# NIELIT Courses

Level Code: Vertical Name:

L5

Embedded Systems

Course ID: Course Name:

L5 ES3 CA

3.9.2 Embedded system Design using 8-bit Microcontrollers

Objective of the Course:

To train students on programming of microcontroller, Interfacing of external peripherals to microcontroller and troubleshooting of microcontroller based Embedded electronic systems/products.

Learning Outcomes :

Participant shall learn

Architecture of 8051 Microcontroller Programming of 8051 microcontroller Peripheral interfacing to 8051 microcontroller

Trouble shooting 8051 microcontroller based systems Architecture of PIC Microcontroller

Programming of PIC microcontroller Peripheral interfacing to PIC microcontroller

Trouble shooting PIC microcontroller based systems

Expected Job Roles:

1. Microcontroller Technician - Trouble shooting of Microcontroller based electronic systems/products
2. Entrepreneur - Development of small electronic gadgets based on Microcontroller

Duration of the Course (in hours)

400 hrs

Minimum Eligibility Criteria and pre-requisites, if any

Diploma or above

The participant shall know and understand

Development of embedded systems with 8051 and PIC Microcontrollers Electronic System Design with 8051 Microcontrollers Electronic System Design with PIC Microcontrollers

Embedded Coding with 8051 Microcontrollers Embedded Coding with PIC Microcontrollers

Professional Skill:

Reading and writing skills

How to read and comprehend the data sheet of various 8051 and PIC based Microcontrollers To document the completed work

To read the standard operating procedures for different types of Microcontroller based Electronic systems

Tool Usage

To work with Embedded Systems Tools such as compiler, assembler, linker and debugger

Core Skill:

Trouble shooting of Microcontroller based electronic systems/products Development of small electronic gadgets based on Microcontroller

Detailed Syllabus of Course

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| Module No | Module Name | No. of Hours |
| Theory / Practical |
| 1. | Embedded C with 8051 - Theory  Introduction to ‘C’ programming Embedded C Programming with KEIL | 15 /25 |
| 2. | 8051 Architecture - Theory  Architecture of 8051 Family of Microcontrollers | 10/0 |
| 3. | 8051 Peripherals - Theory  Timers Interrupts Serial Port | 15/60 |

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| 4. | Interfacing 8051 to peripheral devices –Theory  LCD  Key board Stepper Motor | 15/60 |
| 5. | Embedded C with PIC – Theory  Embedded C Programming with MPLab | 15/25 |
| 6. | PIC Architecture – Theory  Architecture of PIC Microcontrollers | 10/0 |
| 7. | PIC Peripherals - Theory  Timers Interrupts ADC  Serial Port | 15/60 |
| 8. | Interfacing PIC to peripheral devices –Theory  LCD  Key board Stepper Motor | 15/60 |
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| Theory / Lecture Hours: Practical / Tutorial Hours:  Total Hours: | | 110 hrs |
| 290 hrs |
| 400 hrs |

Recommended Hardware:

1. 8051 Microcontroller kits
2. PIC Development kit
3. PC
4. Interfacing boards
5. Electronic Components for Mini project as per requirement

Recommended Software:

1. Kiel ‘C’ or similar Embedded C Compiler for 8051
2. MP Lab with PIC –C Compiler/any other appropriate compiler

Text Books:

1. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, “The 8051 Microcontroller and Embedded Systems using Assembly and C”, 2nd Edition,

Prentice Hall

1. Design with PIC Microcontrollers, Peatman, John B , Pearson Education PTE. Ltd.

Reference Books:

1. Programming and Customizing The 8051 Microcontroller, Predko, Myke, Tata Mgh, New Delhi
2. Programming and Customizing the PIC Microcontroller, Predko, Myke, Tata Mgh, New Delhi