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LEROTHOLI POLYTECHNIC

SCHOOL OF ENGINEERING AND TECHNOLOGY

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Program:	**B.ENG.TECH COMPUTER ENGINEERING**
Subject Name:	**Microcontroller Systems 1**
Subject Code:	**MCSY22107**
Assignment Number:	**4**

Due Date:	**1**	**5**	**0**	**4**	**2**	**0**	**2**	**4**

Lecturer:	**Mr. T.P Raliete**

Declaration of own work

I hereby declare that this assignment is my own work and that it has not been copied from any other person or document.

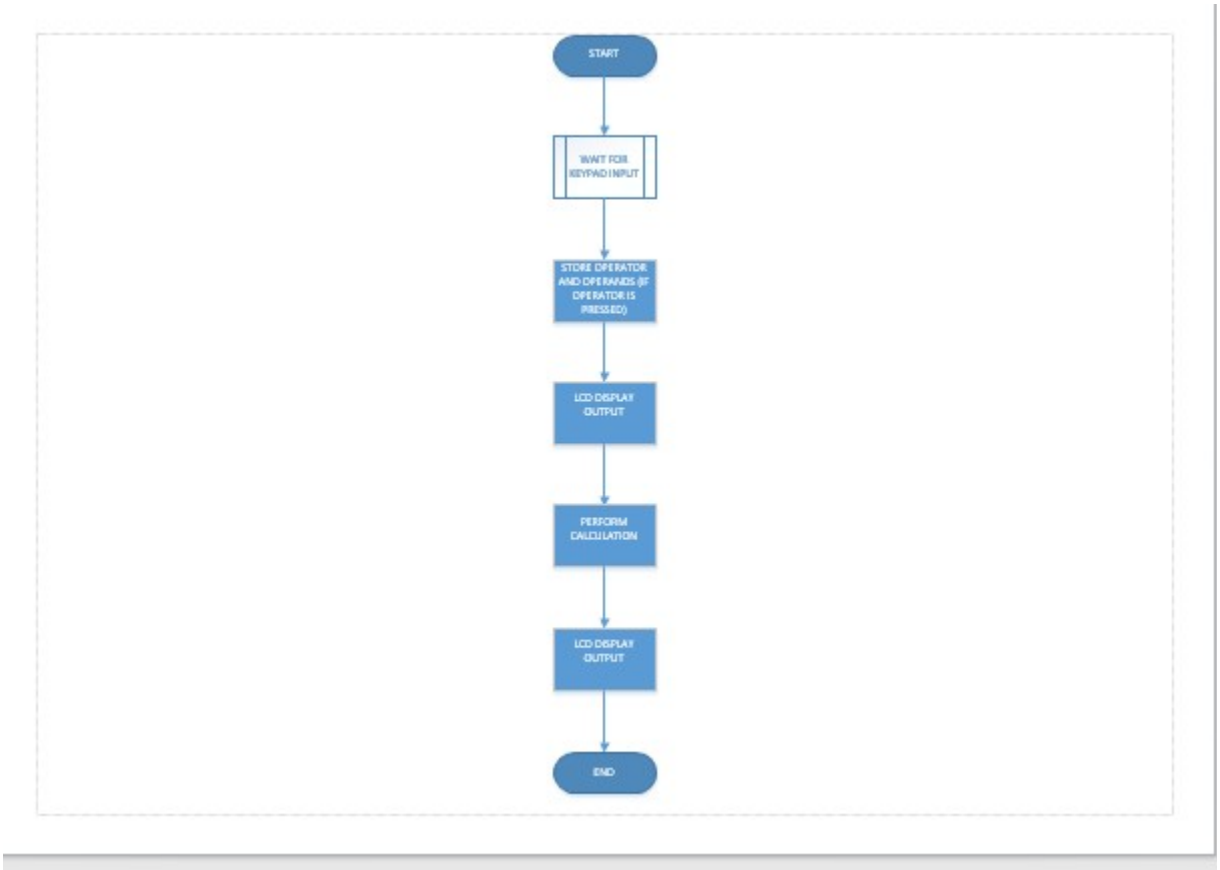
...T.Potloane..... ....15/04/24.....

signature date

TRUTH TABLE

Operand 1	Operator	Operand 2	Result
00-99	+	00-99	00-99
00-99	-	00-99	00-99
00-99	*	00-99	00-99
00-99	/	00-99	00-99

FLOW CHART



THE CODE

```
unsigned short kp;
char oldstate = 0;
int cnt = 0;
char txt[13] = {'\0','\0','\0','\0','\0','\0','\0','\0','\0','\0','\0','\0','\0'};

// Keypad module connections
char keypadPort at PORTD;
// End Keypad module connections
```

```
// LCD module connections
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;
// End LCD module connections

int keyPad() {
   // Wait for key to be pressed and released
   do {
      kp = Keypad_Key_Click(); // Store key code in kp variable
   } while (!kp);

   // Prepare value for output, transform key to its ASCII value
   switch (kp) {
      case  1: return 49; break; // 1
      case  2: return 50; break; // 2
      case  3: return 51; break; // 3
```

```
        case  4: return 65; break; // A
        case  5: return 52; break; // 4
        case  6: return 53; break; // 5
        case  7: return 54; break; // 6
        case  8: return 66; break; // B
        case  9: return 55; break; // 7
        case 10: return 56; break; // 8
        case 11: return 57; break; // 9
        case 12: return 67; break; // C
        case 13: return 42; break; // *
        case 14: return 48; break; // 0
        case 15: return 35; break; // #
        case 16: return 68; break; // D
    }
}
    char key;
    char input[4] = {0}; // Maximum 3 digits for input plus '\0'
    int num1 = 0, num2 = 0, result = 0;
    char operatorr = 0;
    int input_length = 0;


void main() {
    ANSEL  = 0;                         // Configure AN pins as digital I/O
    ANSELH = 0;

    Keypad_Init();
```

```
LCD_Init();
Lcd_Cmd(_LCD_CLEAR);                    // Clear display
Lcd_Cmd(_LCD_CURSOR_OFF);               // Cursor off
//LCD_OUT(1,1,"Calculator");
delay_ms(500);

while (1) {
   key = Keypad_Key_Click();

   if (key) {
      if (key >= '0' && key <= '9') {
         // Append digit to input string
         if (input_length < 3) {
            input[input_length++] = key;
            LCD_Chr(1, input_length, key);
         }
      } else if (key == '+' || key == '-' || key == '*' || key == '/') {
         // Store first number and operator
         int i;
         for (i = 0; i < input_length; i++) {
            num1 = num1 * 10 + (input[i] - '0');
         }
         operatorr = key;
         LCD_Chr(2, 1, key);
         LCD_Chr(2, 2, ' ');
         LCD_Chr(2, 3, ' ');
         LCD_Chr(2, 4, ' ');
```

```
    input_length = 0; // Clear input
} else if (key == '=') {
    // Perform calculation

    // Convert the hundreds digit (if present)
    if (input[0] >= '0' && input[0] <= '9') {
        num2 += (input[0] - '0') * 100;
    }

    // Convert the tens digit (if present)
    if (input[1] >= '0' && input[1] <= '9') {
        num2 += (input[1] - '0') * 10;
    }

    // Convert the units digit
    if (input[2] >= '0' && input[2] <= '9') {
        num2 += (input[2] - '0');
    }

    LCD_Chr(2, 4, '=');
    switch (operatorr) {
        case '+':
            result = num1 + num2;
            break;
        case '-':
            result = num1 - num2;
            break;
```

```
                case '*':
                    result = num1 * num2;
                    break;
                case '/':
                    result = (num2 != 0) ? num1 / num2 : 0; // Handle division by zero
                    break;
            }

            // Extract individual digits from result and store them in the input array
            input[0] = '0' + (result / 100);       // Hundreds digit
            input[1] = '0' + ((result / 10) % 10);  // Tens digit
            input[2] = '0' + (result % 10);         // Units digit
            input[3] = '\0'; // Null-terminate the input array

            LCD_Out(2, 6, input);
        } else if (key == 'C') {
            // Clear input and reset variables
            input[0] = input[1] = input[2] = input[3] = '\0'; // Clear all elements of the input array
// Clear the contents of the input array
            num1 = num2 = result = 0;
            operatorr = 0;
            LCD_Cmd(_LCD_CLEAR);
        }
    }
  }
}
```

SIMULATION CIRCUIT