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| **Serial No.** | | **Topic** | **Number of Hours** | **References** | **CO** |
|  | **Module 1** | | | | |
|  | | Refresher to Python | 1 hr | <https://www.w3schools.com/python/python_intro.asp> | CO1 |
|  | | Python if, Else, Elif, While, for | 1 hr | <https://www.w3schools.com/python/python_conditions.asp>  <https://www.w3schools.com/python/python_while_loops.asp>  <https://www.w3schools.com/python/python_for_loops.asp> | CO1 |
|  | | Introduction to ESP32 | 0.5 hr | [https://docs.micropython.org/en/latest/esp32/quickref.html#](https://docs.micropython.org/en/latest/esp32/quickref.html) | CO1 |
|  | | Introduction to MicroPython | 0.5 hr | <https://docs.micropython.org/en/latest/esp32/tutorial/index.html> | CO1 |
|  | | GPIO as Output, LED Blink | 1 hr | <https://docs.micropython.org/en/latest/esp32/quickref.html#pins-and-gpio> | CO1 |
|  | | LED Blink - Change rate | 0.25 hr | <https://docs.micropython.org/en/latest/esp32/quickref.html#pins-and-gpio> | CO1 |
|  | | Hall Sensor  **(Magnetic Field Detector, Current Detector)** | 0.5 hr | <https://docs.micropython.org/en/latest/esp32/quickref.html?highlight=hall> | CO1 |
|  | | Switch LED Interfacing - Concept of Pull Up Resistor | 1 hr | <https://learn.sparkfun.com/tutorials/pull-up-resistors/all> | CO1 |
|  | | Switch LED Interfacing - LED Blinking | 0.5 hr | <https://docs.micropython.org/en/latest/esp32/quickref.html#pins-and-gpio> | CO1 |
|  | | Touch Sensor | 1 hr | <https://docs.micropython.org/en/latest/esp32/quickref.html#capacitive-touch> | CO1 |
|  | | Quiz – 1 | 0.5 hr |  | CO1 |
|  | **Module – 2** | | | | |
|  | | Interrupt | 1 hr |  | CO2 |
|  | | PWM, PWM – Commands | 0.5 hr | https://docs.micropython.org/en/latest/esp32/quickref.html#pwm-pulse-width-modulation | CO2 |
|  | | PWM - LED Brightness, Hee Haw, RGB  (Dimmer using TRIAC, Speed Controller of Motor) | 1 hr | https://docs.micropython.org/en/latest/esp32/quickref.html#pwm-pulse-width-modulation | CO2 |
|  | | ADC and POT Interfacing | 1hr | https://docs.micropython.org/en/latest/esp32/quickref.html#adc-analog-to-digital-conversion | CO2 |
|  | | ADC - Read Voltage | 0.5 hr | https://docs.micropython.org/en/latest/esp32/quickref.html#adc-analog-to-digital-conversion | CO2 |
|  | | ADC - LM35 Read Temperature C | 0.5 hr | https://www.ti.com/lit/ds/symlink/lm35.pdf | CO2 |
|  | | RTC - Print Date Time | 1 hr | https://docs.micropython.org/en/latest/esp32/quickref.html#real-time-clock-rtc | CO2 |
|  | | RTC - Enter Date Time and then Print | 0.5 hr | https://docs.micropython.org/en/latest/esp32/quickref.html#real-time-clock-rtc | CO2 |
|  | | Quiz – 2 | 0.5 hr | https://forms.gle/FcMKTXmqWjaNJ8ws7 | CO2 |
| **Module – 4** | | | | | |
|  | | Introduction to TS and Create ThingSpeak Account | 0.5 hr | <https://thingspeak.com/> | CO4 |
|  | | Create Channel and Write data to single field from browser | 0.5 hr | <https://www.mathworks.com/help/thingspeak/writedata.html> | CO4 |
|  | | Brief About HTTP Methods | 0.5 hr | <https://www.tutorialspoint.com/http/http_methods.htm> | CO4 |
|  | | Connect ESP32 to Wifi | 1 hr | <https://docs.micropython.org/en/latest/esp32/quickref.html#networking> | CO4 |
|  | | Upload Data to ThingSpeak – ESP32 | 1 hr | <https://www.mathworks.com/help/thingspeak/writedata.html>  <https://mpython.readthedocs.io/en/master/library/mPython/urequests.html> | CO4 |
|  | | Upload data to multiple fields from browser | 0.5 hr | <https://mpython.readthedocs.io/en/master/library/mPython/urequests.html> | CO4 |
|  | | Upload Data to ThingSpeak – ESP32 Multiple Fields | 0.5 hr | <https://mpython.readthedocs.io/en/master/library/mPython/urequests.html> | CO4 |
|  | | Upload LM35 and LDR data to ThingSpeak | 1 hr | <https://mpython.readthedocs.io/en/master/library/mPython/urequests.html> | CO4 |
|  | | Temperature dependent THINGTWEET Specify Temperature in Tweet with date time | 1 hr | <https://www.mathworks.com/help/thingspeak/thingtweet-app.html> | CO4 |
|  | | Read Channel Feed using Browser | 0.5 hr | <https://www.mathworks.com/help/thingspeak/readdata.html> | CO4 |
|  | | Read Channel Feed – ESP32 | 1 hr | <https://www.mathworks.com/help/thingspeak/readdata.html> | CO4 |
|  | | Read Specific field – Browser | 0.5 hr | <https://www.mathworks.com/help/thingspeak/readfield.html> | CO4 |
|  | | Read Specific Channel field- ESP32 | 0.5 hr | <https://www.mathworks.com/help/thingspeak/readfield.html> | CO4 |
|  | | Quiz – 4 | 0.5 hr | <https://forms.gle/BM2yvfWLwPqZu6oA9> | CO4 |
|  | **Module – 5** | | | | |
|  | | Introduction to Talkback, Create a TalkBack “LED CONTROL” – Command “LEDON” | 1 hr | <https://www.mathworks.com/help/thingspeak/talkback-app.html> | CO4 |
|  | | Read TalkBack Command response of above using Browser and ESP32 | 1 hr | <https://www.mathworks.com/help/thingspeak/gettalkbackcommand.html> | CO4 |
|  | | Read TalkBack Command – extract command | 1 hr | <https://www.w3schools.com/python/python_strings_slicing.asp> | CO4 |
|  | | Read TalkBack Command – extract command and Control RELAY | 0.5 hr | <https://www.w3schools.com/python/python_strings_slicing.asp> | CO4 |
|  | | Update talkback | 1 hr | <https://www.mathworks.com/help/thingspeak/updatetalkbackcommand.html> | CO4 |
|  | | Update talkback “from 2 switches” | 1 hr | <https://www.mathworks.com/help/thingspeak/updatetalkbackcommand.html> | CO4 |
|  | | Remote Switch – Send command from one device and Receive from other device – Control RELAY from Switches | 1hr | <https://www.mathworks.com/help/thingspeak/updatetalkbackcommand.html> | CO4 |
|  | | Google Assistant Controlled RGB with IFTTT and ThingSpeak | 2 hr | <https://ifttt.com/google_assistant> | CO4 |
|  | | IR Intruder Alarm using IFTTT | 1 hr | <https://ifttt.com/voip_calls> | CO4 |
|  | | Quiz - 5 | 0.5 hr |  | CO4 |
| **Total Hours** | | | **35 Hr** |  |  |