, PSW 0x00, P0 0x7b, P1 0x00, P2 0x00, P3 0x00, SP 0x07, DPL 0x00, DPH 0x00, PCON 0x00, TMOD 0x00, TL0 0x00, TL1 0x00, TH0 0x00

Location / Value:
0x00 0x00, 0x01 0x00, 0x02 0x00, 0x03 0x00, 0x04 0x00, 0x05 0x00, 0x06 0x00, 0x07 0x00, 0x08 0x00, 0x09 0x00, 0x0a 0x00, 0x0b 0x00, 0x0c 0x00, 0x0d 0x00, 0x0e 0x00

Port 0

```
1  MOV P0,#10n   //to display d
2  MOV P0,#47h   //to display F
3  MOV P0,#77h   //to display 8
4  MOV P0,#70h   //to display 7
5  MOV P0,#33n   //to display 4
6  MOV P0,#1Fh   //to display 0
7  MOV P0,#79h   //to display 9
8
```

Run or Debug or Reset

CONCLUSION: We learn about 7 segment display and simulations using the 8051 Microcontroller. We then simulated a few examples by writing the code.