FUNDAMENTALS OF EMBEDDED SYSTEMS
(Elective for B Tech)

Course Code:	14B1WEC735	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	**Contact Hours:**	L-3, T-0, P-0

Course Objectives
1. To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
2. To provide experience to integrate hardware and software for microcontroller applications systems.

Course Outcomes
To acquire knowledge about microcontrollers embedded processors and their applications.
1. Foster ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
2. Foster ability to write the programs for microcontroller.
3. Foster ability to understand the role of embedded systems in industry.
4. Foster ability to understand the design concept of embedded systems.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to embedded systems: Introduction to embedded systems, Difference between Embedded and General-Purpose Computing. Embedded microcontrollers and their architectures. Embedded system components.	Text Book #1 Chapter No. 1 Chapter No. 2	4
2.	8051 Microcontroller: 8051 Architecture, Pin configuration, Reset and system clock, timers and interrupts, Special function registers, Program/ data memory, addressing modes. Introduction to 8051 assembly language programming, Arithmetic instructions, Logic and Compare instructions, Branch and conditional instructions, Single bit instruction programming.	Text Book # 2 Chapter No. 2 Chapter No. 3 -8	9
3	8051 Interrupts: Introduction to 8051 interrupts, programming of timer interrupts, programming external hardware interrupts, programming the serial communication interrupts, interrupt priority in the 8051.	Text Book # 2 Chapter No. 9 Chapter No. 11	4
4	Serial Communication: Basics of serial communication, 8051 connection to RS 232, 8051 serial communications Programming.	Text Book # 2 Chapter No. 10	3

5	Real World Interfacing: Interfacing of A/D and D/A converter, interfacing stepper motor, interfacing of LCD, interfacing of sensors, interfacing keyboard.	Text Book # 2 Chapter No. 12	5
6	PIC18F Family: The Architecture of PIC family of devices, PIC18F instructions and assembly language, PIC18F programming model, instruction set, instruction format. Data copy, arithmetic, branch, logical, bit manipulation and multiply divide operations. Stacks, subroutines and macros.	Text Book # 3 Chapter No. 3-7	8
7	Interrupts and Timers of PIC: Concepts of Interrupts and Timers. Interrupts and their implementation in PIC18. The PIC18 timers. The CCP. Use of Interrupts in applications.	Text Book # 3 Chapter No. 10 Chapter No. 12	5
8	I/O Port and Interfacing: Concepts of I/O interfacing and PIC18 I/O ports. Interfacing output and input peripherals.	Text Book # 3 Chapter No. 13 Chapter No. 14	4
		Total Number of Lectures	**42**

Evaluation Scheme

1. Test 1 : 15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1. Embedded systems design by Steve Heath, Newnes.
2. The 8051 Microcontroller and embedded systems by Muhammad Ali Mazidi, PHI.
3. PIC microcontroller and embedded systems by Muhammad Ali Mazidi, PHI.

Reference Books

1. The 8051 microcontroller by Kenneth J. Ayala, Cengage Learning.