LITHION POWER
ASSIGNMENT

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AIM: To measure 0 to 100Vdc using microcontroller

Algorithm:

1)Read the voltage from the analog input pin using the ADC.

2)Scale the voltage to the range 0 to 100Vdc using a voltage divider.

3)Convert the scaled voltage to a digital value using the ADC.

4)Display the digital value on an LCD or other display device.

Flowchart:

Start → Read voltage from analog input pin → Scale voltage to 0 to 100Vdc range → Convert scaled voltage to digital value → Display digital value on LCD or other display device →End.

Program:

```
#include<lpc214x.h>
void adcinit(void){
PINSEL1 |=0x01000000;
AD0CR = 0x00200402;
}
void uartinit(void){
PINSEL0 |= 0x00000005;
U1LCR = 0x83;
U1DLL = 97;
U1DLM = 0;
U1LCR = 0x03;
}
int main(){
int data,val;
float voltage;
adcinit();
uartinit();
```

```
while(1){
while(!(U1LSR & 0x01));
data = U1RBR;
if(data == 'A'){
AD0CR |= 0x01000000;
while(!(AD0GDR & 0x80000000));
val = (AD0GDR >> 6) & 0x3FF;
voltage = ((float)val / 1023.0)*100.0;
U1THR = (int)voltage;
while(!(U1LSR & 0x20));
}
}
```

Theoretical accuracy:

To calculate the achievable theoretical accuracy, we'll consider the parameters provided:

1. ADC Resolution (N): 10 bits (meaning 1024 possible digital values).

2. Reference Voltage (Vref): 3.3V.

3. Input Voltage Range (Vin): 0 to 100V.

Step 1: Calculate the Step Size (ΔV):

The step size is the smallest voltage difference that the ADC can distinguish. It is determined by the resolution of the ADC and the reference voltage.

$$\Delta V = V_{ref}/2^N = 3.3V/1024 \approx 0.00322V$$

Step 2: Calculate Accuracy in Percent:

Accuracy is defined as the maximum error in the measurement as a percentage of the full-scale input range.

$$Accuracy(\%) = (\Delta V / Vin_{max}) \times 100 = 0.00322V/100V \times 100 \approx 0.00322\%$$

The achievable theoretical accuracy for this system is approximately 0.00322%. This means that under ideal conditions, the measurement could have an error of up to 0.00322% of the full-scale input range (0 to 100V).