

**THEORY TOPICS (WITH PRACTICAL EXPERIMENTS)**

1. Concept of Atom
2. Concept of Electric Charge
3. Definition of Conductor & Insulator
4. Concept of Free Electron
5. Concept of Potential Difference (PD)
6. Concept of Resistance
7. Concept of Electric Power
8. Unit Multiple and related scale like pico to Tera multiples
9. Use of Digital Multimeter
10. Important Symbols
11. Resistor Color Code Chart
12. Series & Parallel Combination of Resistors
13. Concepts of AC & DC
14. Transistor (NPN & PNP)
15. Pin Configuration of Transistors
16. Soldering Techniques
17. Details of Breadboard
18. Concept of Faraday's Laws of Electromagnetic Induction
19. Lenz's Law
20. Study of Transformer

**The syllabus is revised every 2 months.** Some practical topics may be added / revised depending on current trends in technology.

**PROJECTS & PRACTICAL TASKS ALLOTMENT (WITH PRACTICAL CONSTRUCTION OF CIRCUITS)**

1. Basic LED & Bulb Dimmer Circuit
2. Basic Heat Indicator & Alarm Circuit
3. Street Light Controlling System
4. Loop Wire Flashing LED Burglar Alarm
5. Water Level Alarm
6. Transistorized Sensitive Touch Switch
7. DC Motor Speed Controlling Circuit
8. Heat Controlled Fan
9. Transistor Sound Amplifier Circuit
10. Transistorized Regenerative Latch Circuit

**SOFTWARE SIMULATIONS**

1. Detailed Use of **Circuit Wizard** Electronics Circuit Simulation Software
2. Detailed Use of **Fritzing** Breadboard Circuits Simulation Software

**FEES: RS. 3900**

**With complete kit, Detailed Notes and Practical Worksheets**

**Important Note:** The student will be allotted homework with topic-wise practical tasks, which must be completed and submitted next day, for topic-wise grading.

**Get certificate from MSME & Vidyasagar Academy, as per grade in final online exam.**

## PRACTICAL ELECTRONICS ADVANCED COURSE (LEVEL-2) SYLLABUS

You can join this course, after completing Practical Electronics Basic Course (Level-1).

### THEORY TOPICS (WITH PRACTICAL EXPERIMENTS)

1. Concept of Integrated Circuits
2. Concept of Amplifier
3. Details of IC 741 as operational amplifier
4. Details of IC 555 timer
5. Concept of Silicon Controlled Rectifier (SCR)
6. Concept of Diac and Triac
7. Concept of Boolean Algebra – Boolean rules, Commutativity, Associativity, Direct Summing, etc.
8. Concept of Logic Gates – *very useful topic for Robotics Courses*
9. Concept of De Morgan's Theorems – *very useful topic for Robotics Courses*
10. Concept of Half Adder & Full Adder – *very useful topic for Robotics Courses*
11. Concept of 4-bit Binary Adder – *very useful topic for Robotics Courses*
12. Concept of Multiplexer & Demultiplexer – *very useful topic for Robotics Courses*
13. Concept of Flip-Flops – *very useful topic for Robotics Courses*
14. Concept of Right/Left Shift Registers – *very useful topic for Robotics Courses*
15. Concept of Basic Counter Circuit – *very useful topic for Robotics Courses*

The syllabus is revised every **2 months**. Some practical topics may be added / revised depending on current trends in modern technology.

### PROJECTS & PRACTICAL TASKS ALLOTMENT (WITH PRACTICAL CONSTRUCTION OF CIRCUITS)

1. Construction of transistorized amplifier
2. Construction and working of IC 555 Timer as AMV, MMV & BMV
3. Construction and working of different applications of IC 555
4. Construction and working of IC 741 Opamp as Inverting Amplifier
5. Construction and working of IC 741 Opamp as Non-Inverting Amplifier
6. Construction and working of IC 741 Opamp as Buffer Circuit
7. Construction and working of IC 741 Opamp as Comparator – *very useful to understand sensors in robotics*
8. Construction and working of different applications of IC 741
9. Construction and working of AND, OR, NOT, NAND, NOR & Exclusive OR Logic Circuits
10. Construction and working of Half Adder & Full Adder Circuits
11. Construction and working of 4-bit Binary Adder
12. Construction and working of SCR Latch Circuit
13. Construction and working of Triac & Diac Circuit as 230V AC mains Dimmer
14. Construction and working of Flip Flops
15. Electronic Simulation to understand working of Right/Left Shift Registers and Counters

### SOFTWARE TO LEARN

1. Detailed Use of **Express PCB** – complete PCB Designing Software
2. Detailed use of **Fritzing** Automatic PCB Designer Software
3. Introduction to **LTSpice** – High performance simulation software

**FEES: RS. 1900**

**With complete advanced kit, Detailed Notes and Practical Worksheets**

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You can join this course, after completing Practical Electronics Basic Course Level-1 or Level-2.

### THEORY TOPICS (WITH PRACTICAL EXPERIMENTS)

1. Basics of C/C++ Programming
2. Concepts of datatypes, functions, keywords, variables, built-in functions, etc.
3. Understanding the Arduino IDE
4. How to use preferences in Arduino IDE?
5. Understanding built-in function of Arduino
6. Understanding built-in keywords of Arduino
7. How to use serial monitor and serial plotter in Arduino IDE?
8. How to edit the code with find/replace commands in Arduino IDE?
9. How to create user defined functions in Arduino Code?
10. Arduino Direct PORT Register Addressing Techniques – *very useful topic for creating short codes*
11. How to use Analog inputs in Arduino?
12. Working of different sensors: IR sensor, Sound sensor, US sensor, etc.
13. Comparative analysis of Arduino UNO and Arduino Nano

The syllabus is revised every **2 months**. Some practical topics may be added / revised depending on current trends in technology.

### PROJECTS & PRACTICAL TASKS ALLOTMENT (WITH PRACTICAL CONSTRUCTION OF CIRCUITS)

1. Writing first code of blinking LED and buzzer beeps
2. Code of multiple LEDs with decorative effects
3. Project of Multiple Decorative LEDs using user defined functions
4. Basic code of Servo motor to set different rotating angles
5. Control servo motor using 'for' loop – *application for CCTV camera controlling*
6. Control servo motor using a potentiometer useful for remote controlling
7. Code of sound sensor controlled relay switch
8. Code of IR sensor controlled relay switch
9. Code of object of counter using IR sensor using Serial monitor
10. Code of Ultrasonic Sensor for distance measurement using Serial monitor
11. Project of using User Defined Functions (UDFs) in Arduino
12. Project of Arduino Calculator with `Serial.print` option
13. Project of LED Toggling using Boolean datatype ("*running*" keyword)
14. Project of displaying analog input data on serial monitor/serial plotter
15. Project of direct port register addressing system

### SOFTWARE TO LEARN

1. Understanding **Arduino IDE** – special software by Arduino.cc
2. Detailed use of **Fritzing** Automatic PCB Designer Software



**FEES: RS. 4900**

**With complete kit, Detailed Notes and Practical Worksheets**

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You can join this course, after completing Arduino Robotics Basic Course Level-1.

### THEORY TOPICS (WITH PRACTICAL EXPERIMENTS)

1. Advanced concepts of C++ Programming
2. Concept of Pointers & Arrays
3. Use of pointers & arrays in Arduino programming
4. Understanding the concept of Real Time Data Logging system
5. Steinhart-Hart empirical equation to measure real time temperature
6. How to create graphical presentation of data logging in MS Excel?
7. Use of arrays in servo motor teaching pendant for industrial automation
8. How to use serial monitor and serial plotter in Arduino IDE?
9. How to edit the code with find/replace commands in Arduino IDE?
10. Concept of real time position reading of servo motor
11. Concept of **analogWrite** and **analogRead** in Arduino
12. How to read/write Analog signals in Arduino?
13. Concept of PWM techniques in Arduino
14. How to generate tones in Arduino using Boolean datatype?
15. Understanding LCD display in Arduino circuits
16. Concept of Interrupt Service Routine (ISR) in Arduino

The syllabus is revised every **2 months**. Some practical topics may be added / revised depending on current trends in technology.

### PROJECTS & PRACTICAL TASKS ALLOTMENT (WITH PRACTICAL CONSTRUCTION OF CIRCUITS)

1. Code to generate different tones using Boolean datatype
2. Code of random LEDs switching using array technique
3. Code of PWM motor speed/LED brightness controlling
4. Code of Saw tooth wave, Sine wave generation in Serial plotter
5. Project of Automatic Overhead Water Tank controlling system
6. Project of Car Parking System
7. Project of Multitasking by merging two or more codes together
8. Project of teaching pendant using servo and potentiometer
9. Project of running LEDs decorative effect using array
10. Project of ISR code for speed controlling of motor
11. Project of 8-bit binary counter using arithmetic operator
12. Project of speed measurement using **millis ()** function
13. Project of Quiz Controlling System using Arduino
14. Project of Sanguinoscope (*Blood Group Monitoring System*) using Arduino
15. Project of RPM Measurement using Arduino



### SOFTWARE TO LEARN

1. Advanced use of **Arduino IDE** – special software by Arduino.cc
2. Advanced use of **VSCode** coding software

### FEES: Rs. 1900

With complete kit, Detailed Notes and Practical Worksheets

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*You can join this course, after completing Practical Electronics Basic Course Level-1 OR Level-2.*

**THEORY TOPICS (WITH PRACTICAL EXPERIMENTS)**

1. Basics of C/C++ Programming
2. Concepts of datatypes, functions, keywords, variables, built-in functions, etc.
3. Formatted Input and Output functions
4. Documentation section, Link section, Definition section, Global declaration section, Main function section, Sub program section
5. Understanding the concept of **while (1)** in programming
6. Concept of conditional logic **if, if \_\_\_\_\_ else** statements
7. Concept of **while** loop, Concept of **for** loop
8. Concept of binary and hexadecimal systems – *simple problems on the topics useful for coding*
9. **KeilµVision5** compiler installation and use
10. How to create project environment in KeilµVision5?
11. Installation of drivers for USBasp programmer
12. Installation and use of **progisp** burner software
13. Understanding the hardware and connection details of robotic trolley in your kit
14. Understanding PORTS and Registers in 8051
15. Motion controlling codes for robotic trolley with sensors
16. Understanding the motor driver **IC L293D** for BU motors

**PROJECTS & PRACTICAL TASKS ALLOTMENT (WITH PRACTICAL CONSTRUCTION OF CIRCUITS)**

1. Writing first code in KeilµVision5 compiler and compile it in hex code
2. Writing code for decorative effect of 8 built-in LEDs at PORT1
3. Writing code for controlling LEDs at PORT1 using IR sensors
4. Writing code for black line following robot
5. Writing code for obstacle avoiding robot
6. Writing code for edge avoiding robot
7. Project of Servo motor controlling
8. Project of 7-segment LED display up/down counting with alarm
9. Project of Quiz control system for 3 contestants
10. Project of Sanguinoscope for blood group manipulation

**The syllabus is revised every 2 months.** Some practical topics may be added / revised depending on current trends in technology.

**SOFTWARE TO LEARN**

3. Detailed use of **KeilµVision5** – advanced compiler for 8051 µC
4. Detailed use of **progisp** USBasp burner Software

**FEES: RS. 4900**

**With complete kit, Detailed Notes and Practical Worksheets**

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### THEORY TOPICS (WITH PRACTICAL EXPERIMENTS)

1. Revision of datatypes, functions, keywords, variables, built-in functions, etc.
2. Revision of **while (1)** in programming
3. Revision of conditional logic **if, if\_\_\_\_\_else** statements
4. Revision of **while** loop, Concept of **for** loop
5. Revision of **KeilµVision5** compiler installation and use
6. Revision of Installation of drivers for USBasp programmer
7. Revision of Installation and use of **progisp** burner software
8. Revision of PORTS and Registers in 8051

### PROJECTS & PRACTICAL TASKS ALLOTMENT (WITH PRACTICAL CONSTRUCTION OF CIRCUITS)

1. Writing first code in KeilµVision5 compiler and compile it in hex code
2. Writing code for decorative effect of 8 built-in LEDs at PORT1
3. Writing code for controlling LEDs at PORT1 using IR sensors
4. Writing code for black line following robot
5. Writing code for obstacle avoiding robot
6. Writing code for edge avoiding robot
7. Project of Servo motor controlling
8. Project of 7-segment LED display up/down counting with alarm
9. Project of Quiz control system for 3 contestants
10. Project of Sanguinoscope for blood group manipulation

The syllabus is revised every **2 months**. Some practical topics may be added / revised depending on current trends in technology.

### SOFTWARE TO LEARN

1. Detailed use of **KeilµVision5** – advanced compiler for 8051 µC
2. Detailed use of **progisp** USBasp burner Software

### FEES: RS. 7000

With complete kit, Detailed Notes and Practical Worksheets

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*You can join this course, after completing Arduino OR 8051 Robotics Course Level-1*

### THEORY TOPICS (WITH PRACTICAL EXPERIMENTS)

1. Linux Concepts
2. Accessing the command line (terminal and desktop)
3. Accessing and using manual pages
4. Working with the command line and the shell
5. Piping and redirection
6. Understanding Linux Operating System (OS)
7. Study of different Linux commands like cp, mv mount
8. Introduction to VI editor, VI editor settings
9. Process of creating script
10. Shell variables conditions (*if else*)
11. Shell control structures
12. Shell programs to read command line parameters
13. Linux lab for shell programming

### HANDS ON PROJECTS

1. Setting up the RPi – Raspbian OS
2. Booting the RPi
3. Networking the RPi
4. Basics of the Linux OS used on the Pi
5. GPIO Interfacing using Linux
6. File-sharing on the RPi
7. Sensor Interfacing
8. Text to Audio Play
9. Video playback on the RPi
10. Connecting a USB webcam
11. Video streaming on the RPi
12. Bluetooth Interfacing
13. Wi-Fi Interfacing
14. Access the World Wide Web
15. Hosting Web Page on Raspberry Pi
16. Controlling Motor through Web Server
17. Building Web Server Project



### SOFTWARE TO LEARN

3. Detailed use of **Geany & Thonny** – advanced compiler for RPi 4
4. Detailed use of **progisp** USBasp burner Software

### FEES: RS. 12500

With complete kit, Detailed Notes and Practical Worksheets

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*You can join this course directly, if you have basic knowledge of using computer.*

### **THEORY TOPICS (WITH PRACTICAL DEMONSTRATION)**

1. Introduction to Python, basics of Python shell
2. Installation procedure of Python 3 (*or above*) and PyCharm IDE
3. How to create project and write first program in PyCharm IDE?
4. Variables in Python and its rules, Multiple assignments in Python
5. Difference between Plus and Concatenation in Python, iteration in Python
6. Details of datatypes and Class in Python, What are string, int and float in Python?
7. Conditional statements in Python
8. Relational and membership operators in Python
9. Details of functions in Python, methods of taking user input in Python
10. Details of Tuples, Lists, Dictionaries and SETs in Python

### **HANDS ON PRACTICAL PROGRAMMING**

1. Tuples in Python, empty tuple, mixed tuples and nested tuple, tuples with lists
2. Operations on tuples, accessing elements in tuple, negative indexing in tuple
3. Looping through a tuple, update elements in tuple, join tuples, tuple methods
4. Lists in Python, empty list, mixed lists and nested lists, comparison between lists and tuples
5. Different operations on lists, access list items, change/add/remove list items
6. Loop lists, list comprehension, Sorting the items in list, copy list, join list
7. Dictionaries in Python, empty dictionary, mixed dictionaries and nested dictionaries
8. Operations on dictionary, accessing elements in dictionary, negative indexing in dictionary
9. Looping through a dictionary, update elements in dictionary, join dictionary, dictionary methods, create dictionary of lists
10. Sets in Python, empty set, mixed sets and nested sets
11. Different operations on sets, access sets items, change/add/remove sets items
12. Loop sets, sets comprehension, Sorting the items in sets, copy set, join sets
13. Simple mathematical application programs for school level students
14. Advanced mathematical application programs for college level students
15. Trending application programs in Python

### **SOFTWARE TO LEARN**

1. Detailed use of **Python Compiler** – 3.11.0
2. Detailed use of **PyCharm Compiler** – 2022.2.4
3. Detailed use of **Anaconda**
4. Detailed use of **Spyder**

### **FEES: RS. 4900**

**With complete kit, Detailed Notes and Practical Worksheets**

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**Who can Join:** Anyone with a little knowledge of using computer and internet.

### **THEORY TOPICS (WITH PRACTICAL EXPERIMENTS)**

1. Understanding computer environment
2. Understanding the internet terminologies: user, data, keyword, WWW, browser, hyperlink, http and other protocols, webpage, website, WordPress, menu, header, footer, body, tag, category, theme, SEO, 400-503 errors, and many more...
3. Fundamentals of browsers, settings, customization and synching, bookmarks, cookies, etc.
4. Fundamentals of HTML – Hypertext Markup Language
5. Fundamentals of PHP – Hypertext Preprocessor
6. Fundamentals of CSS – Cascading Style Sheets
7. Practical demo of inline CSS in Free WordPress site
8. Details of WordPress dashboard – posts, pages, media, comments, appearance, users, tools, settings, Jetpack stats
9. Creating and customizing posts & pages
10. Decorating your website with themes
11. Create YouTube channel and customize it
12. Create social network on Facebook, Twitter, Pinterest, etc.
13. Fundamentals of Search Engine Optimisation (SEO)
14. Understanding terms of search engine like Google
15. Importing subscribers list in Jetpack

### **HANDS ON PROJECTS**

1. Installation of localhost with XAMPP
2. Creating databases and user accounts in MySQL
3. Installation of WordPress
4. Working of different menus in Dashboard of WordPress
5. Installation of required plugins
- 6.

### **SOFTWARE TO LEARN**

1. Detailed use of **XAMPP** – server for localhost
2. Detailed use of **MySQL** – to work on databases

### **FEES: RS. 7000**

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