**HW 1 Code**

**Graphical user interface, text, application, letter, email

Description automatically generated**

Answer 1) resolution = 3.30/2^8 = 12.89mV/unit

Answer 2)

import PCF8591 as ADC

import time

ADC.setup (0x48) #setup I2C of PCF8591

while True:

pressure\_units=ADC.read(1) #read ADC units at ch1

pressure\_volts=(ADC\_units\*3.3)/256 # resolution = 3.30/2^8 = 12.89mV/unit

pressure\_pa = pressure\_volts/0.02 # calcualte pressure in KPa

print("pressure at channel 1 is **%2.2f** KPa" %(pressure\_pa) #display pressure in KPa

Answer 3)

1. Inaccuracy of the sensors
2. Error from sensor overheating which may affect the readings
3. Resolution of the chip is 8 bits only so it is a low resolution
4. Unstable voltage supply
5. Human error

Answer 4) Maximum pressure = (3.3V \* 1KPa )/ 20mV = 165 KPa

AN1 = V -> ADC1

AN2 = V -> ADC2

Dff = Final ADC

2.5\*Final\_ADC

Volt

Answer 5)

Voltage read from the sensor = (20 kPa \* 20mV) / 1KPa = 0.4V

ADC code read = 0.4V \* 256 / 3.3V = 31 units

Final ADC code = 31 \* 6.4 = 198

Output voltage written to output = (198 \* 3.3) / 256 = 2.55V

Answer 6)

Calculations for ANI:

voltage read at channel AN1 = 50kpa \* 20mV/1kpa = 1 V

ADC code for AN1 = 1 \* 256 / 3.3 = 77

Voltage read at channel AN3 = 50kpa\* 8.5mV/1kpa = 0.425

ADC code for AN3 = 0.425 \* 256/3.3 = 32

Hence, ADC code of 45 is achieved by the differential input AN1-AN3

Control byte = 01010001 = 51

**Proteus screenshots**

Diagram

Description automatically generated

When 7 is pressed which is the correct key, LED is on:Diagram

Description automatically generated

When any other button is pressed LED is off:

Diagram

Description automatically generated

Diagram

Description automatically generated

When system is not running (schematic diagram)Diagram, schematic

Description automatically generated

Operating Temperature sensor:Diagram

Description automatically generated

Operating Humidity sensor:Diagram

Description automatically generated