Embedded C Programming
Laboratory 11
Programs on LCD and Keypad

Task 1:
Write 'SENSE' on the LCD using 8051

```
#include <reg51.h>

void LCD_CMD(unsigned char CMD);
void LCD_DATA(unsigned char DATA);
void DELAY_ms(unsigned char j);

sbit RS= P3^7;
sbit RW= P3^6;
sbit EN= P3^5;

void main()
{
        P2=0x00;                                    //Port used to connect LCD datapins D0-D7
        LCD_CMD(0x01);          //Clear the display screen
        DELAY_ms(5);
        LCD_CMD(0x0E);          //Display on, cursor blinking
        DELAY_ms(5);
        LCD_CMD(0x38);          //2 lines, 5x7 matrix, 8bit mode
        DELAY_ms(5);
        LCD_CMD(0x80);          //Force the cursor to the beginning of the 1st line
        DELAY_ms(5);
        LCD_DATA('S');
        LCD_DATA('E');
        LCD_DATA('N');
        LCD_DATA('S');
        LCD_DATA('E');
        while(1);
}

void LCD_CMD(unsigned char CMD)
{
        P2=CMD;
        RS=0;
        RW=0;
        EN=1;
```

```
        DELAY_ms(5);
        EN=0;
}

void LCD_DATA(unsigned char DATA)
{
        P2=DATA;
        RS=1;
        RW=0;
        EN=1;
        DELAY_ms(5);
        EN=0;
}

void DELAY_ms(unsigned int j)
{
        unsigned int i;
        for(;j>0;j--)
        {
                for(i=250;i>0;i--);
                for(i=250;i>0;i--);
        }
}
```

Task 2:

Write your first name in LCD using 8051

Task 3:

Write 'Welcome to VIT' in first line and 'SENSE' in second line of LCD

```
#include <reg51.h>

void LCD_CMD(unsigned char CMD);
void LCD_DATA(unsigned char DATA);
void DELAY_ms(unsigned char j);

sbit RS= P3^7;
sbit RW= P3^6;
sbit EN= P3^5;

void main()
{
        unsigned char i,message1[]={"Welcome to VIT"};
        unsigned char k,message2[]={"SENSE"};
```

```
        P2=0x00;                                        //Port used to connect LCD
datapins D0-D7
        LCD_CMD(0x01);              //Clear the display screen
        DELAY_ms(5);
        LCD_CMD(0x0E);              //Display on, cursor blinking
        DELAY_ms(5);
        LCD_CMD(0x02);              //4bit mode
        DELAY_ms(5);
        LCD_CMD(0x28);              //2 lines, 5x8 matrix, 4bit mode
        DELAY_ms(5);
        LCD_CMD(0x80);              //Force the cursor to the beginning of the 1st
line
        DELAY_ms(5);
         for(i=0;message1[i]!=0;i++)
  {
    LCD_DATA(message1[i]);
  }
        DELAY_ms(5);
        LCD_CMD(0xC5);              //Force the cursor to the beginning of the 1st
line
        DELAY_ms(5);
         for(k=0;message2[k]!=0;k++)
  {
    LCD_DATA(message2[k]);
  }
        while(1);
}

void LCD_CMD(unsigned char CMD)
{
        P2=(CMD & 0xF0);
        RS=0;
        RW=0;
        EN=1;
        DELAY_ms(5);
        EN=0;

        DELAY_ms(5);
        P2=((CMD<<4) & 0xF0);
        RS=0;
        RW=0;
        EN=1;
        DELAY_ms(5);
        EN=0;
```

```
}

void LCD_DATA(unsigned char DATA)
{
        P2=(DATA & 0xF0);
        RS=1;
        RW=0;
        EN=1;
        DELAY_ms(5);
        EN=0;

        DELAY_ms(5);
        P2=((DATA<<4) & 0xF0);
        RS=1;
        RW=0;
        EN=1;
        DELAY_ms(5);
        EN=0;
}


void DELAY_ms(unsigned int j)
{
        unsigned int i;
        for(;j>0;j--)
        {
                for(i=250;i>0;i--);
                for(i=250;i>0;i--);
        }
}
```

Task 4:

Write 'SENSE' in LCD using Keypad and 8051

```
#include<reg51.h>

#define display_port P2      //Data pins connected to port 2 on microcontroller

sbit rs = P3^7;  //RS pin connected to pin 2 of port 3

sbit rw = P3^6;  // RW pin connected to pin 3 of port 3

sbit e =  P3^5;  //E pin connected to pin 4 of port 3
```

```
sbit C4 = P0^3;     // Connecting keypad to Port 1

sbit C3 = P0^2;

sbit C2 = P0^1;

sbit C1 = P0^0;

sbit R4 = P1^3;

sbit R3 = P1^2;

sbit R2 = P1^1;

sbit R1 = P1^0;


void msdelay(unsigned int time)  // Function for creating delay in milliseconds.

{

   unsigned i,j ;

   for(i=0;i<time;i++)

   for(j=0;j<1275;j++);

}

void lcd_cmd(unsigned char command)  //Function to send command instruction to
LCD

{

   display_port = command;

   rs= 0;

   rw=0;

   e=1;

   msdelay(1);
```

```
    e=0;
}

void lcd_data(unsigned char disp_data)  //Function to send display data to LCD
{
    display_port = disp_data;
    rs= 1;
    rw=0;
    e=1;
    msdelay(1);
    e=0;
}
void lcdstring(char *str)
{
    while(*str)
    {
        lcd_data(*str);
        str++;
    }
}
 void lcd_init()    //Function to prepare the LCD  and get it ready
{
    lcd_cmd(0x38);  // for using 2 lines and 5X7 matrix of LCD
```

```
   msdelay(10);
   lcd_cmd(0x0F);  // turn display ON, cursor blinking
   msdelay(10);
   lcd_cmd(0x01);  //clear screen
   msdelay(10);
   lcd_cmd(0x80);  // bring cursor to position 1 of line 1
   msdelay(10);
}

void row_finder1() //Function for finding the row for column 1
{
R1=R2=R3=R4=1;
C1=C2=C3=C4=0;

if(R1==0)
lcd_data('0');
if(R2==0)
lcd_data('4');
if(R3==0)
lcd_data('8');
if(R4==0)
lcd_data('C');
}
```

```
void row_finder2() //Function for finding the row for column 2

{

R1=R2=R3=R4=1;

C1=C2=C3=C4=0;


if(R1==0)

lcd_data('1');

if(R2==0)

lcd_data('5');

if(R3==0)

lcd_data('9');

if(R4==0)

lcd_data('D');

}


void row_finder3() //Function for finding the row for column 3

{

R1=R2=R3=R4=1;

C1=C2=C3=C4=0;


if(R1==0)

lcd_data('2');

if(R2==0)
```

```
lcd_data('6');
if(R3==0)
lcd_data('A');
if(R4==0)
lcd_data('E');
}

void row_finder4() //Function for finding the row for column 4
{
R1=R2=R3=R4=1;
C1=C2=C3=C4=0;

if(R1==0)
lcd_data('3');
if(R2==0)
lcd_data('7');
if(R3==0)
lcd_data('B');
if(R4==0)
lcd_data('F');
}

void main()
```

```
{

 lcd_init();
          lcdstring("Please press key");
          lcd_cmd(0xC0);

   while(1)

   {

      msdelay(30);

      C1=C2=C3=C4=1;

       R1=R2=R3=R4=0;

       if(C1==0)

       row_finder1();

       else if(C2==0)

        row_finder2();

        else if(C3==0)

      row_finder3();

      else if(C4==0)

      row_finder4();

   }

}
```