ITE6002 Advanced Embedded Systems

L T P J C
3 0 0 4 4

Pre-req: Nil

Objectives:

1. To describe an embedded electronic systems.
2. To study debugging tools to run on the microcontroller.
3. To learn interfacing of real world input and output devices.

Expected Outcomes:

- To implement formal design methodology and to optimize various aspects in the design of embedded systems.
- To apply knowledge of various embedded processor architectures in industrial automation.
- To develop, test and analyze micro architectures for embedded processors.

Module	Topics	L Hrs	SLO
1	**Introduction to Embedded System Design** Embedded systems Architecture and model-Programming languages and standards-Networking standards-Embedded Hardware blocks and boards.	6	2
2	**Embedded Processors** ISA architecture models-Processors-board memory-board IO and board bus, performance issues.	6	2,17
3	**Embedded software and Operating system** Device drivers – memory device drivers –IO device drivers and Bus device drivers. OS standards and performance guidelines. Middleware-application layer software.	6	2
4	**Embedded systems Design and Development** Architectural Patterns and Reference Models-Architectural Structures-Analyze and Evaluate the Architecture.	6	2
5	**Embedded Design: Implementation and Testing** Embedded C Programs, Role of infinite loop, Compiling, Linking, Locating and Debugging. Emulators and Simulators, External Peripherals, Memory testing, Flash memory, System Boot-Up, Quality Assurance and Testing of the Design. Computer-Aided Design (CAD) and the Hardware.	6	2,17
6	**ARM Cortex Processors** Overview of the Cortex-M3Operation Modes Nested Vectored Interrupt Controller memory map and bus interface-Instruction set.	6	2
7	**Cortex-M3 Programming** CMSIS-using bit band for semaphores-Exception Programming-Memory protection unit.	6	2,17
8	**Expert talk on recent trends**	3	17
	Total Lecture Hours	**45**	

 # Mode: Flipped Class Room, [Lecture to be videotaped], Use of physical and computer models to lecture, Visit to Industry, Min of 2 lectures by experts

Text Books:

Tammy Noergaard, "Embedded systems Architecture: A comprehensive guide for engineers and programmers", second edition, Newnes Elsevier, 2012.

Reference Books: Joseph Yiu., The definitive guide to ARM Cortex –M3 and Cortex M4 Processors, third edition, Newnes Elsevier, 2014. Michael Barr, Programming Embedded Systems, O'Reilly Media, Second edition, 2006. Frank Vahid and Tony Givargis, "Embedded System Design: A Unified Hardware/Software Introduction", 1st Edition, John Wiley & Sons, 2009.	
Compiled by: Prof V. Shashikiran and Prof P. Kumaresan	