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

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

Lab # 3

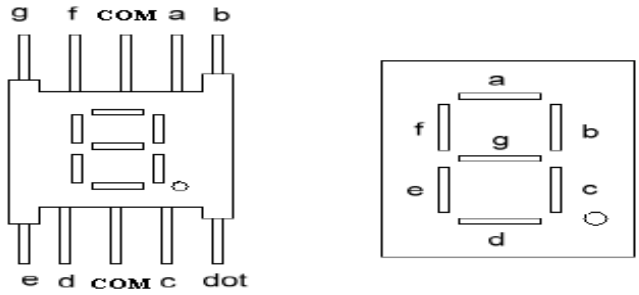
Controlling the Seven Segment display of MDA-8086 Kit.

Objective:

To understand MDA 8086 trainer Kit Commands to control its Seven Segment Display.

Theory:

- **Seven Segment Display**
  The 7 segment inside the MDA – 8086 trainer kit can be used to display numbers. This requires PIO 8255 ports which are already 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 0 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:**

8	4	2	1	8	4	2	1		
dp	g	f	e	d	c	b	a	DECIMAL VALUE	HEX VALUE
0	1	0	0	0	0	0	0	0	80
1	1	1	1	1	0	0	1	1	F9
1	0	1	0	0	1	0	0	2	A4
1	0	1	1	0	0	0	0	3	B0
1	0	0	1	1	0	0	1	4	99
1	0	0	1	0	0	1	0	5	92
1	0	0	0	0	0	1	0	6	82
1	1	1	1	1	0	0	0	7	F8
1	0	0	0	0	0	0	0	8	80
1	0	0	1	0	0	0	0	9	90

- **Example Program**

; Program to display '3' in 7-segment display

```
CODE SEGMENT
ASSUME      CS:CODE, DS:CODE, ES:CODE, SS:CODE
ORG 1000H                ; The code is placed at offset 1000h
MOV AL, 10000000B        ; Mode set for Control Word to control 8255 PPI
OUT 1FH, AL              ; Initiate transfer of information from Source to Destination
MOV AL, 10110000B        ; Actual data for displaying '3' provided in Accumulator
OUT 19H, AL              ; Data Transfer to Output Port
INT 3                    ; Single-step Interrupt
CODE ENDS
END
```

Tasks to do:

1. Write an Assembly Language Program to show all the HEX digits (0 ~ 9 and A ~ F) on the 7 segment display at a time (using pause/delay so that each digits can be seen for a certain interval of time; (**Hint:** for timer take help from Lab-1 example code).
2. Compile the program using MASM and make an *. OBJ file.
3. Using the *.OBJ file make an *.ABS file (i.e., file with Machine Code) and load it into the MDA-8086 kit through WinCOMM software (use command 'L' and then press F3).
4. Run the program in MDA-8086 kit and ensure the display output.