EXPRESSMENT NO.:

➢ **Title:**
   Build a cloud-ready temperature sensor with the Raspberry PI and the Any IoT Platform

➢ **Objectives:**
   1. To know about various Temperature available in the market.
   2. To know about various Humidity Sensors available in the market.
   3. To know about DHT 11 Sensor
   4. To Know how to work with Raspberry Pi 3.

➢ **Outcomes:**
   1. Students will learn to interface various sensors with Raspberry Pi 3
   2. Students will learn to interface various actuators with Raspberry Pi 3
   3. Students will learn to Install Operating System Raspberry Pi 3.
   4. Students will learn to program Raspberry Pi 3

➢ **Hardware Requirement:**
   Raspberry Pi 3, USB to VGA Converter, Monitor, Keyboard, Mouse, 9v adaptor, USB cable, Temperature and humidity (DHT11) sensor, Breadboard.

➢ **Software Requirement:**
   Raspbian OS, Python 3 IDE.

**Theory:**

**Thingspeak:**
ThingSpeak is an “open data platform for the Internet Of Things”. To get started, you need to create a *channel* that specifies what you are plotting - title, range, number of fields, etc. You then update data in your channel with an HTTP request of the form:


The data stream itself can be viewed at the following URL:

https://api.thingspeak.com/channels/YOUR_CHANNEL_ID

ThingSpeak provides a lot of options for displaying your channel’s data - make it public/private, changing extents, layouts, etc. The only limitation is the rate of data
updates - it has to be no more frequent than 15 seconds. But the whole software is Open Source, which means you could host it on your own if you need faster updates.

**Configuring Python**

Not all the libraries we need to make this project are pre-loaded on the Raspberry Pi. You will need the Adafruit GPIO Python library and the Adafruit DHT 11 library. We will use Adafruit's guide and library for setting up Python to communicate with the Raspberry Pi GPIO pins.

[https://learn.adafruit.com/adafruits-raspberry-pi-lesson-4-gpio-setup/configuring-gpio](https://learn.adafruit.com/adafruits-raspberry-pi-lesson-4-gpio-setup/configuring-gpio)

We also need Adafruit's Python library for the DHT11 sensor, which you can find here:


**Build the Circuit**

We are keeping the circuit simple and building it on a breadboard using our components and jumper wires. Before connecting anything to your Raspberry PI, disconnect the power.

**Warning** - you can destroy your Raspberry Pi with a short circuit from a wrong connection. Just be careful and double check everything before powering back on.
To connect from the Raspberry Pi to breadboard I like to use Dupont Cables, they are jumper wires that have a female side and a male side. The female side connects right to the male header pins of the Raspberry Pi and the male side plugs right into the Breadboard.

For this circuit we need to use the **3.3v out from the Raspberry Pi Pin 1** (do not use the 5v on Pin 2) and we need Ground (GND) of course. Connect these from the Pi to the Breadboard.

**The DHT 11 has 4 Pins. Pin 1 is VCC, Pins 2 is Data, Pin 3 is NOT USED, Pin 4 is Ground.**

- Connect DHT 11 Pin 1 to 3.3v
- Connect DHT 11 Pin 2 to Raspberry PI Pin 16/GPIO 23 and connect a 4.7 or 10k resistor from DHT 11 Pin 2 to DHT Pin 1
- Connect DHT 11 Pin 4 to Ground
- **Setup Thingspeak for Our IOT Data**

![Thingspeak Setup](image)

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Our Python script is going to read data from the DHT11 sensor and the photoresistor and then publish the values of that data to our channel on Thingspeak. First we need to set it up.

Go to Thingspeak.com and create a free account or login to your existing account. Click on "My Channels" and then click on New Channel. Name your new channel and name the fields. The order of the fields is important later when we post data. They can be in any order, but when you post the data the data you need to remember position.
You can decide if you want the channel to be public or not as well as publish information about its location. This is all up to you and will not affect our code. You will also need the Write API key for the channel as it will be required to post data to the channel.

**Conclusion:**

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**Questions:**

1. Explain Functional blocks of IoT
2. Summarize concept of Home Automation