Aim of the Experiment:

The aim of experiment is to provide a basic knowledge and hands on experience on PC based Instrumentation. In this experiment a setup is made with a temperature controlled oven and temperature sensor to measure the temperature of the oven and Interfacing the Sensor with the PC.

Apparatus required:

1. Temperature Sensor(LM35)
2. Glass Thermometer
3. TRIAC based Lamp dimmer
4. Metallic OVEN
5. ATMEGA 328P microcontroller Board(Arduino UNO)
6. Computer With LabVIEW
7. USB Cable

Principle Of Design:

1. A electric Lamp is used to heat an aluminium chamber using the Triac based dimmer.
2. A LM35 temperature sensor is used to sense the temperature of the chamber. The sensor is calibrated for 10mV/ Deg C
3. The microcontroller ATMEGA 324P has 6 ADC ports, One of these analog ports are used for converting analog output of temperature sensor in to digital. The in built ADC is of 10 bits. The ADC has 0-1023 count. And ADC reference voltage is 5volt.
4. The microcontroller is an open source firmware and having a open source IDE for writing program. We are using Arduino IDE to Write a program using C language.
5. The algorithm is designed here to read the temperature sensor and send it to the PC using the principle serial communication.
6. The serial ports of PC and Microcontroller are configured with 9600 baud rate, 8 bit data and 1 stop bit and no parity at both sides i.e. PC and microcontroller.

Procedure:

1. First switch ON the power plug of Heat Furnace and observe the heat produced in the furnace with the help of thermometer (0°- 200°F) which is provided in the heat furnace itself. We can increase / decrease the heat of the furnace with the help of the POT which is provided on the heat furnace itself.
2. Then connect the output of the Temperature sensor (LM35) to the analog port (A0) of the Arduino uno Board and then connect sensor Vcc to the Arduino Vcc and similarly for the Gnd also.
3. Then connect the USB cable of Uno Board to the Com. Serial Port of PC.
4. Then upload the Temperature sensing program (Analog Read) to the Arduino Uno board.
5. Then open serial monitor window of that Arduino software and observe the Temperature data and compare with the Thermometer reading.

The Code for the microcontroller is as follows:

```
int sensorPin = A0;
long int sensorValue = 0;
int ledPin =13;

void setup() {
  Serial.begin(9600);
   pinMode(ledPin, OUTPUT);
}

void loop() {
digitalWrite(ledPin, HIGH);
sensorValue =analogRead(A0);
long int x= ((sensorValue*5000)/1023);
float y = (x*1.8+32);
Serial.println(y);
delay(1000);
digitalWrite(ledPin, LOW);
delay (1000);
}
```

6. Then open LabVIEW software and monitor the Temperature value and as well as Thermometer value.

timeout (10sec)
10000

VISA resource name
I/O

baud rate
U32

data bits
U16

parity
U16

stop bits
U16

flow control
U16

read buffer
abc

byte count
1.23
U32

return count
1.23
U32

stop
STOP
TF

i

BLOCK DIAGRAME

VISA resource name

COM1

baud rate   byte count
9600   0

data bits
8

parity
None

stop bits
1.0   stop
                   STOP
flow control
None

Temperature

return count
0

Front Panel

7. Then note the tabulation between sensor value & Thermometer value

Tabulation:

SI No.	Sensor Value	Thermometer Value