

EMBEDDED SYSTEMS DESIGN

I Semester: M TECH (ES)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
BESB01	Core	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			

COURSE OBJECTIVES :

The course should enable the students to:

- I Introduce the difference between embedded systems and general purpose systems.
- II Optimize hardware designs of custom single-purpose processors.
- III Compare different approaches in optimizing general-purpose processors.
- IV Introduce different peripheral interfaces to embedded systems.

COURSE OUTCOMES (COs):

- CO 1 Understand the basic concepts of embedded system and various applications and characteristics system design of embedded system design and Quality Attributes of Embedded Systems.
- CO 2 Classify the different types of processors and compare them and remember the definitions of ASICs, PLDs, memory, memory interface. Communication Interface.
- CO 3 Applying the blocks and different circuits and Embedded Firmware Design Approaches and Development Languages.
- CO 4 Understand Operating System Basics, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.
- CO 5 Understand Task Communication Synchronization Issues, Task Synchronization Techniques, Device Drivers, analyze RTOS.

COURSE LEARNING OUTCOMES (CLOs):

1. Demonstrate to understand the definition and comparison of embedded system with other systems.
2. Explain to understand the history embedded system, Classify the embedded systems.
3. List out the application areas of embedded systems Understand the purpose of the embedded systems.
4. Understand the concepts of the characteristics and quality attributes.
5. Classify the different types of processors and compare them and remembering the definitions of ASICs, PLDs.
6. Concept of COTS and Explain the memory shadowing, memory selection.
7. Communication Interface: Onboard and External Communication Interfaces.
8. Applying the different blocks and different circuits.
9. Applying the embedded firmware design approaches and development languages.
10. Remembering the basics of operating system and types of operating systems.
11. Understanding the definitions of task, process and threads.
12. Analyze the multiprocessing, multi tasking, task scheduling.
13. Understanding Task Communication.
14. Analyze the Task Synchronization, issues and techniques.
15. Analyze Real Time Operating System and how to choose RTOS.

Unit-I	INTRODUCTION TO EMBEDDED SYSTEMS:	Classes: 09
Definition of Embedded System, Embedded Systems Vs 5General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.		
Unit-II	TYPICAL EMBEDDED SYSTEM:	Classes: 09
Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.		
Unit-III	EMBEDDED FIRMWARE:	Classes: 09
Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.		
Unit-IV	RTOS BASED EMBEDDED SYSTEM DESIGN:	Classes: 09
Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.		
Unit-V	TASK COMMUNICATION:	Classes: 09
Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.		
Text Books:		
1. Frank Vahid, Tony Givargis, “Embedded System Design”, John Wiley Publications, 3 rd Edition, 2006.		
Reference Books:		
1. Raj Kamal, “Embedded Systems”, TMH, 2 nd Edition, 2008. 2. Shibu K.V, “Introduction to Embedded Systems, McGraw Hill, 3 rd Edition, 2012. 3. Lyla, “Embedded Systems”, Pearson Education, 2 nd Edition, 2013.		
Web References:		
1. http://www.igniteengineers.com 2. http://www.ocw.nthu.edu.tw 3. http://www.uotechnology.edu.iq 4. http://www.nptel.com		
E-Text Books:		
1. https://www.jntubook.com/embedded-systems-textbook 2. http://trdownload.com/results/neamen-embedded-systems-.html 3. http://www.everythingvtu.wordpress.com		