

EMBEDDED SYSTEMS - 1

(Common to CSE & IT)

Course Code :13CT1117

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Course Educational Objectives:

This syllabus was designed to provide a comprehensive exposure on popular 8-bit embedded processors and their programming.

- ❖ To expose 8-bit Embedded-processors, and their versatility in programming.
- ❖ To gain hands on experience of peripheral systems builtin in these processors.
- ❖ To enable a student the confidence to writing application programs.
- ❖ To provide alternate ways of building solutions to the given practical exercises so that they understand creative solutions to applications.

Course Outcomes:

At the end of the course the student will be able to

- ❖ Understand the essentials of the INTEL 8051, PIC16F877 and Atmega8535 architectures
- ❖ Understand the instruction sets , its registers.
- ❖ Write programs in assembly language for real time problems.
- ❖ Understand the serial communication buses.
- ❖ Understand the peripheral systems in atmega 8535.

UNIT-I

(12 Lectures)

Introduction to Classic 8051 family Architecture. Address and data bus with multiplexed I/O pins. Registers Examples with arithmetic and Boolean instruction set. Applications using, Timers, Counters and I/O programming for external logic sensing and control.Interrupts and their reatime programming in all applications. This processor is based on the classic architecture the Von Neumann Architecture.

UNIT-II**(15 Lectures)****Introduction to the advanced Harvard architecture for faster instructions.**

Introduction to PIC family Architecture and instruction set. Introduction to the shorter RISC instruction set and its usage with example programs. Interrupts using change of state on ports and its use in all application programming.

PERIPHERAL SYSTEMS IN PIC 16F877A PROCESSOR.

- (a) Digital Input and Output Programming,
- (b) Timers and Counters
- (c) Capture Control and PWM
- (d) Analog to Digital Converters and their Programming
- (e) Simple data acquisition systems and programming.

UNIT-III**(9 Lectures)**

Introduction to Atmega processor with a large register set. Family architecture exposes Accumulator free programming, with advanced addressing modes and faster Cache memory controlled I/O. Programming using the popular Atmega 8535 processor and instruction set. The versatile peripherals and their applications in 8535.

Logical sequence of steps to design a program to suit an objective. Examples in Robotics, Motor control, Display control will be exposed.

UNIT-IV**(12 Lectures)****PERIPHERAL SYSTEMS IN ATMEGA 8535**

- (a) Digital Input and Output Programming
- (b) Timers and Counters wave form generation.
- (c) Capture Control and PWM
- (d) Analog to Digital Converters and their Programming
- (e) Simple data acquisition programming.

UNIT-V**(12 Lectures)****SERIAL COMMUNICATION BUSSES**

- (a) USART, with addressable communication feature

- (b) SPI bus, ants speed and versatility
- (c) 12c {inter integrated bus] the two wire communication bus .
- (d) Introduction to USB bus and its features for fast synchronous communication.

TEXT BOOKS:

1. Bendapudy Kanta Rao, “*Embedded Systems, Prentice Hall India*”, 1st Edition, 2011.
2. Milan Verle, “*PIC microcontrollers, MikroElektronika*”, 1st Edition,2008
3. Muhammad Ali Mazidi, Sarmad Naimi, Sepehar Naimi, “*The AVR Microcontroller and Embedded systems using assembly & C*”, 1st Edition, Prentice Hall, Pearson education, 2009.

REFERENCES:

1. Ali Mazidi Mohammed Gillispie, Mazide Janice, “*The 8051Microcontroller and Embedded Systems using assembly & C*”, 2nd Edition, Pearson Education, 2009
2. Timothy D.Green, “*Embedded Systems Programming with the PIC16F877*”, 2nd Edition,2008
3. Kenneth J Ayala, “*The 8051 Micro Controller*”, 3rd Edition, Thomson Publishers, 2009.

