**B.Eng. in Software and Electronic Eng**

**Year 1**

**C/C++ Programming for Electronics**

**Summer Project I – Weather Station Monitoring System**

**Using a multifile approach, write a C++ program to** create a weather station that measures temperature, humidity, atmospheric pressure and altitude using sensors.

**Create a project to include the following files**

* **main.cpp – code file to create and simulate objects of type dht11 and bmp180.**
* **DHT11.h**
* **DHT11.cpp**
* **BMP180.h**
* **BMP180.cpp**

**When the program runs it prompts the user with a menu to select one of the following**

1. **Normal – All sensors are simulated using random number generator and statements are generated to give the readings or all sensors.**
2. **Test –The test option uses values from parameterised constructors to trigger all sensors and display the appropriate outputs and state whether the temperature, humidity or atmospheric pressure levels are dangerously high.**
3. **Exit**

**The DHT11 sensor produces both a temperature and humidity output.**

**Include a default constructor for the dht11 that initialises the value of temperature and humidity to 0, and a parameterised constructor for test purposes.**

**Include an readTemp() and readHumidity() function that returns the value of temperature and humidity.**

**Make the readTemp() output a random number between -5 and 50, to represent the output from the sensor.**

**Make the readHumidity() output a random number between 0% and 100%, to represent the humidity from the sensor.**

**Include a converToFah() function that takes the temperature in Celsius and converts to Fahrenheit.**

**Include a function to display the temperature and humidity around the weather station.**

**The BMP180 sensor produces both a barometric pressure and altitude output.**

**Include a default constructor for the bmp180 that initialises the value of pressure and altitude to 0, and a parameterised constructor for test purposes.**

**Include an readPressure() and readAltitude() function that returns the value of pressure and altitude around the weather station.**

**Make the readPressure() output a random number between 300 and 1100hPa, to represent the output from the sensor.**

**Make the readAltitude() output a random number between -50m and 9000m, to represent the output from the sensor.**

**Include a function to display the pressure and altitude around the weather station.**

**The program must produce and output statement every 5 secs (doesn’t have to be 5s but include a delay) with temperature (in both Celsius and Fahrenheit), humidity, pressure and altitude. The programme continues to display the up to date outputs until the user hits a button to exit the programme.**

**Test Mode:** People often point to a study published in 2010 that theorized that a wet-bulb temperature of 95 F (35 C) at 100% humidity, or 115 F (46 C) at 50% humidity – would be the upper limit of safety. Use these values in your test mode and include a function that displays a warning if these are the conditions detected by the sensors at the weather station.

**You MUST comment your code.**

**Due Date: 31st Aug, 2024**