



## **WIZTECH AUTOMATION SOLUTIONS (P) LTD.,**

An ISO 9001:2000 and IAO certified company

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### **Syllabus for P.G. Diploma in Advanced Embedded 8051 MICROCONTROLLER**

#### **Module 1: Introduction**

- ❖ Introduction to various technologies in Electronics
- ❖ Analog, Power and Digital electronics basics
- ❖ Comparison of different technologies
- ❖ Introduction to embedded system
- ❖ Importance and evolution of Embedded system
- ❖ Comparison with other technologies
- ❖ Different architectures and elements used in embedded system

#### **Module 2: 8051 microcontroller**

- ❖ Introduction to 8051 architecture
- ❖ Comparison of 8051 with RISC based systems and Microprocessors
- ❖ 8051 Clones
- ❖ Instruction set / Bus architecture
- ❖ RAM, FLASH, UART and other peripherals.
- ❖ Pin configurations of different Microcontrollers (According to Packages)
- ❖ Introduction to 8051 programming KIT

#### **Module 3: Assembly & Embedded C language**

- ❖ Assembly Language (Instruction set, Mnemonics, Memory address)
- ❖ Introductions to Embedded C
- ❖ Loops, String , Arrays, Pointers
- ❖ Functions and Macros
- ❖ Compilers , Editors and Burners
- ❖ Compilation and burning hex file on Programmer

#### **Module 4: Peripheral Interfacings**

- ❖ Port programming & led interfacing
- ❖ Seven segment display
- ❖ Linear keyboard
- ❖ Matrix keyboard
- ❖ DC motor
- ❖ Stepper motor
- ❖ Relay
- ❖ Timer & Counter

#### **Module 5: Communication Protocols and Converters interfacings**

- ❖ RTC (I2C)
- ❖ EEPROM (I2C)
- ❖ UART (Serial Communication)
- ❖ ADC(0804)
- ❖ Sensors

#### **Module 6: Advance display modules**

- ❖ Introduction to graphics
- ❖ 16×2 LCD display
- ❖ Graphics on Character LCD
- ❖ Introduction Graphic LCD
- ❖ Graphic LCD Controller and Commands
- ❖ Interfacing and making Graphics for 128×64 GLCD

#### **Module 8: Final project**

- ❖ Final embedded based Project

#### **SYLLABUS FOR PIC MICROCONTROLLER Module 1: Introduction**

- ❖ Introduction to various technologies in Electronics
- ❖ Analog, Power and Digital electronics basics
- ❖ Comparison of different technologies
- ❖ Introduction to embedded system
- ❖ Importance and evolution of Embedded system
- ❖ Comparison with other technologies
- ❖ Different architectures and elements used in embedded system

#### **Module 2: PIC 16f877 / 18f4520 microcontroller**

- ❖ Introduction to PIC architecture
- ❖ Comparison of PIC with other CISC & RISC based systems and Microprocessors

- ❖ PIC family Categories and importance (10F/12F/16F/18F)
- ❖ 16f877 / 18f4520 pin details and specifications (with package detail)
- ❖ Instruction set / Bus architecture
- ❖ RAM, FLASH, UART and other peripherals.
- ❖ Interrupts, timer , Counters
- ❖ Introduction to PIC ProBASIC programming KIT

### **Module 3: Assembly language**

- ❖ Assembly Language (Instruction set, Mnemonics, Memory address)
- ❖ Use of Assemblers & Simulator
- ❖ MPLAB
- ❖ Configuring of 16f and 18f
- ❖ Rules to write a code
- ❖ Programming for PIC
- ❖ Examples programs for PIC
- ❖ Compilation and burning hex file on Programmer

### **Module 4: Embedded C language**

- ❖ Introductions to Embedded C
- ❖ Loops, String , Arrays, Pointers
- ❖ Functions and Macros
- ❖ Compilers , Editors and Burners( HI-TECH C , C18 )

### **Module 5: Peripheral Interfacings**

- ❖ Port programming & led interfacing
- ❖ Seven segment display
- ❖ Liner keyboard
- ❖ Matrix keyboard
- ❖ DC motor
- ❖ Stepper motor
- ❖ Relay
- ❖ Internal Watchdog timer
- ❖ Timer & Counter

### **Module 6: Communication Protocols and Converters interfacings**

- ❖ Serial RTC (I2C)
- ❖ EEPROM (I2C)
- ❖ UART (Serial Communication)(SPI)
- ❖ 8 – Channel Internal ADC
- ❖ Sensors

### **Module 7: Advance display modules**

- ❖ Introduction to graphics
- ❖ 16×2 LCD display
- ❖ Graphics on Character LCD
- ❖ Introduction Graphic LCD
- ❖ Graphic LCD Controller and Commands
- ❖ Interfacing and making Graphics for 128×64 GLCD

### **Module 8: Final project**

- ❖ Final embedded based Project

### **AVR MICROCONTROLLER Module 1: Introduction**

- ❖ Introduction to various technologies in Electronics
- ❖ Analog, Power and Digital electronics basics
- ❖ Comparison of different technologies
- ❖ Introduction to embedded system
- ❖ Importance and Evolution of Embedded system
- ❖ Comparison with other technologies
- ❖ Different architectures and elements used in embedded system

### **Module 2: ATmega 16 microcontroller**

- ❖ Introduction to AVR architecture
- ❖ Comparison of AVR with other CISC & RISC based systems and Microprocessors
- ❖ AVR family Categories and importance (AT tiny/ ATmega/ Xmega)
- ❖ Atmega 8515 / Atmega 16 pin details and specifications (with package detail)
- ❖ Instruction set / Bus architecture
- ❖ RAM, FLASH, UART and other peripherals.
- ❖ Interrupts, timer , Counters
- ❖ Introduction to AVR ProBASIC and SPI programming KIT

### **Module 3: Assembly language**

- ❖ Assembly Language (Instruction set, Mnemonics, Memory address)
- ❖ Use of Assemblers & Simulator
- ❖ Rules to write a code
- ❖ Programming for AVR
- ❖ Examples programs for AVR
- ❖ Compilation and burning hex file on Programmer

#### **Module 4: Embedded C language**

- ❖ Introductions to Embedded C
- ❖ Loops, String , Arrays, Pointers
- ❖ Functions and Macros
- ❖ Compilers, Editors and Burners (Win AVR, GNU – GCC etc.)

#### **Module 5: Peripheral Interfacings**

- ❖ Port programming & led interfacing
- ❖ Seven segment display
- ❖ Liner keyboard
- ❖ Matrix keyboard
- ❖ DC motor
- ❖ Stepper motor
- ❖ Relay
- ❖ Watchdog timer
- ❖ Timer & Counter
- ❖ Opto-Isolators

#### **Module 6: Communication Protocols and Converters interfacing**

- ❖ Serial RTC (I2C)
- ❖ EEPROM (I2C)
- ❖ UART (Serial Communication)
- ❖ ADC (Internal and External)
- ❖ Sensors
- ❖ On chip devices

#### **Module 7: Advance display modules**

- ❖ Introduction to graphics
- ❖ 16×2 LCD display
- ❖ Graphics on Character LCD
- ❖ Introduction Graphic LCD
- ❖ Graphic LCD Controller and Commands
- ❖ Interfacing and making Graphics for 128×64 GLCD

#### **Module 8: Final project**

- ❖ Final embedded based Project

**ARM PROCESSOR** ARM is the industry's leading provider of 32-bit embedded microprocessors, offering a wide range of processors based on a common architecture that deliver high performance, industry leading power efficiency and reduced system cost. Combined with the broadest ecosystem in the industry with over 750 Partners delivering silicon, tools and software, the wide portfolio of more than 20 processors are able to meet every application challenge. With more than 20 billion processors already created and in excess of 10 million shipped every day, ARM truly is The Architecture for the Digital World. **Module 1: Introduction**

- ❖ Introduction of ARM Processors
- ❖ Evolution of ARM
- ❖ 32 – bit Programming

#### **Module 2: ARM7 Architecture**

- ❖ ARM7 Architecture
- ❖ Instruction Set Architecture
- ❖ LPC21xx Description
- ❖ Memories
- ❖ Peripherals

#### **Module 3: ARM Processor Programming**

- ❖ ARM Processor Programming in C
- ❖ Using ARM Programming Tools

#### **Module 4: I/O Device Interface and practical**

- ❖ Study of Input Output Devices
- ❖ LED Display
- ❖ Intelligent LCD Display
- ❖ BUZZER
- ❖ Serial Communication Concepts(Tx & Rx)
- ❖ RTC

#### **Module 5: Advance IO**

- ❖ ADC
- ❖ EEPROM

## **Module 6: Latest trends in ARM Processor Introduction to**

- ❖ ARM9
- ❖ RTOS
- ❖ Embedded Linux on ARM

**Duration: 6 weeks** Robotics is the branch of technology that deals with the design, construction, operation, structural disposition, manufacture and application of robots. **Syllabus for Robotics**

### **Module 1: Introduction**

- ❖ What is Robotics
- ❖ Introduction to various technologies in Robotics
- ❖ Utility and real implementation of Robots
- ❖ Introduction to embedded system
- ❖ Importance and Evolution of Embedded system
- ❖ Relation with Real time systems

### **Module 2: Robot Projects**

- ❖ Robotic Arm and its controlling
- ❖ Automatic guided vehicles
- ❖ Line follower
- ❖ Path finder

### **Module 3: Motors**

- ❖ Types of Motors
- ❖ DC geared motors
- ❖ Stepper motors and their types
- ❖ Size and speed specifications
- ❖ Motor driving ICs

### **Module 4: Programming**

- ❖ Architecture of the Microcontroller
- ❖ Embedded Programming in C and assembly
- ❖ Implementation over simulator
- ❖ Implementation over real model

**Module 5: Sensors**

- ❖ Infrared sensor
- ❖ Ultrasound sensor
- ❖ Light sensors
- ❖ Smoke sensor

**Module 6: Communication Devices**

- ❖ IR Communication
- ❖ RF Module Interfacing
- ❖ GSM Module interfacing
- ❖ GPRS Module interfacing

**Duration: – 6 weeks**