

**Course Title:** Peripherals, Interfacing and Embedded Systems Lab (CSE-4640)

Department of Computer Science and Engineering (CSE)  
**Islamic University of Technology (IUT), Gazipur**

**Lab # 5**

*LED and Seven Segment Display Interfacing using EMU8086 and Proteus.*

**Objective:**

To understand LED and Seven Segment Display interfacing by using 8086 Microprocessor and 74HC373 Latch, 8255 PPI and LED-BIRY in Proteus.

**Theory:**

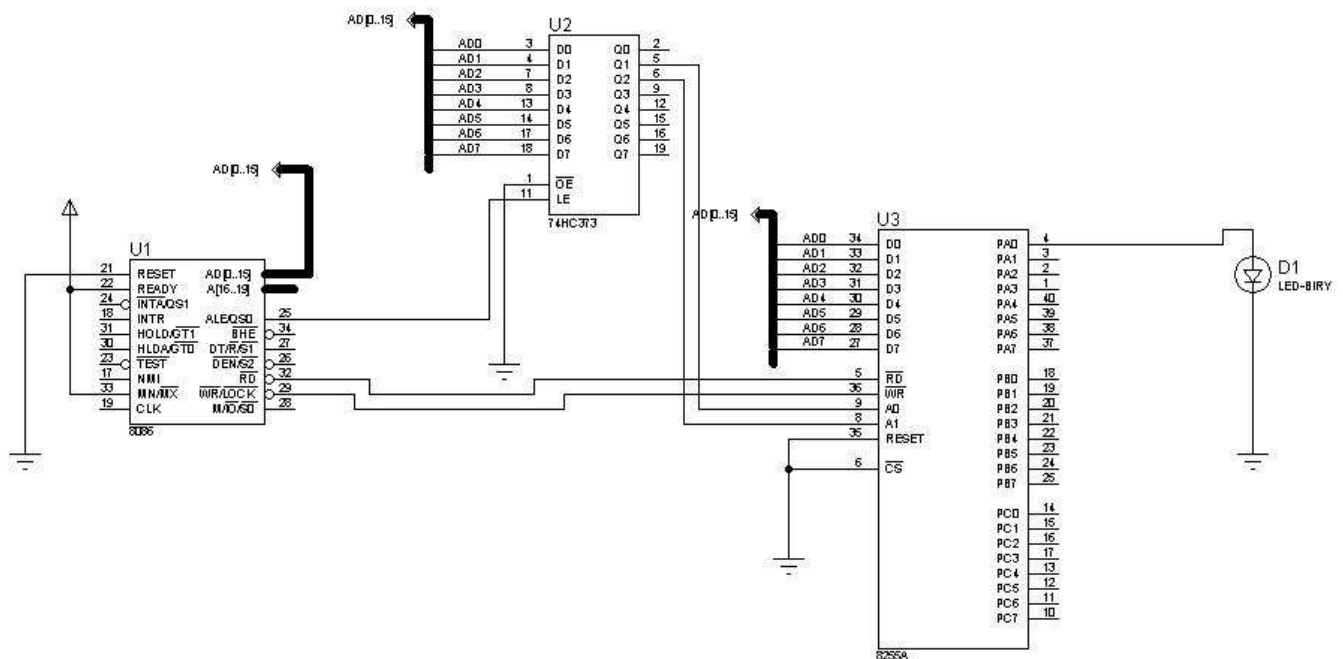
- **Example Program for LED Interfacing**

```
DATA SEGMENT
PORTA EQU 00H
PORTB EQU 02H
PORTC EQU 04H
PORT_CON EQU 06H
DATA ENDS
CODE SEGMENT
MOV AX, DATA
MOV DS, AX

ORG 0000H
START:
MOV DX, PORT_CON
MOV AL, 10000000B; port C (output), port A (output) and port B (OUTPUT) in mode 0
OUT DX, AL

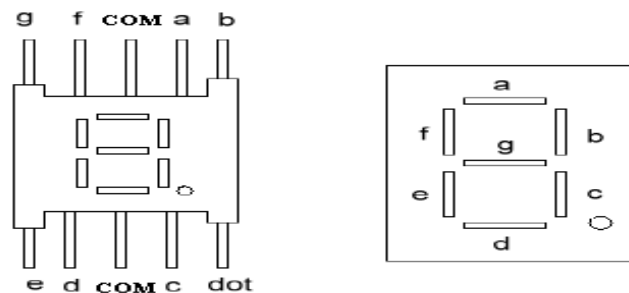
JMP XX
XX:
MOV AL, 0000H
MOV DX, PORTA
OUT DX, AL
MOV CX, 0DF36H; Delay
loopy1: loop loopy1
MOV AL, 00FFH
MOV DX, PORTA
OUT DX, AL
MOV CX, 0DF36H; Delay
loopy2: loop loopy2
JMP XX
CODE ENDS
END
```

## Circuit Diagram for LED Interfacing:



- Seven Segment Display**

The 7 segment is used to display numbers. This requires 8255A ports which need to be connected to the 7 segment internally. Through the code we can access the PIO 8255 ports and provide binary or hex value to switch the required segment on and off. In order to turn a segment ON, a logical 1 is required as shown below. Any number from 0 – 9 can be displayed on the 7 segment by providing the actual hex or binary value which turns those segments ON to display the digit.



Seven-Segment Display

- Seven Segment Display Data Generation Rule:**

Digit	BCD	g	f	e	d	c	b	a
0	0000	0	1	1	1	1	1	1
1	0001	0	0	0	0	1	1	0
2	0010	1	0	1	1	0	1	1
3	0011	1	0	0	1	1	1	1
4	0100	1	1	0	0	1	1	0
5	0101	1	1	0	1	1	0	1
6	0110	1	1	1	1	1	0	1
7	0111	0	0	0	0	1	1	1
8	1000	1	1	1	1	1	1	1
9	1001	1	1	0	1	1	1	1

- **Example Program for Seven Segment Display Interfacing**

```
DATA SEGMENT
PORTA EQU 00H
PORTB EQU 02H
PORTC EQU 04H
PORT_CON EQU 06H
DATA ENDS
```

```
CODE SEGMENT
MOV AX,DATA
MOV DS, AX
```

```
ORG 0000H
START:
```

```
MOV DX, PORT_CON
MOV AL, 10000000B
OUT DX, AL
```

```
JMP XX
```

```
XX:
MOV AL, 00111111B ; displaying 0
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay0:loop Delay0
```

```
MOV AL, 00000110B ; Displaying 1
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay1:loop Delay1
MOV AL, 01011011B ;Displaying 2
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay2:loop Delay2
```

```
MOV AL, 01001111B ; Displaying 3
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay3:loop Delay3
```

```
MOV AL, 01100110B ; Displaying 4
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay4:loop Delay4
```

```
MOV AL, 01101101B ;Displaying 5
MOV DX, PORTA
OUT DX,AL
```

```
MOV CX,0DF36H; Delay
Delay5:loop Delay5
```

```
MOV AL, 0111101B ;Displaying 6
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay6:loop Delay6
```

```
MOV AL, 00000111B ;Displaying 7
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay7:loop Delay7
```

```
MOV AL, 01111111B ;Displaying 8
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay8:loop Delay8
```

```
MOV AL, 01101111B ; Displaying 9
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
```

```
Delay9:loop Delay9
```

```
JMP XX
JMP START
```

```
CODE ENDS
END
```

- Circuit Diagram for Seven Segment Display Interfacing**

