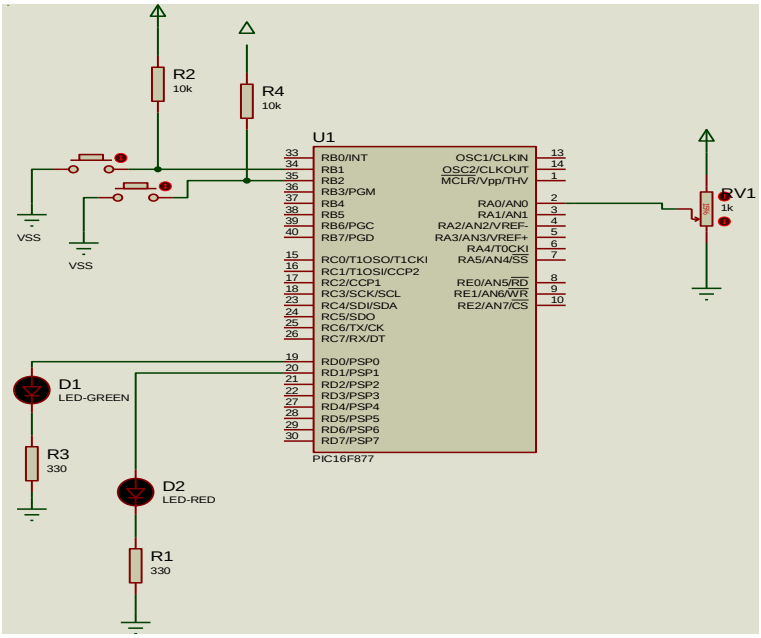
EXPERIMENT 2

LEARNING TO USE BUTTON, LCD and ANALOG INPUT

Purpose : To learn how to use push button in active HIGH and active LOW states, how to connect LCD control and data lines to the PIC 16F877 microcontroller, how to acquire a variable analog voltage by the microcontroller and how to display this value on the LCD display using Proteus Circuit Simulator, MikroC pro for PIC software and the EXPKITS development kit.

Experiments using Buttons and Analog Input:

1) Draw the following circuit diagram using the Proteus Simulator (Push Buttons in active LOW state)



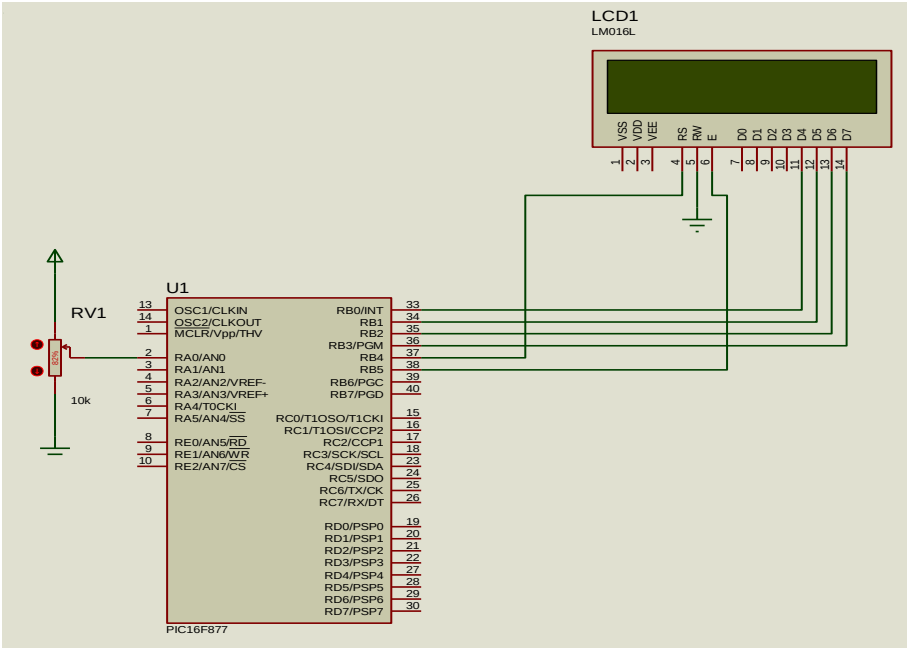
2) Write the following code using the MikroC software and compile it to obtain the hex code.

```
unsigned int value;
void main(){
 TRISB=0x06;              // Define B1 and B2 as inputs for the buttons
 TRISD=0x06;              // Define all pins of port D as outputs for the LEDS
 PORTD = 0;               //  Turn off LEDS  at the initial state
 //OPTION_REG.F7 = 0;       //Enable Pull-up Resistor  property of PORTB
 while(1){
 if (Button(&PORTB, 2, 1, 0))RD0_bit  = 0;        //if Button2 is pressed, turn OFF LED1
 if (Button(&PORTB, 1, 1, 0))RD0_bit  = 1;        // if Button1 is pressed, turn ON LED1
 value = ADC_Read(0);           // Read the pot value and save it in the variable value
 if(value > 500)RD1_bit = 1;      // if the value  > 500, turn ON LED2
 else RD1_bit  = 0;               // if the value  < 500, turn OFF LED2
   }
}
```

3) Download the hex code to the Pic 16F877 microcontroller and perform
4) Repeat the above procedure using the internal pull up property of the Pic 16F877 microcontroller
5) Repeat the above procedure for the active HIGH state buttons

Experiments using the LCD and the Analog Input:

1) Repeat the above procedure for the circuit given below




```
// LCD module connections  Define the connections between the LCD and PIC terminals
sbit LCD_RS at RB4_bit;
sbit LCD_EN at RB5_bit;
sbit LCD_D4 at RB0_bit;
sbit LCD_D5 at RB1_bit;
sbit LCD_D6 at RB2_bit;
sbit LCD_D7 at RB3_bit;

sbit LCD_RS_Direction at TRISB4_bit;
sbit LCD_EN_Direction at TRISB5_bit;
sbit LCD_D4_Direction at TRISB0_bit;
sbit LCD_D5_Direction at TRISB1_bit;
sbit LCD_D6_Direction at TRISB2_bit;
sbit LCD_D7_Direction at TRISB3_bit;

char txt1[] = "Analog Value";   // Define a string variable to be displayed on the LCD
char text[7];                   // Define a text array to store the analog value to be displayed on LCD
unsigned int temp_res;

void main(){
  Lcd_Init();                   // Initialize LCD
  while(1){
  temp_res = ADC_Read(0);       // Readthe analog pot voltage at AN0 input and save it in temp_res
  IntToStr(temp_res, text);     // convert the integer variable to string to display on the LCD
  Lcd_Out(1,1,txt1);            // Write text in first row, from the second column
  Lcd_Out(2,5,text);            // Write text in second row, starting from the first column
  Delay_ms(100);
    }
}
```

Each student should write a conclusion explaining:

1) What they have learned from this experimental procedure
2) Problems faced durin the experiments and how they were solved
3) In which applications they can use these properties of the PIC microcontrollers, buttons and the LCD.