Embedded System

1. ***introduction (4h)***
    - *What is embedded systems*
    - *Embedded Systems Application*
    - *Difference between MCU and MP*
    - *Memories*
    - *Addressing I/O devices*
    - *Microcontroller Categorize And Providers*

2. C Programming & Data Structure (40h)

- *Hello c, data types, operators*
- *Rest of operators, if switch case loops*
- *Function and modular programming*
- *C building process*
- *Pointers*
- *Arrays , strings*
- *Structures and unions*
- *Standard C library*
- *Stack, Linked list ,Queue*
- *Searching algorithms*
- *Sorting algorithms*
- *C Exam*

3. Software Engineering (4h)

- *Introduction to software engineering*
- *Software process and models*
- *Rapid software development*
- *Agile method*
- *Case study (V Model)*

4. Embedded system Tools (6h)

- *Software configuration management (SVN) Simulator*
- *Emulator*
- *Debugger*
- *IDE*
- *Preprocessor*
- *Compiler*
- *Assembler*
- *Linker*
- *Make file*

5. Computer Architecture(5h)

- *Computer Architecture*
- *CISC vs RISC*
- *Processor Design*
- *Memory Types*
- *MCU Internal Architecture*
- *Introduction to MCU peripherals*

6. Embedded C (5h)

- *Bit Math*
- *Qualifiers Keywords (volatile and const)*
- *Design Concepts*
- *Device Drivers*
- *Layered Architecture Motivation*
- *Configuration Types (Precompile , link time and Post build config.)*

7. Microcontroller Interfacing AVR &ARM (60h)

- *Microcontroller (AVR ATmega 32)*
- *I/O Ports*
- *AVR DIO module*
- *ATmega 32 data sheet*
- *Layered architecture in Embedded Software (case study is AVR)*
- *LCD and Keypad driver*
- *Interrupts*
- *ADC and Sensors*
- *General Purpose timer*
- *Timers and PWM interfacing*
- *UART Interface*
- *SPI*
- *I2C*
- *Overview on ARM architecture*
- *ARM Cortex-M4 and ARM Cortex-M3 Specifications*
- *TM4C123GH6PM Microcontroller Peripherals*
- *TIVA TM4C123GH6PM Launchpad*
- *Startup Code*
- *GPIO Interface with applications*
- *DMA*

8.RTOS (20h)

- *Design patterns*
- *Foreground/background systems*
- *Real time systems*
- *Types of real time systems*
- *Multi-tasking vs Multi-processing*
- *Scheduling algorithms*

- *FreeRTOS Porting to TivaC and ATMEGA32*
- *Tasks creation*
- *Task states*
- *Task control*
- *Task utils*
- *Shared resource problem*
- *Race condition*
- *Reentrancy*
- *Critical sections*
- *Queue management Using queues Semaphores*
- *Binary semaphores*
- *Counting semaphores*
- *Priority inversion and deadlocks*
- *Mutex*
- *Priority inheritance*

9.ISTQB (18h)

- *What is software quality*
- *Improving quality*
- *QC&QA*
- *Verification and validation*
- *Static verification*
- *Dynamic verification*
- *Test case structure & design*
- *Nonfunctional test*
- *Test automation*
- *Test planning*

10. Automotive Bus technology (4h)

- *Introduction*
- *Basic concepts*
- *Frame formats*
- *Error detection*
- *Error Handling*
- *CAN protocol versions*
- *LIN Bus*