EMBEDDED SYSTEM ARCHITECTURE

II Semester: ES

Course code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BESB11	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

I. COURSE OVERVIEW:

This course is allows the students to learn the fundamentals of embedded system hardware and firmware design. It focuses on basics of embedded systems, embedded firmware design approaches, development languages and system design. The knowledge acquired from this course will enable the students to implement embedded hardware projects and models for engineering and scientific appli- cations

II. COURSE OBJECTIVES:

The students will try to learn:

I. The fundamental embedded systems design paradigms, architectures.
II. The possibilities and challenges, both with respect to software and hardware.
III. The system both as whole and in the included parts, to understand how these parts interact inthe functionality and properties of the system.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO1	**Outline** the basic concepts and architectures of embedded system in real time applications.	Understand
CO2	**Illustrate**the challenges, design issues and cyclic process for the development of embedded system design.	Understand
CO3	**Demonstrate** the architecture and instruction set of ARM Processors for efficient embedded assembly language level programming.	Apply
CO4	**Make use of** memory and input/output peripherals to interface the programmable embedded devices for increasing time response of a system.	Apply
CO5	**Develop** embedded system programming using ARM thumb instruction set to increase the code density.	Apply
CO6	**Explore** the architecture and programming of Industry standard 32-bit popular ARM Cortex-M3 Microcontroller for high performance and low cost embedded devices.	Apply

IV. SYLLABUS:

UNIT-I	INTRODUCTION TO EMBEDDED SYSTEMS	Classes: 09

Embedded system model, embedded standards, block diagrams, powering the hardware:Embedded board using von Neuman model; EMBEDDED processors: ISA architecture models, application specific ISA models and general purpose ISA models: Instruction level parallelism.

UNIT-II	**PROCESSOR HARDWARE**	**Classes: 09**
Internal processor design: ALU, registers, control unit, clock, on chip memory, processor i/o, interrupts, processor buses, processor performance.		
UNIT-III	**SUPPORT HARDWARE**	**Classes: 09**
Board memory: ROM, RAM, cache , auxiliary memory, memory management, memory performance Board buses: Arbitration and timing, PCI bus example, integrating bus with components, bus performance.		
UNIT-IV	**SOFTWARE**	**Classes: 09**
Middleware and applications: PPP, IP middleware UDP, Java. Application layer: FTP client, SMTP, HTTP server and client.		
UNIT-V	**ENGINEERING ISSUES OF SOFTWARE**	**Classes: 09**
Design and development: architectural patterns and reference models: Creating the architectural structures, documenting the architecture, analyzing and evaluating the architecture, debugging testing, and maintaining.		

Text Books:

1. Tammy Noergaard, "Embedded system architecture", Elsevier, 2006.

Reference Books:

1. Jean J. Labrosse, "Embedded Systems Building Blocks: Complete and Ready-To-Use Modules in C", the publisher Paul Temme, 2011.

Web References:

1. http://www.nptelvideos.in/2012/11/embedded-systems.html
2. http://nptel.iitg.ernet.in/courses/Elec_Engg/IIT%20Delhi/Embedded%20Systems%20(Video).htm

E-Text Books:

1. http://www.sciencedirect.com/science/book/9780750677929
2. https://books.google.co.in/books/about/Embedded_systems.html?id=tgLm2g8KnH0C