

### 3/4B.Tech-SIXTHSEMESTER

EC6T6FE4

Microcontrollers

Credits:3

Lecture:3periods/week  
Tutorial:1period/week

InternalAssessment:30Marks  
SemesterEndExamination:70Marks

---

Prerequisites:Microprocessors&Microcontrollers(EC6T2)

#### Courseobjectives:

- To introduce the concepts and techniques associated with the understanding of micro controllers and advanced micro controllers in the development of various applications
- To know complete architectural, programming, interfacing details. **Learning outcomes:**

#### Learning outcomes:

Student will be able to

- Program a microcontroller to perform various tasks
- Interface a microcontroller to various devices and peripherals
- Design and implement a microcontroller-based embedded system

#### UNIT I

##### Introduction to Microcontrollers:

8, 16, 32 bit microcontrollers, embedded and external memory microcontrollers, CISC and RISC architecture microcontrollers, Harvard and Princeton memory architecture microcontrollers, examples of popular microcontrollers.

#### UNIT II

**Microcontroller on chip resources:** Basic processing unit, internal buses and interrupt handling, program and data memory, parallel ports, on-chip registers, special function registers, UART, timers/counters, PWM, watchdog timers, on-chip A/D converters, power down mode, Real time clock, reset circuit, oscillator circuit, interrupts in 8051.

#### UNIT III

**Peripherals and interfacing:** serial UART, USART, I2C & SPI communication interfacing, parallel I/O ports interface, sources of interrupts and programming. ADC, DAC circuit interfacing.

#### UNIT IV

**32-bit ARM7, ARM9 microcontrollers:** Architecture of ARM7, ARM9 & ARM-Cortex

#### UNIT V

**ARM Instructions & Development tools:** ARM instruction set, thumb instruction set, exception handling in ARM, development tools.

## Learning Resources

### Text Books:

1. Microcontrollers Architecture, programming, interfacing and system design - Raj Kamal, Second Edition, Pearson.
2. Microprocessors & Microcontrollers – N. Senthil Kumar, M. Saravanan, S. Jeevananthan. Oxford university press.

### References:

1. Introduction to Embedded System - Shibu KV, McGraw Hill Higher Edition.
2. Embedded/Real Time Systems - KVKK Prasad, Dreamtech Press, 2005.

### Web resources

1. [http://www.ti.com/lscs/ti/microcontrollers\\_16-bit\\_32-bit/msp/overview.page](http://www.ti.com/lscs/ti/microcontrollers_16-bit_32-bit/msp/overview.page)
2. <http://community.arm.com/docs/DOC-7261>
3. <http://nptel.ac.in/courses/Webcourse-contents/IITKANPUR/microcontrollers/micro/ui/TOC.htm>