# INTERNET OF THINGS (IOT) WITH ARDUINO

| Sr. no | Details | Days |
|---|---|---|
| 1 | **Hardware Fundamentals**<br>Basic Electronics Laws and Components Resistance, Capacitor, Inductors, Diode, Transistors, Opto coupler, Voltage Regulator, Regulated Power supply, Protection of Circuits from Over voltage, Noise, EMI RF interferences for reliability of Circuits,<br>Digital Fundamentals and ICs Mux/Demux, Encoder/Decoder/F Latch, Shift register, Tri State logic, driver ices etc.<br>Linear Fundamentals and Opamp, Voltage Comparators and ADC<br>Fault Finding Techniques for circuits not working. | 3 Days |
| 2 | **C & Embedded C language**<br>Introduction to C programming, Data types, Format specifier<br>Qualifiers, Operators, decision control structure<br>Loop control structure<br>Arrays, strings, Pointers | 1 Days |
| 3 | **Introduction to Arduino Uno Board**<br>**1) What Exactly Is an Arduino?**<br>a) Exploring the Arduino Board.<br>b) Types of Arduino Boards<br>c) Installing the Arduino IDE<br>d) Compiling and Uploading Programs<br>e) Working with LED's<br>f) Managing Projects and Sketches<br>g) Changing Preferences<br>h) Using Serial Ports to see the events<br>**2) Arduino UNO**<br>a) Architecture<br>b) Arduino Uno 328 pin Mapping<br>c) Understanding of Input / Output<br>**3) Arduino Input and Output Programming**<br>a) Take input from the switch or sensor<br>b) Drive anything from Arduino output<br>c) Digital I/O:<br>d) PinMode ()<br>e) DigitalWrite ()<br>f) DigitalRead ()<br>**4) Arduino Interrupt**<br>a) What is interrupt and when to use it?<br>b) Interrupts ()<br>c) noInterrupts ()<br>d) External Interrupts:<br>e) attachInterrupt ()<br>f) detachInterrupt () | 8 Days |

**5) Display Interfacing with Arduino**

**a)** Liquid Crystal Display
b) Pin Configurations LCD
c) Arduino LCD Function
d) Display on LCD
e) Arduino LCD Interfacing
f) Display Custom Character and Text

6) **Seven Segment Display**

a) Pin Configuration
b) Common Anode Segment
c) Common Cathode Segment
d) Interfacing with Arduino
e) Seven Segment Multiplexing

7) **Analog to Digital Conversion (ADC)**

a) Understanding the ADC
b) Analog Sensors and how to deal with it
c) Temperature Sensor Interfacing
d) Analog IR Sensor Interfacing
e) Arduino library functions
f) analogReference ()
g) analogRead ()
h) analogWrite () – PWM

**8) Memory**

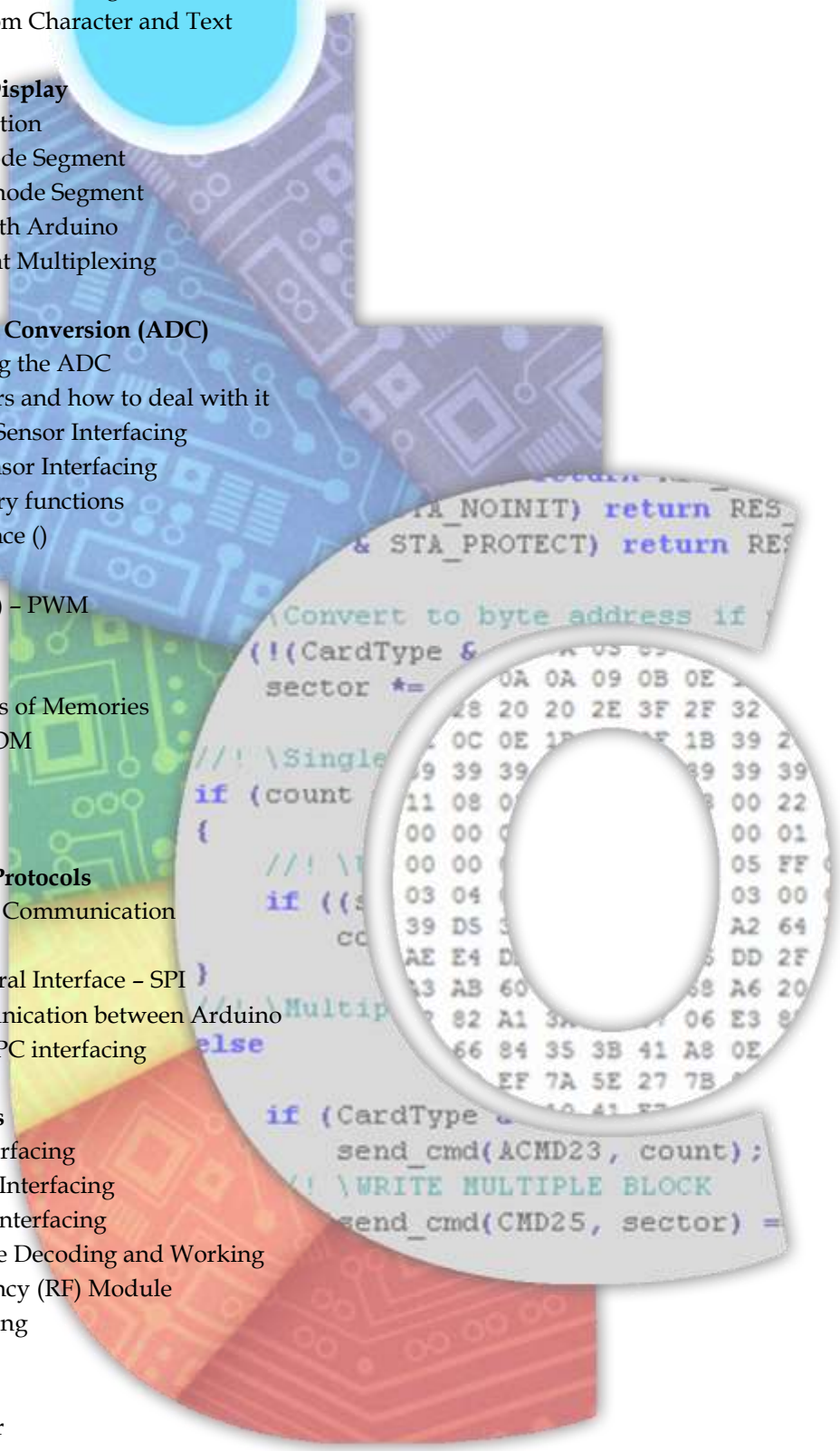
a) Different types of Memories
b) Role of EEPROM
c) read ()
d) write ()

**9) Communication Protocols**

a) What is Serial Communication
b) UART
c) Serial Peripheral Interface – SPI
d) Serial Communication between Arduino
e) Arduino and PC interfacing

**10) Wireless Modules**

a) Bluetooth Interfacing
b) GSM Modem Interfacing
c) GPS Module Interfacing
d) TV/IR Remote Decoding and Working
e) Radio Frequency (RF) Module
f) RFID Interfacing
g) Sensors
h) Reed Switch
i) Motion Sensor
j) Ultrasound Module
k) Infrared Sensor (IR)
l) Thermistor Interfacing



| | | |
|---|---|---|
| | m) Motors<br>n) Selection and types of Motors<br>o) DC Motor<br>p) H-Bridge (L293D IC)<br>q) Stepper Motor<br>r) Servo Motor<br>s) Understanding PWM<br>t) Relay<br>u) Working and Application of Relay<br>v) Controlling with Arduino<br>w) Home Appliances Control using Relay<br>x) Opto Coupler<br>y) What are opto coupler<br>z) Advantages and their interfacing<br><br>**11) Buzzer**<br>a) How sound are generated<br>b) Why busser are preferred and their types<br>c) How to interface Buzzer | |
| **4** | **IoT (Internet of Things) Projects**<br><br>Introduction of IoT<br>Current Business Trends in IoT<br>IoT Application Architecture<br>Sensors and Actuators<br>IoT Communication Layer<br>Wireless Communication<br>IoT Protocols: TCP, UDP, HTTP<br><br>**1) ESP8266 Introduction: Hardware and Software**<br>a) ESP Module Types and Features<br>b) Introduction to NodeMCU<br>c) Programming ESP8266 In Arduino<br>d) Setting up the software tools and understanding text-based data types<br>e) How to Connect to WIFI in ESP8266<br>f) Setting up Things Speak<br>g) Connecting to the Internet and a Web Server<br>h) Establishing a WIFI Connection<br>i) ESP8266 Wi-Fi Library: Part 1<br>j) ESP8266 Wi-Fi Library: Part 2<br>k) The anatomy of an HTTP request<br>l) Data Logging with the Things Speak<br><br>**2) Hardware Interfacing**<br>a) WIFI module<br>b) Power supply card<br>c) Relay card interfacing<br>d) Leds<br>e) Light bulb<br>f) Switches interfacing<br>g) Sensor module<br>h) Hardware design for feedback system<br>i) On Board Soldering Techniques and wiring | 10 days |

| | | |
|---|---|---|
| | **3) Arduino IDE compiler-based programs**<br>a) Web server using ESP8266<br>b) Introduction of HTML<br>c) Web Page Design App for controlling devices<br>d) WIFI interaction programming<br>e) WIFI based hotspot interface programming<br><br>**4) How to use cloud for controlling device using internet**<br>5) **IoT based device control with feedback system** | |
| **5** | Certificate Distribution and feedbacks | 1 days |