

EEE316 MICROPROCESSORS

PRE-LABORATORY REPORT

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OBJECTIVES OF THE LABORATORY ASSIGNMENT:

Objectives of this lab are embedded programming with C language, getting familiar with parallel ports, and to understand how to use four 7 segment display.

CODE AND COMMENTS:

1.

```
#include <xc.h>

/**Define the signal pins of all four displays**//
#define s1 PORTAbits.RA0
#define s2 PORTAbits.RA1
#define s3 PORTAbits.RA2
#define s4 PORTAbits.RA3
/**End of definition**//

void main()
{
    unsigned int a,b,c,d,e,f; //just variables
    unsigned int g = 0; //1st digit is saved here
    int i = 0; //the 4-digit value that is to be displayed
    int flag = 0; //for creating small delay

    unsigned int seg[]={0X3F, //Hex value to display the number 0
                        0X06, //Hex value to display the number 1
                        0X5B, //Hex value to display the number 2
                        0X4F, //Hex value to display the number 3
                        0X66, //Hex value to display the number 4
                        0X6D, //Hex value to display the number 5
                        0X7C, //Hex value to display the number 6
                        0X07, //Hex value to display the number 7
                        0X7F, //Hex value to display the number 8
                        0X6F, //Hex value to display the number 9
                        }; //End of Array for displaying numbers from 0 to 9

    /****I/O Configuration**//
    TRISB=0X00;
    PORTB=0X00;
    TRISA=0x00;
    PORTA=0X00;
    /**End of I/O configuration**//

    #define _XTAL_FREQ 20000000
```

```

while(1)
{
    /***Splitting "i" into four digits***/
a=i%10; //4th digit is saved here
b=i/10;
c=b%10; //3rd digit is saved here
d=b/10;
e=d%10; //2nd digit is saved here
f=d/10;
/***End of splitting***/

if (seg[e] == 0X7C ) // If command for increment 1st digit when second is 60.

{
    i=0; // reset all
    g=g+1; // increment
}

PORTB=seg[g];s1=1; //Turn ON display 1 and print 4th digit
__delay_ms(1);s1=0; //Turn OFF display 1 after 2ms delay
PORTB=seg[e];s2=1; //Turn ON display 2 and print 3rd digit
__delay_ms(2);s2=0; //Turn OFF display 2 after 2ms delay
PORTB=seg[c];s3=1; //Turn ON display 3 and print 2nd digit
__delay_ms(2);s3=0; //Turn OFF display 3 after 2ms delay
PORTB=seg[a];s4=1; //Turn ON display 4 and print 1st digit
__delay_ms(2);s4=0; //Turn OFF display 4 after 2ms delay


if(flag>=1) //wait till flag reaches 1
{
    i++;flag=0; //only if flag is one "i" will be incremented
}
flag++; //increment flag for each flash
}
}

```

2.

```
#include <xc.h>
/**Define the signal pins of all four displays**//
#define s1 PORTAbits.RA0
#define s2 PORTAbits.RA1
#define s3 PORTAbits.RA2
#define s4 PORTAbits.RA3
/**End of definition**//
void main()
{
int a=0;
static char flow;
unsigned int
seg[]={0X78,0X3E,0X7B,0X76,0X77,0X54,0x00,0X39,0X77,0X54,0x00,0X7A,0X77,0X7B,0X3D,
0X30,0X54,0x00,0x06,0x6D,0x3F,0X66,0X3F,0X4F,0X3F,0X3F,0X6D,0X00,
}; //End of Array for displaying Name,Surname,Number
/**I/O Configuration**//
TRISB=0X00;
PORTB=0X00;
TRISA=0x00;
PORTA=0X00;
/**End of I/O configuration**//
#define _XTAL_FREQ 20000000
while(1) // infinite loop
{
    turhan: // when the process is done, it will come here and start again
    flow=0; // f=0
if (flow == 0) // Start
{
    for (int i = 0; i<25; ++i) // for loop to wait a little while
    {
        s1= 1; // RA0=1
        PORTB=seg[0]; // Write "T" to the 1st digit
        __delay_ms(2); // very small delay
        s1=0; // RA0=0
        s2=1; // RA1=1
        PORTB=seg[1]; // Write "U" to the 2nd digit
        __delay_ms(2); // very small delay
        s2=0; // RA1=0
        s3=1; // RA2=1
        PORTB=seg[2]; // Write "R" to the 3th digit
        __delay_ms(2); // very small delay
        s3=0; // RA2=0
        s4=1; // RA3=1
        PORTB=seg[3]; // Write "H" to the 3th digit
        __delay_ms(2); // very small delay
        s4=0; // RA3=0
    }
    flow = 1;
}
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if (flow == 1)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[1];           // Write "U" to the 1st digit
        __delay_ms(2);          // very small delay
        s1=0;
        s2=1;
        PORTB=seg[2];           // Write "R" to the 1st digit
        __delay_ms(2);          // very small delay
        s2=0;
        s3=1;
        PORTB=seg[3];           // Write "H" to the 1st digit
        __delay_ms(2);          // very small delay
        s3=0;
        s4=1;
        PORTB=seg[4];           // Write "A" to the 1st digit
        __delay_ms(2);          // very small delay
        s4=0;
    }
    flow=2;
}

if (flow == 2)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[2];           // Write "R" to the 1st digit
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[3];           // Write "H" to the 1st digit
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[4];           // Write "A" to the 1st digit
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[5];           // Write "N" to the 1st digit
        __delay_ms(2);
        s4=0;
    }
    flow=3;
}

if (flow == 3)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[3];           // Write "H" to the 1st digit
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[4];           // Write "A" to the 1st digit
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[5];           // Write "N" to the 1st digit
        __delay_ms(2);
    }
}

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s3=0;
    s4=1;
    PORTB=seg[6];           // Write " " to the 1st digit
    __delay_ms(2);
    s4=0;
}
    flow=4;
}

if (flow == 4)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[4];       // Write "A" to the 1st digit
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[5];       // Write "N" to the 1st digit
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[6];       // Write " " to the 1st digit
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[7];       // Write "C" to the 1st digit
        __delay_ms(2);
        s4=0;
    }
    flow=5;
}

if (flow == 5)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[5];       // Write "N" to the 1st digit
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[6];       // Write " " to the 1st digit
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[7];       // Write "C" to the 1st digit
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[8];       // Write "A" to the 1st digit
        __delay_ms(2);
        s4=0;
    }
    flow=6;
}

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if (flow == 6)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[6];           // Write " " to the 1st digit
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[7];           // Write "C" to the 1st digit
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[8];           // Write "A" to the 1st digit
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[9];           // Write "N" to the 1st digit
        __delay_ms(2);
        s4=0;
    }
    flow=7;
}

if (flow == 7)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[7];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[8];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[9];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[10];
        __delay_ms(2);
        s4=0;
    }
    flow=8;
}

if (flow == 8)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[8];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[9];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[10];
        __delay_ms(2);
    }
}

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s3=0;
    s4=1;
    PORTB=seg[11];
    __delay_ms(2);
    s4=0;
}
    flow=9;
}
if (flow == 9)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[9];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[10];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[11];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[12];
        __delay_ms(2);
        s4=0;
    }
    flow=10;
}
if (flow == 10)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[10];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[11];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[12];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[13];
        __delay_ms(2);
        s4=0;
    }
    flow=11;
}

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if (flow == 11)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[11];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[12];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[13];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[14];
        __delay_ms(2);
        s4=0;
    }
    flow=12;
}

if (flow == 12)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[12];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[13];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[14];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[15];
        __delay_ms(2);
        s4=0;
    }
    flow=13;
}

if (flow == 13)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[13];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[14];
        __delay_ms(2);
        s2=0;
        s3=1;
    }
}

```



```

PORTB=seg[15];
    __delay_ms(2);
    s3=0;
    s4=1;
    PORTB=seg[16];
    __delay_ms(2);
    s4=0;
}

    flow=14;
}

if (flow == 14)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[14];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[15];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[16];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[17];
        __delay_ms(2);
        s4=0;
    }

    flow=15;
}

if (flow == 15)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[15];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[16];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[17];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[18];
        __delay_ms(2);
        s4=0;
    }

    flow=16;
}

```

```

if (flow == 16)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[16];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[17];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[18];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[19];
        __delay_ms(2);
        s4=0;
    }
    flow=17;
}

if (flow == 17)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[17];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[18];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[19];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[20];
        __delay_ms(2);
        s4=0;
    }
    flow=18;
}

if (flow == 18)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[18];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[19];
        __delay_ms(2);
        s2=0;
        s3=1;
    }
}

```

```

PORTB=seg[20];
    __delay_ms(2);
    s3=0;
    s4=1;
    PORTB=seg[21];
    __delay_ms(2);
    s4=0;
}

    flow=19;
}

if (flow == 19)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[19];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[20];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[21];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[22];
        __delay_ms(2);
        s4=0;
    }

    flow=20;
}

if (flow == 20)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[20];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[21];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[22];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[23];
        __delay_ms(2);
        s4=0;
    }

    flow=21;
}

```

```

if (flow == 21)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[21];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[22];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[23];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[24];
        __delay_ms(2);
        s4=0;
    }
    flow=22;
}
if (flow == 22)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[22];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[23];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[24];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[25];
        __delay_ms(2);
        s4=0;
    }
    flow=23;
}
if (flow == 23)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[23];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[24];
        __delay_ms(2);
        s2=0;
        s3=1;
    }
}

```

```

PORTB=seg[25];
    __delay_ms(2);
    s3=0;
    s4=1;
    PORTB=seg[26];
    __delay_ms(2);
    s4=0;
}

    flow=24;
}
if (flow == 24)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[24];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[25];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[26];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[27];
        __delay_ms(2);
        s4=0;
    }

    flow = 25;
}
if (flow == 25)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[25];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[26];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[27];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[27];
        __delay_ms(2);
        s4=0;
    }

    flow = 26;
}

```

```

if (flow == 26)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[26];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[27];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[27];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[27];
        __delay_ms(2);
        s4=0;
    }
    flow = 27;
}

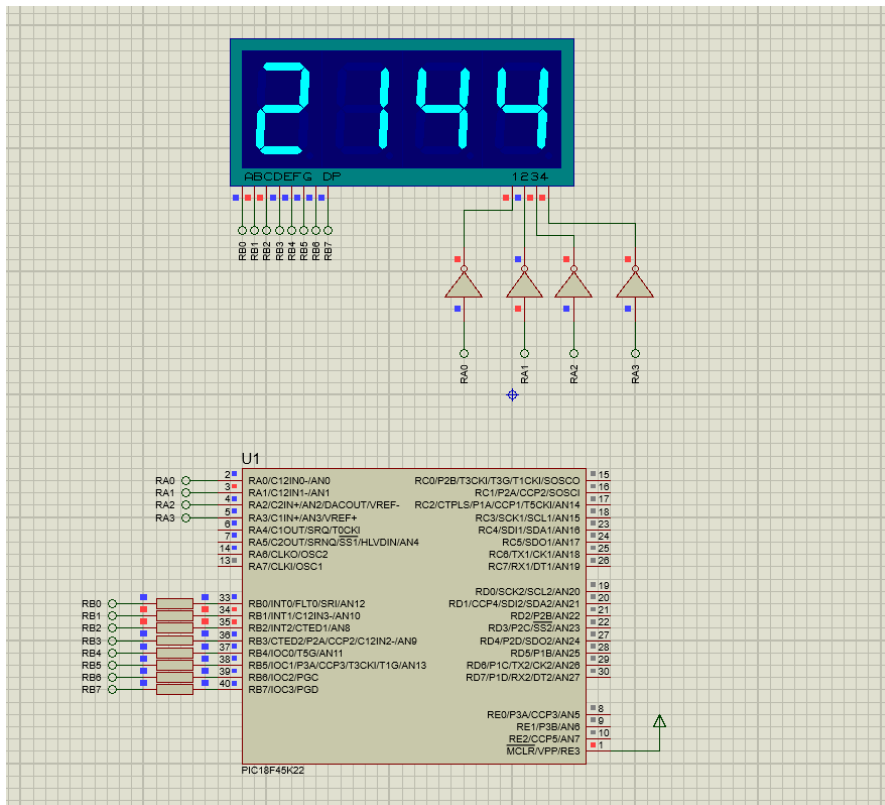
    if (flow == 27)
{
    for (int i = 0; i<25; ++i)
    {
        s1= 1;
        PORTB=seg[27];
        __delay_ms(2);
        s1=0;
        s2=1;
        PORTB=seg[27];
        __delay_ms(2);
        s2=0;
        s3=1;
        PORTB=seg[27];
        __delay_ms(2);
        s3=0;
        s4=1;
        PORTB=seg[27];
        __delay_ms(2);
        s4=0;
    }
    flow = 27;
}
if (flow==27) // if command to start from the beginning
{
    goto turhan; // go to starting point of the while(1) loop
}
}
}

```

EXPLANATIONS:

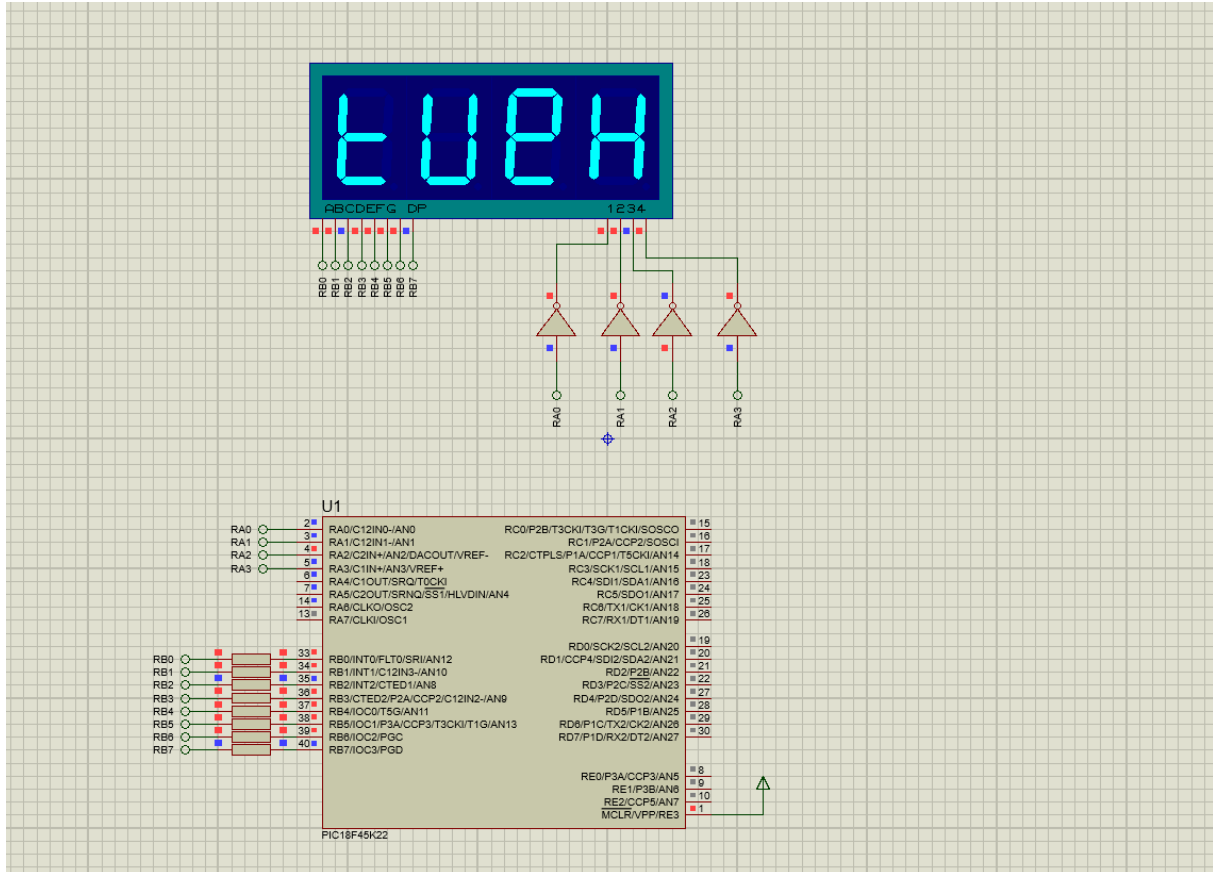
QUESTION-1:

The aim of the question is design a chronometer in C programming language by using Mplab consisting of three fields to show minute, second and tenth of a second like in figure below.



QUESTION-2 :

The aim of the question is to write a scrolling text application in C programming language by using Mplab which shows your name, surname, student number by moving the letters or numbers four 7-segment like in figure below.



Note:

This document will be prepared before the lab session. Unless you bring this document in the desired format or prepared, you will not be let to the session.