

**IV/IV B. TECH. FIRST SEMESTER  
EMBEDDED SYSTEMS (Elective-II)****Course Code: CS 7T5B****Credits: 3****Lecture:3 periods/week****Internal assessment: 30 Marks****Tutorial: 1period/week****Semester end examination: 70 Marks**

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**Prerequisites: C Language, I/O, Analog and Digital interfacing, and peripherals.**

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**Course Objectives:**

The objective of this course is to equip the students with the basic concepts of embedded system, applications in which they are used, 8051 microcontroller programming concepts and various aspects of embedded system design from Hardware and Software points of view and it describes tools and methodologies needed for embedded system design. It provides RTOS concepts for coding the embedded system software routines. It tells what makes a system a real-time system and describes the characteristics of latency in real-time systems.

**Course Outcomes:**

At the end of this course student will:

CO1) Understand the microprocessor architecture and its components used in embedded systems

CO2) Write the 8051 assembly language code for specific purposes

CO3) impliment code for interfacing various devices.

CO4) Develop simple embedded systems for real time operations

CO5) Compose simple embedded system with error free software to obtain target system

**Syllabus:****UNIT 1**

**Embedded Systems Basics:** Introduction to Embedded systems, Examples of embedded systems, TypicalHardware,Gates,TimingDiagrams,Memory, Microprocessors, Buses, DirectMemoryAccess, Interrupts, Microprocessor Architecture, and Interrupt Basics.

**UNIT 2**

The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input/output Pin Ports and Circuits, External Memory, Serial data Input/output, Interrupts.

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**UNIT 3**

**Basic Assembly Language Programming Concepts:** The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.

**UNIT 4**

**Moving Data:** Introduction, Addressing Modes, External Data Moves, Code Memory Read-Only Data Moves, Push and Pop Opcodes, Data Exchanges.

**Basic Design Using a Real-Time Operating System:** Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment

**UNIT 5**

**Applications:** Introduction, keyboards, Human Factor, Key Switch Factors, Keyboard Configurations, Displays, Seven-Segment Numeric Display, D/A and A/D Conversions.

**Embedded Software Development Tools:** Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

**Learning Resource****Text Books**

1. An Embedded Software Primer, David E. Simon, Pearson Education.
2. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.

**References**

1. 8051 Microcontrollers, Satish Shah, Oxford Higher Education.
2. Embedded Microcomputer Systems Real Time Interfacing, Jonathan W. Valvano, Cengage Learning.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
  - a. <http://nptel.ac.in/courses.php>
  - b. <http://jntuk-coeerd.in/>