Name : Patil Suraj shantaram.

Class : Sybcs   Roll No. :   Batch :

Experiment No. :   Performed Date :   /   /20

Title of Experiment : LCD Interface.

REMARKS

- **Aim :-** To study LCD interfacing with 8051 microcontroller.

- **Software :-** keil.

- **Apparatus :-** SST 89x516RD2 microcontroller board, LCD module.

- **Theory :-**

   Pin description for LCD :

   VSS : Ground

   VCC : +5V power supply

   RS :- select Register

       RS = 0 selects command register.

       RS = 1 selects data register.

   R/W : R/W = 0 for write

       R/W = 1 for read

   E : Enable pin

       E high to low for write.

       E low to high for read.

   DB0 ---- DB7 : Data lines

<u>Circuit Diagram :-</u>

Vcc

8051 μC

40

P3.0 → D0
P3.1 → D1
P3.2 → D2
P3.3 → D3
P3.4 → D4
P3.5 → D5
P3.6 → D6
P3.7 → D7

LCD

Vcc
VEE →
VSS

P2.7   P2.6

RS   R/W̄   E
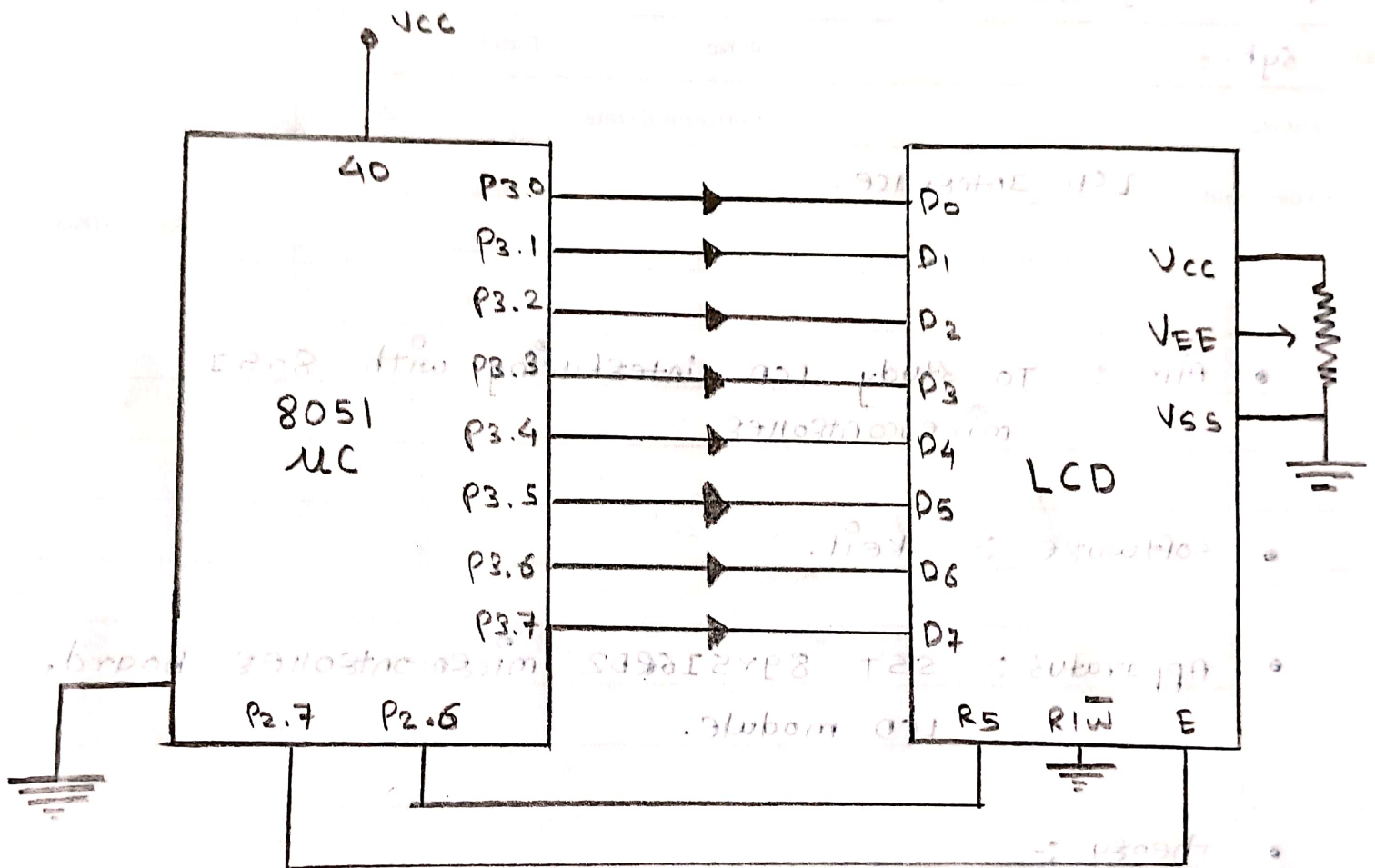
- LCD command codes :-

code (hex)	command to LCD instruction Register.
1.	clear display screen.
2.	return home.
4.	shift cursor to left
5	shift display right
6	shift cursor to right
7	shift display left
8	display off, cursor off
A	display off, cursor on.
C	display on, cursor off.
E	display on, cursor blinking.
F	display on, cursor blinking.
10	shift cursor position to left.
14	shift cursor position to right.
18	shift the entire display to the left.
1C	shift the entire display to right.
80	force cursor to beginning of 1st line.
C0	force cursor to beginning of 2nd line.
38	2 lines and 5x7 matrix.

- Algorithm :-
1. start.
2. initialize the command array.
3. initialize the data array.
4. Read all the elements of command array.
5. copy the command to the P3.
6. initialize RS=0, give high to low pulse to Enable.

7. Read all the elements of data array.
8. copy the data to the P3.
9. initialize RS=1, give high to low pulse to Enable.
10. Repeat from step 4.

- Steps for programming :-
- intializing LCD
  - To initialize LCD to the 8051 the following instruction and commands are to be embed in to the function.
  - 0x38 is used for 8-bit data initialization.
  - 0x0e for making LCD display on and cursor blinking.
  - 0x01 for clearing the display of the LCD,
  - 0x06 for shift cursor to eight.
  - 0x84 for positioning the cursor at fifth position of first line.

- sending commands to the LCD.
  - E=1; enable pin should be high.
  - RS=0, Register select should be low for sending commands.
  - placing the command on the command registers.
  - R/w=0; Read/write pin should be low for writing the data.

- welting the data to the LCD.
  - E=1; enable pin should be high.
  - RS=1; Register select should be high for writing data.
  - placing the data on the data registers
  - Rlw=0; Read/write pin should be low for writing the data.

Program :-

```c
#include <reg51.h>
const unsigned char cmdword[5] = {0x38, 0x0e, 0x01, 0x06, 0x84};
const unsigned char dat[5] = {'H', 'E', 'L', 'L', 'O'};
int i;
void delay_ms (unsigned int);
void main()
{
    while (1)
    {
        for (i=0; i<=4; i++)
        {
            P3 = cmdword[i];
            P2 = 0x80;
            delay_ms (255);
            P2 = 0x00;
        }
        for (i=0; i<=4; i++)
        {
            P3 = dat[i];
            P2 = 0xc0;
            delay_ms(255);
            P2 = 0x40;
        }
    }
}
void delay_ms (unsigned int ms)
{
    unsigned int j, k;
    for (j=0; j<ms; j++)
```

```
{
    for(k=0; k<255; k++);
}
}
```

- Result :- string displayed : "HELLO".

- conclusion :-
i) LCD can be interfaced to 8051 using I/O parts.
ii) The data bus of LCD is connected to the part of 8051.
iii) control bit RIS, RIW and E are connected to 3 parts bits of P1 of 8051.
iv) for giving command RIS condition for selecting command Register RS=0, RIW=0, E=⎍
v) for selecting data Register RS.
RS=1, RIW=0, E=⎍