

## **ADVANCED DIPLOMA IN EMBEDDED SYSTEMS**

**DURATION – 120 DAYS**

**contact:9640648777**

### **ADVANCED C**

#### **Introduction**

- What is a program?, What is a programming language?, Evolution of C language, Features of C, Structure of a C program, Compilation and execution?
- Keywords in C, constants, variables, data types, Comments in C, Format strings, escape sequences, Basic I/O instructions

#### **Operators**

Classification of operators

- ✓ Arithmetic operators
- ✓ Relational operators
- ✓ Logical operators
- ✓ Assignment operators
- ✓ Increment/Decrement operators
- ✓ Bitwise operators
- ✓ Conditional operator
- ✓ Other operators

#### **Flow control instructions**

Decision Control Instructions

- If, if-else, if-else-if, nested if-else

Loop control instructions

- for loop, while loop, do while, use of break and continue

Selection instructions

- switch

#### **Functions**

Arrays

Pointers

Strings

Structures and Unions

Storage classes and scoping

Files

Other Features

Preprocessor

### **OBJECT ORIENTED PROGRAMMING C++**

#### **Introduction to C++**

1. Introduction to Object Oriented Programming
2. Procedure Oriented Vs Object Oriented
3. Difference between C and C++
4. C++ Output/ Input
5. Keywords in C++
6. New Style of header files Specification
7. Comments in C++
8. Variables in C++

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### **Classes and Object**

- a. Structures in C
- b. Structure in C++
- c. Access Specifier
- d. Classes
- e. Objects in C++

- **More on Classes and Objects**
- **Dynamic Memory Management**
- **Constructor and Destructor**
- **Inheritance**
- **Virtual Functions and Inheritance**
- **Operator Overloading**
- **Constructor- Destructor Invocation**
- **Templates**
- **Exception Handling**
- **Working with input and output and files**
- **Basic understanding of standard template library**
- **the string of C++**
- **Miscellaneous concept of C++**

### **8051 MICRO CONTROLLER**

#### **Introduction to Embedded systems**

- What is Embedded System?
- Types of Embedded System
- Classifications of Embedded Systems
- Characteristics of an Embedded System
- Applications of embedded system

#### **8051 (8-bit) microcontroller Architecture & Programming**

- Block diagram and Pin description
- Ports
- Timers
- Serial communication
- Interrupts

#### **Lab Sessions:**

- Session 1: Software Introduction (Keil Micro vision), Projection Creation
- Session 2: Port programming
- Session 3: Timer programming
- Session 4: Serial Communication
- Session 5: Interrupts
- Session 6: Practice

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### **89S52 interfacing with**

Session 1: PCB Express Tool  
Session 2: Seven segment display  
Session 3: LED's  
Session 4: LCD (16\*2)  
Session 5: Keypad (4\*4)  
Session 6: LCD & Keypad

Session 7: Keypad & Serial  
Session 8: ADC (0809)  
Session 9: DC Motor  
Session 10: Stepper Motor  
Session 11: Relay

### **89S52 Interfacing with Modules**

Different Types of Modules, Features of Different Modules, and Uses of Different modules interface

Session 1. RFID  
Session 2. GSM  
Session 3. GPS

Session 4: Zigbee  
Session 5: Finger print  
Session 6: Voice Module

### **Practical Projects**

- RFID and Keypad based ATM security.
- GSM based electrical Device Control.
- GPS Data Logger
- Zigbee based wireless data communication system.
- GSM & GPS based Vehicle Tracking
- RFID based time and Attendance

## **ARM7 MICRO CONTROLLER**

### **ARM (32-bit) Processor Architecture & Programming**

#### **Introduction to ARM7**

- Introduction to ARM family
- LPC2148 features
- block diagram and pin description
- register set
- Ports
- Timers
- Serial communication
- Interrupts

### **Lab Sessions**

Session 1: Software Introduction (Keil Micro vision)  
Session 2: Port programming  
Session 3: Timer programming

Session 4: Serial Communication  
Session 5: Interrupts  
Session 6: Practice

### **LPC2148 interfacing with Modules**

Session 1: Seven segment display  
Session 2: LED's  
Session 3: LCD (16\*2)  
Session 4: Keypad (4\*4)  
Session 5: LCD & Keypad

Session 6: Keypad & Serial  
Session 7: ADC (0809)  
Session 8: DC Motor  
Session 9: Stepper Motor  
Session 10: Relay

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### **LPC2148: Interfacing with Modules**

Different Types of Modules, Features of Different Modules, and Uses of Different Modules interface

Session 1.RFID

Session 4: ZIGBEE

Session 2.GSM

Session 5: Finger print

Session 3.GPS

Session 6: Voice Module

### **LINUX OPERATING SYSTEM**

#### **Operating Systems**

Learning of operating system concepts will help you in understanding Desktop, Embedded & Real-time Operating Systems easily in less time.

- Introduction
- Processes
- Threads
- CPU Scheduling
- Process Synchronization
- Deadlocks
- Memory management
- Virtual Memory.
- File management & Disk management

#### **Linux Basic Commands**

##### **Linux System programming**

- Program, Process, Process IDs,
- Processes Priorities, Process States, CPU Scheduling
- Process Management API – fork, vfork, exec, wait and exit.
- Zombie and Orphan Process
- Pthread Programming and Thread Attributes
- Process Synchronization Techniques.
- Semaphores, Mutex, Spinlock, Memory

##### **Barriers**

- Inter Process Communication Techniques
- Pipe, FIFO, Signals, Shared Memory
- Timer API – Jiffies, kernel Timers, wait queues, sleeps
- Interrupt and Exception API – Task lets, Work queues
- Kernel Debugging – kgdb, printk, jprobs, kprobs

##### **Linux Device Drivers Programming**

- Introduction to Device Drivers
- Device Number, Major and Minor Numbers
- Inbuilt and Modular Drivers
- User Space and Kernel Space Communication.
- dev directory and device files
- Character, Block and Network Driver.
- Advanced Driver API – fcntl,iocctl
- Unified Device Model (udev)
- Proc File System, sys file system.
- usbfs file system.
- Character Device Driver Programming
- Block Device Driver Programming
- Serial Port Driver Programming
- Parallel Port Driver Programming
- USB Device Driver Programming
- Network (Ethernet) Driver Programming
- Flash Drive Driver Programming

##### **Linux Network Programming:**

- Networking Architecture in Linux.
- TCP/IP defector model and layer in kernel.
- Client – Server Programming API.
- TCP, UDP, RAW, UNIX, FTP, TFTP
- VOIP Protocol Programming.
- Arithmetic Server, Concurrent Server.
- Broadcast Server Programming
- Wireless Architecture and Programming

## **ADVANCED DIPLOMA IN EMBEDDED SYSTEMS**

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### **Real -Time Operating System (RTLinux) Programming**

- Real Time Concept, RTLinux Installation.
- Scheduling and Preemption Programming.
- GPOS and RTOS API Programming.
- FIFO and Round Robin Scheduling Programming
- Task Management, synchronization, Intertask Communication
- Timers, Interrupt API in RTOS.
- Signals, Events handling API in RTOS.
- Priority Inversion/Inheritance.

### **ARM 9/ARM11– Linux Programming**

- ARM Architecture and ARM Processor family.
- ARM Microcontroller ICs in Market.
- ARM Development Boards and features.
- Friendly ARM Development Boards.
- Mini2440, Mini6410, Mini210 Development Boards.
- Raspberry Pi Development Board.
- Beagle Bone Development Board.
- Boot loader Configuration and Compilation for ARM
- Kernel Configuration and Compilation for ARM.
- File System Configuration and Compilation for ARM.
- Porting Linux / Android OS on Development Boards.
- DNW Tools, USB Push, Hyper Terminal Tool.

### **QT CREATOR-OPENCV-ARM9/ARM11/ARM CORTEX A7**

- Installing QT Framework.
- Installing Opencv and Pocket Sphinx.
- Application Development Using QT Creator.
- Sensors and modules Programming in QT Creator.
- Wireless Protocol Programming in QT Creator.
- Image and Video Processing Programming in Opencv.
- Audio Processing Programming in Pocket Sphinx.
- Interfacing Opencv with QT Creator.
- Interfacing Pocket Sphinx with QT Creator.
- Creating HTML and HTTP pages for ARM Board.