



BSc (Hons) in Computer Engineering
Laboratory Practical

Experiment #2 Interface with 7-Segment Displays and Introduction to MCU based Hardware Module development

Name:	
Index No	
Intake	
Date	
Instructor Name and Signature:	
Comments	Grade

Objectives:

To identify hardware and software requirement to 7-segment display. And identify capability to design and develop missing hardware ICs Using MCU

Outcomes:

After completing this experiment, students would be able to:

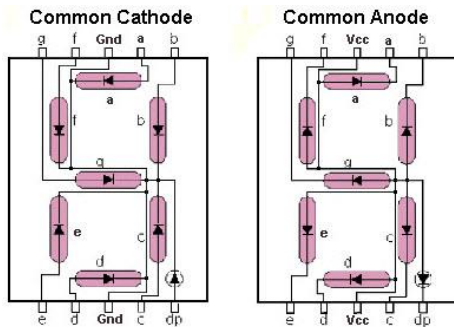
- a) Identify functionality on 7-segment displays.
- b) Explain how MCU can be used to make a missing/ ICs (Steps to build IC using MCU)

Equipment Required:

7-segment display -2, PIC16F887-1 , PIC16F628A-1, D400-2

Ex 01: Identify Existing hardware and Software available on a given Computer or Server

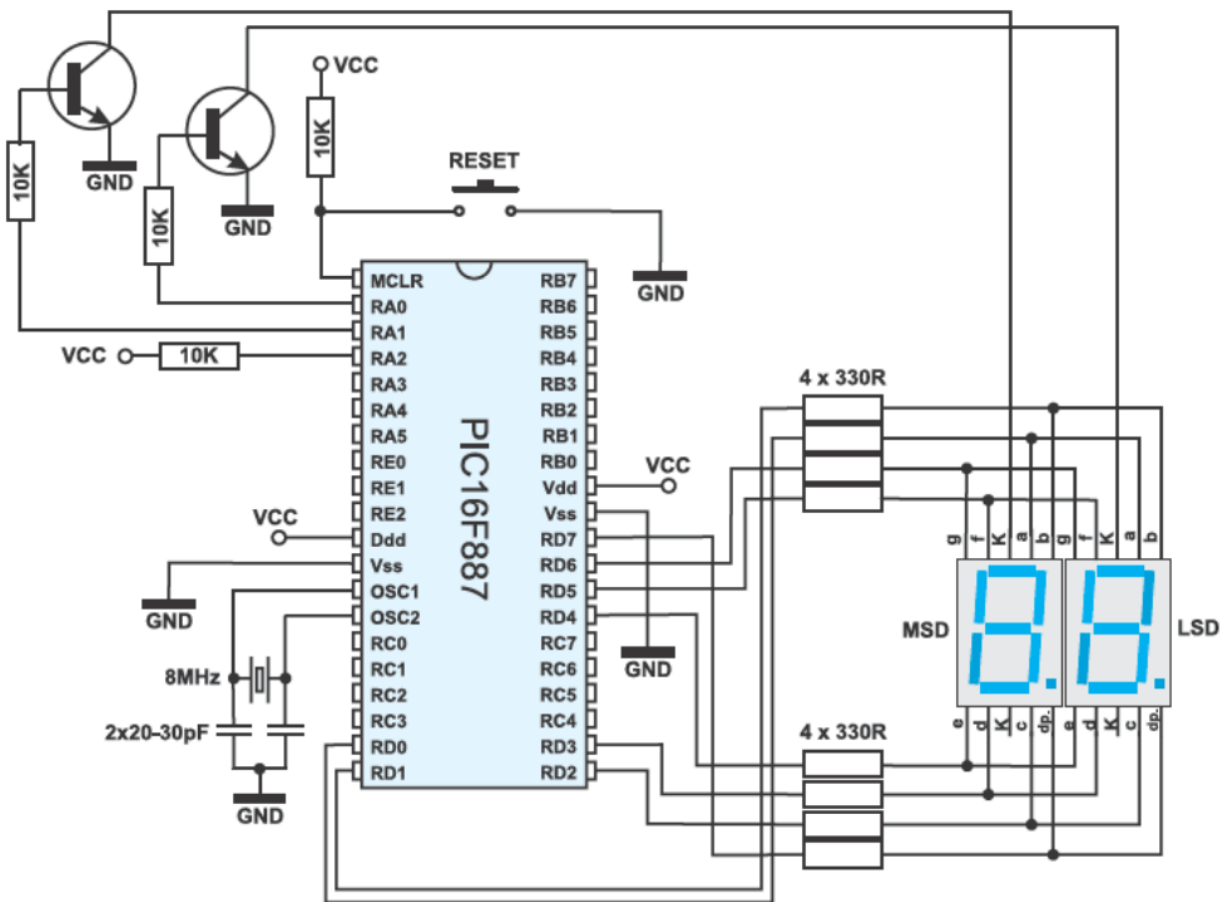
A 7 Segment Display is one of the simplest types of display devices that can display numbers from 0 through 9 (you can also display characters from ‘A’ through ‘F’). The name ‘7 Segment Display’ means that it has 7 LEDs in the form of hexagonal bars that are arranged in the form of ‘8’.



Digits to	Display Segments							
	dp	a	b	c	d	e	f	g
0	0	1	1	1	1	1	1	0
1	0	1	1	0	0	0	0	0
2	0	1	1	0	1	1	0	1
3	0	1	1	1	1	0	0	1
4	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1
6	0	1	0	1	1	1	1	1
7	0	1	1	1	0	0	0	0
8	0	1	1	1	1	1	1	1
9	0	1	1	1	1	0	1	1

Identify different in between CC and CA 7 segments. Draw a two circuit diagram how these items are fits in to a circuit board or project board.

Ex 02: Create a two Digits Counter Using PIC 16F887



- a) Create a simple up-down counter using sample diagram (Change this as required)
- b) Briefly describe Identify limitation of the this type of counters

You can use the following sample code to run this program

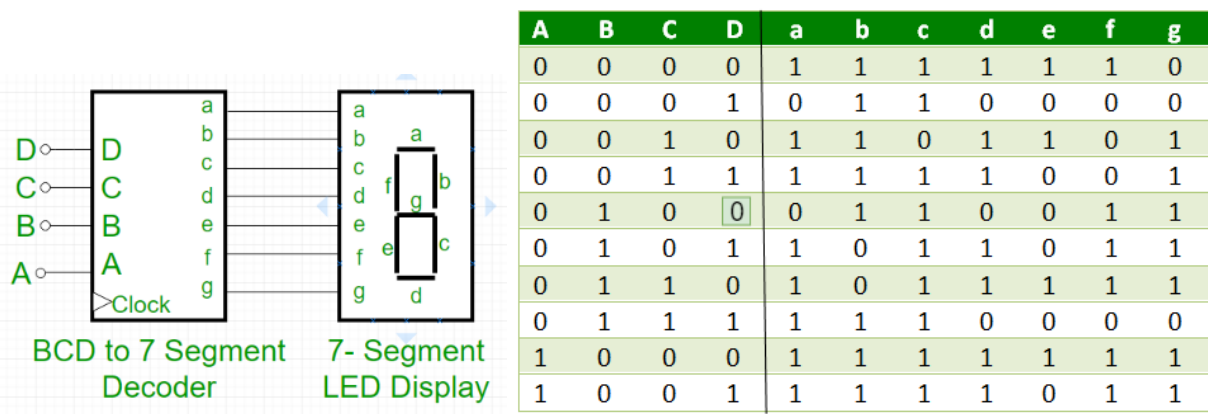
```
/*Header*****  
unsigned short mask(unsigned short num) {  
switch (num) {  
case 0 : return 0x3F;  
case 1 : return 0x06;  
case 2 : return 0x5B;  
case 3 : return 0x4F;  
case 4 : return 0x66;  
case 5 : return 0x6D;  
case 6 : return 0x7D;  
case 7 : return 0x07;  
case 8 : return 0x7F;  
case 9 : return 0x6F;  
}  
}
```

```
/*Header*****  
  
unsigned short mask(unsigned short num);  
unsigned short digit_no, digit10, digit1, digit, i;  
  
void interrupt() {  
    if (digit_no==0) {  
        PORTA = 0; // Turn off both displays  
        PORTD = digit1; // Set mask for displaying ones on  
PORTD  
        PORTA = 1; // Turn on display for ones (LSD)  
        digit_no = 1;  
    } else {  
        PORTA = 0; // Turn off both displays  
        PORTD = digit10; // Set mask for displaying tens on  
PORTD  
        PORTA = 2; // Turn on display for tens (MSD)  
        digit_no = 0;  
    }  
    TMRO = 0; // Reset counter TMRO  
    INTCON = 0x20; // Bit TOIF=0, TOIE=1  
}
```

```
  
void main() {  
    OPTION_REG = 0x80; // Set timer TMRO  
    TMRO = 0;  
    INTCON = 0xA0; // Disable interrupt  
PEIE,INTE,RBIE,TOIE  
    PORTA = 0; // Turn off both displays  
    TRISA = 0; // All port A pins are configured  
as outputs  
    PORTD = 0; // Turn off all display segments  
    TRISD = 0; // All port D pins are configured  
as outputs  
  
    do {  
        for (i = 0; i<=99; i++) { // Count from 0 to 99  
            digit = i % 10u;  
            digit1 = mask(digit); // Prepare mask for displaying ones  
            digit = (char)(i / 10u) % 10u;  
            digit10 = mask(digit); // Prepare mask for displaying tens  
            Delay_ms(1000);  
        }  
    } while (1); // Endless loop  
}
```

Ex 03: Identify Funcnality of the BCD to 7 segment decoder

BCD to seven segment decoder has four input lines (A, B, C and D) and 7 output lines (a, b, c, d, e, f and g), this output is given to seven segment LED display which displays the decimal number depending upon inputs



- Draw a logic diagram of the BCD to 7 segment decoder (After Simpplify)
- Draw a two bit counter circuit using 7447 docoder IC
- Briefly describe advantage of the use of 7447 decoder

Ex 04: Create a Simple BCD to 7 Segment decoder Using MCU

Assume that it is difficult to find (buy) 7447 IC. Therefore you are required to create a MCU that work as a 7447 IC. Use the following steps to complete the above task.

- Identify Functionality of the 7447 using its datasheet.
- Select suitable MCU for this development (Briefly describe your answer)
- Write optimize code for the MCU to make the requirments
- Create a circuit and demonstrate functions of the Create MCU as for the 7447 (Hint: to demonstrate this you can use a circuit diagram as given below)
- If you are going to create a hardware module for this work draw a suitable pin connection diagram
- Create a Simple datasheet to your development

