

# Short Term Training Programs

# Basic Electronics

- Voltage and Current basics
- Analog signals
- Soldering techniques
- Components lead identification testing
- Discrete Components
  - Capacitors
  - Resistors
  - Inductors
  - Diodes LEDs
  - Crystals
- RC networks
- Transformers
  - Ratings
  - Primary and secondary windings identification
- Digital Signals
- Reading Schematics
- Reading datasheets
- Cooling techniques used in electronics
- Power Supplies
- SMPS
- Rectifiers
- Voltage regulators
- Convertors ( DC – DC )
- Sensors
- Introduction to PCBs

**Course Duration:** 5 days

## Fee Structure

- Registration Fee: Rs.100/-
- Course Fee: Rs.500/-
- Literature Fee (Soft & hard Copy): Rs.100/-

\* This course is designed keeping in mind in campus training programs.

# BASIC Mcs51

- Introduction to Embedded Systems
- Architecture of 8051, 89c51, 89c52, 89s51, 89s52
  - Harvard/Princeton Architectures
  - RISC & CISC
  - Microcontroller hardware oscillator & clock options
  - I/O Pins, Ports & Circuits
  - External Memory
  - Counters & Timers
  - Watchdog Timer
  - Serial data I/O
  - UART
  - Interrupts
- Assembly language programming of 89c51, 89c52.
  - Mechanics of Programming
  - Programming tools & Techniques
  - How to use the assemblers
- Interfacing of different hardware to microcontrollers :
  - LCD
  - Seven Segment Displays
  - Dot matrix Displays
  - Keypads
- Different communication protocols used by microcontrollers :
  - Microwire communication
  - I2C
- Study & implementation of Latches, Encoders, Decoders, Mux & Demux.

**Course Duration:** 10 days.

## Fee Structure:

- Registration Fee : Rs. 100/-
- Course Fee : Rs. 900/-
- Literature Fee(Soft & hard copies) : Rs. 200/-

## Vision PCB

- Introduction to PCB making techniques.
- Various tools used for PCB designing.
- Schematics capture using ORCAD CAPTURE.
- Editing of Schematic components library.
- Annotation of components.
- Editing of PCB library.
- Creating PCB design.
- Component placing on PCB.
- Multilayer PCB designing procedure.
- Minimum track spacing.
- Manual routing of PCB.
- High frequency design considerations.
- Etching of PCB.
- Introduction to industrial standards.
- Standard finished PCB thickness.
- Copper thickness for PTH and vias.
- Standard hole dimension.

**Course Duration:** 12 Days.

### Fee Structure:

- Registration Fee : Rs. 100/-
- Course Fee : Rs. 1100/-

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# ProBasic

- Introduction to Embedded Systems
- Architecture of 8051, 89c51, 89c52, 89s51, 89s52
  - Harvard/Princeton Architectures
  - RISC & CISC
  - Microcontroller hardware oscillator & clock options
  - I/O Pins, Ports & Circuits
  - External Memory
  - Counters & Timers
  - Watchdog Timer
  - Serial data I/O
  - UART
  - Interrupts
- Assembly language programming of 89c51, 89c52.
  - Mechanics of Programming
  - Programming tools & Techniques
  - How to use the assemblers
- Interfacing of different hardware to microcontrollers :
  - LCD
  - Seven Segment Displays
  - Dot matrix Displays
  - Keypads
- Different communication protocols used by microcontrollers :
  - Microwire communication
  - I2C
- Study & implementation of Latches, Encoders, Decoders, Mux & Demux.
- Introduction to PCB making techniques.
- Various tools used for PCB designing.
- Schematics capture using ORCAD CAPTURE.
- Editing of Schematic components library.
- Annotation of components.
- Editing of PCB library.
- Creating PCB design.
- Component placing on PCB.
- Multilayer PCB designing procedure.
- Minimum track spacing.
- Manual routing of PCB.
- High frequency design considerations.

- Etching of PCB.
- Introduction to industrial standards.
- Standard finished PCB thickness.
- Copper thickness for PTH and vias.
- Standard hole dimension.

**Course Duration:** Three Weeks

## Fee Structure:

- Registration Fee : Rs. 100/-
- Course Fee : Rs. 1800/-
- Literature Fee(Soft & hard copies) : Rs. 200/-

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# Long Term Training Programs

# Embedded Mcs51

- Introduction to embedded systems.
- Introduction to AVR series of microcontrollers.
- Architecture of 8051, 89C51, 89C52, 89S51, 89S52
  - Harvard/Princeton Architecture
  - RISC & CICS
  - Microcontroller hardware, oscillator & clock options
  - I/O pins, ports & circuits
  - External memory
  - Counters and timers
  - Watchdog timer
  - Serial data I/O
  - UART
  - Interrupts
- Assembly language programming of 89C51, 89C52
  - Mechanics of programming
  - Programming tools and techniques
  - How to use the assemblers
- Interfacing different hardware to microcontroller
  - LCD
  - Seven segment display (SSD)
  - DC motors
  - Geared DC motors
  - Stepper motors
  - Servo Motors
  - Dot matrix displays
  - Different types of keypads
  - Serial communication between Microcontroller and PC
  - Using DTMF Encoder and Decoder
  - External memory interfacing
- Different communication protocols used by microcontrollers
  - Serial RS – 232
  - Microwire communication
  - I2C communication
- Study and implementation of Latches, Decoders, Mux, Demux, Analogue Switches, Crosspoint Switches, Triac control and SCR control.
- Practical implementation of hardwares on perforated boards and PCB.

- Introduction to Biometric Finger Print sensor
- Introduction to Scientific and Medical devices working concepts.

## Projects

- Four digits SSD Pulse Counter.
- Moving message LED Dot Matrix display
- IR remote controlled lighting system
- Message displays using LCD
- Controlling DC motors
- Controlling Geared motors
- Real Time Clock (RTC) programming
- Sine wave generation using 89C51
- Square pulse generator using 89C51
- Triangular wave generation using 89C51
- DTMF Keypads
- Graphics on LCD using microcontrollers

\* Student can choose any two of these projects for practical implementation or they can implement their own design. Introduction to all of these will be given to them.

**Course Duration:** Seven Weeks

## Fee Structure

- Registration Fee: Rs.500/-
- Course Fee: Rs.6500/-
- Project Fee: Rs.1500/-
- Literature Fee (Soft & hard Copy): Rs.500/-

# Tech PCB

- Introduction to PCB design and tools used
- Schematics Capture using ORCAD
- Editing of Schematics components library
- Annotation of components
- Netlist generation
- Importing Netlist to layout
- Editing of PCB library
- Printed circuit board fabrication
  - PCB layers and stack-up
  - PCB fabrication process
  - Photolithography and chemical etching
  - Mechanical milling
- Creating a circuit design using ORCAD Capture
  - Starting a new project
  - Placing parts
  - Wiring ( Connecting ) the parts
  - Creating the Layout Netlist in Capture
- Designing the PCB with layout
  - Starting Layout and importing the Netlist
  - Making a board outline
  - Placing the parts
  - Autorouting the boards
  - Manual routing
  - Making Inductance on PCBs
  - Making capacitance on PCBs
  - Cleanup
  - Locking traces
  - Performing DRC
  - Post processing the board for manufacturing
- Understanding the Layout environment and tools used
  - The toolbar
  - Auto ECO utility
  - The session frame and design window
  - Controlling the autorouter
  - Postprocessing the Layer details
- Introduction to industry standards
- Introduction to the standards organization

- PCB assembly and soldering processes
- Soldering processes
  - Manual Soldering
  - Wave soldering
  - Reflow soldering
- Component placement and orientation
- Minimum track and current spacing
- Footprint and Padstack design for PCB manufacturability
- Land patterns for SMDs
- Land patterns for THDs
  - Footprint design for thorough hole devices
  - Padstack design for through hole devices
  - Hole to Lead ratio
  - PTH land dimensions
  - Clearance between plane layers and PTHs
  - Soldermask and solder paste dimensions
- Other issues
  - Noise
  - Distortion
  - Frequency response
  - Electromagnetic interface and Cross Talk
  - Magnetic fields and inductive coupling
  - Ground planes and ground bounce
  - Split power and ground planes
  - PCB electrical characteristics
  - Reflection and ringing
  - Bypass capacitors and fanout
  - Trace width for current carrying capability
  - Trace width for controlled impedance
  - Trace spacing for voltage withstanding
  - Trace spacing to minimize cross talks
- Making and editing capture parts
- Capture parts library
- Part editing tools
- Constructing capture parts
- Using the pad array generator
  - Introduction
  - Footprint design for PGAs
  - Footprint design for BGAs

- Blind, buried and microvias
  - Mounting holes
  - Printing a catalogue of a footprint library
- Adding test points
  - Printing of PCBs
  - Using Preventive coatings for PCB

**Course Duration:** Seven Weeks

## Fee Structure

- Registration Fee: Rs 500/-
- Course Fee: Rs 7500/-
- Project Fee: Rs 1000/-

# Embedded Pro

- Introduction to computer architecture
  - Concepts
  - Memory
  - Input/output
  - DMA
  - Embedded computer architecture
- Electronics
  - Voltage and current
  - Analog signals
  - Power
  - Resistors
  - Capacitors
  - RC Circuits
  - Inductors
  - Transformers
  - Diodes, Crystals
  - Digital Signals
  - Understanding schematics
  - Reading datasheets
- Analog
  - Amplifiers
  - A to D Converters
  - Interfacing external ADC
  - Sensors ( Temperature, magnetic field, Accelerometers)
  - D to A conversion
  - Switching big loads
- Introduction to embedded systems.
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**Course Duration:** Eighteen Weeks

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- Course Fee: Rs.11000/-
- Project Fee: Rs.1500/-
- Literature Fee (Soft & hard Copy): Rs.500/-