St. Francis Institute of Technology

Class: SE-ITA/ITB Semester: IV; A.Y. 2023-2024

Subject: Microprocessor Lab

Experiment – 10: Study of Interfacing LED display with 8086 via 8255

1. Aim:

To study the interfacing of LED display with 8086 microprocessor via 8255 PPI

2. Theory

Interfacing LED with 8086 via 8255A in I/O mapped I/O:

The 8086 has four special instructions IN, INS, OUT, and OUTS to transfer data through the input/output ports in I/O mapped I/O system. M/IO signal is always low when 8086 is executing these instructions. Here, RD and WR signals are activated when M/IO signal is low, indicating I/O bus cycle. Reset out signal from the clock generator is connected to the reset signal of 8255. 8255 operates in its mode 0 (i.e. Basic Input/Output Mode).

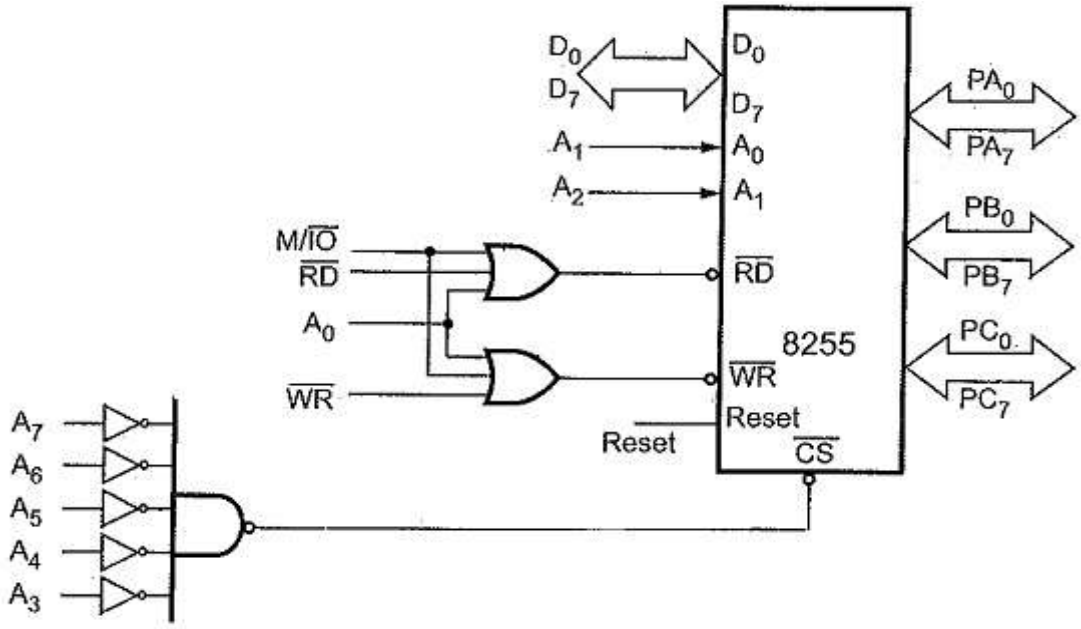

Fig.1: I/O Mapped I/O technique

Fig.1 shows 8255 interfacing with 8086 in I/O mapped I/O technique. The addresses generated as shown in Fig. 2 below.

Port / control Register	Address lines								Address
	A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0	
Port A	0	0	0	0	0	0	0	0	00H
Port B	0	0	0	0	0	0	1	0	02H
Port C	0	0	0	0	0	1	0	0	04H
Control register	0	0	0	0	0	1	1	0	06H

Fig.2: I/O Mapped I/O

Operation of 8255 is based on the Control Word loaded in the Control Word Register of 8255. The control word format is shown below in Fig.3.

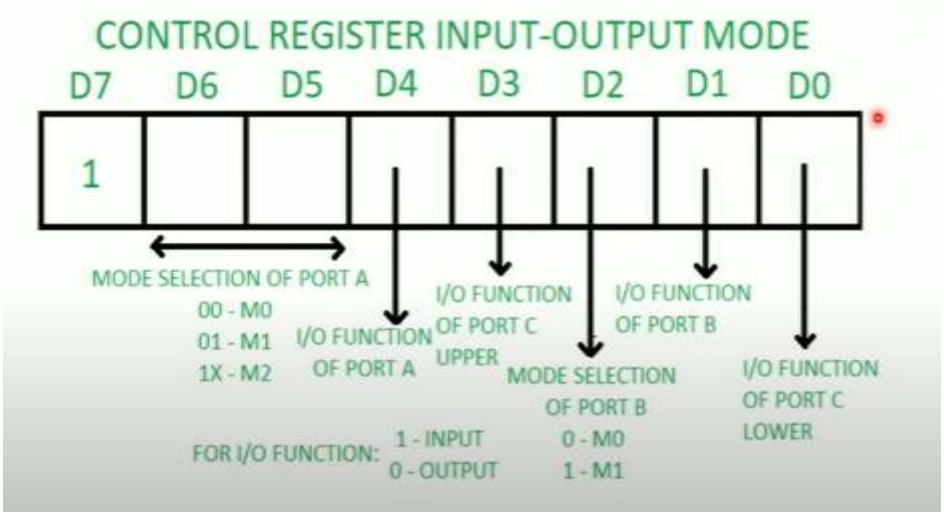

Fig.3: Control word of 8255

8255 operates in 2 modes: BSR (Bit Set/Reset) Mode and I/O (Input/Output) Mode. BSR mode is used to set reset bits of Port C only and is indicated by setting D7 bit to 0 in CWR. I/O mode is selected when D7 bit is set to 1 in CWR. I/O mode is further subdivided into 3 modes namely Basic I/O mode, Strobed I/O mode and Bidirectional I/O. Basic I/O mode is selected by setting D6 and D5 bits to 0 and 1 respectively. This allows individual ports to be function as either Input or Output ports depending on the Bits D4 to D0. Fig.4 shows Interfacing of LED with 8086 at Port A of 8255A.

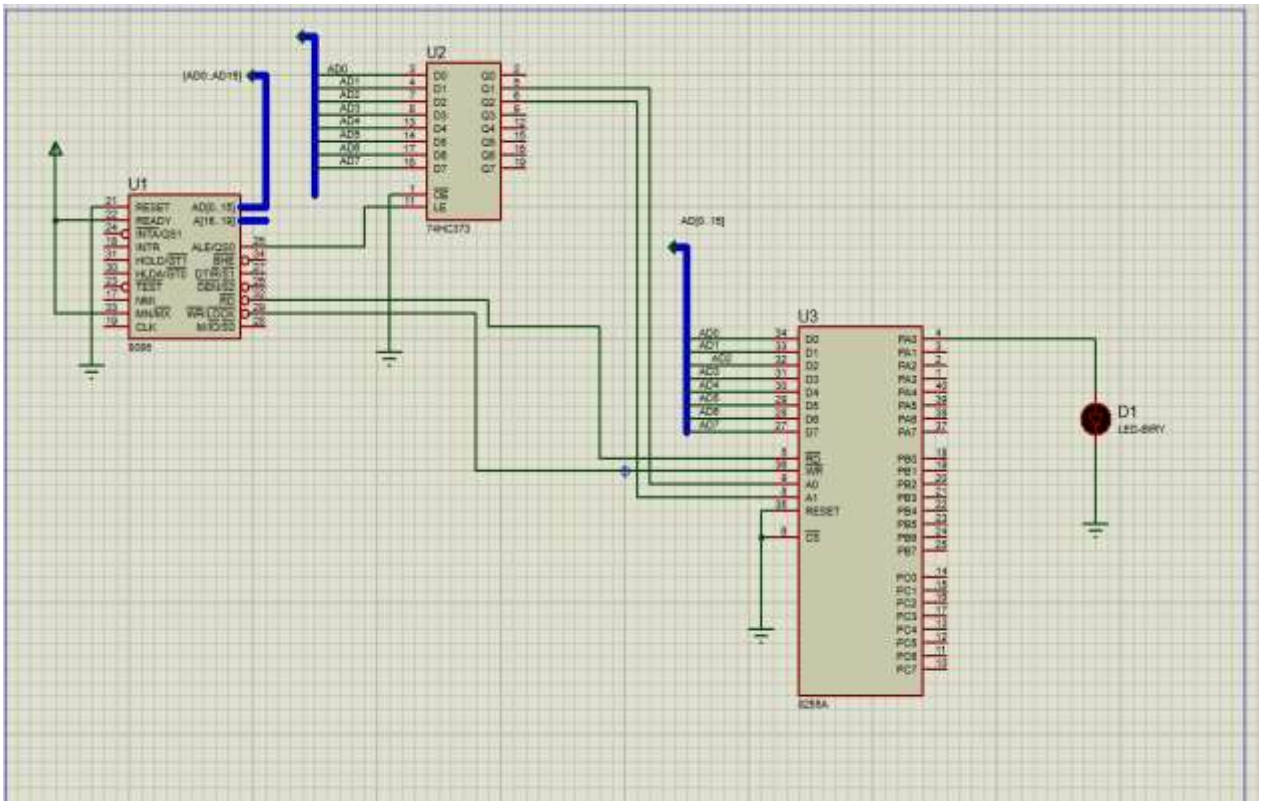

Fig.4: Interfacing of LED with 8086 at Port A of 8255A

In I/O mode of 8255, Port A is connected as a simple output port in Mode 0, Port B is connected as input port in Mode 0 and Port C is connected as output Port. The CWR can be calculated as 10000010B. 8086 program for blinking of an LED 10 times is given as follows.

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

        CODE SEGMENT
                ASSUME CS:CODE,DS:DATA
                START:
                        MOV AX,DATA
                        MOV DS,AX

                        MOV DX,CWR
                        MOV AL,10000010B
                        OUT DX,AL
                        MOV CX,000AH
                UP:     MOV AL,01H
                        MOV DX,PORTA
                        OUT DX,AL            ; as FFh is sent to PORT A, LED will glow
                        MOV AL,00H
                        MOV DX,PORTA
                        OUT DX,AL           ; as 00h is sent to PORT A, LED will go off
                        LOOP UP
                        MOV AH,4CH
                        INT 21H
        CODE ENDS
        END START
```

3. Questions:

i. Give any two examples of interfacing 8086 with 8255A apart from the one above.

ii. Write the control word if in I/O mode, Port A is connected as strobed input port, Port B is connected as output port and port C is connected as output port.