18ECOE05	BASICS OF EMBEDDED SYSTEMS	L	T	P	C
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Prerequisite: Microcontrollers

Course Objectives:

1.	To impart knowledge on embedded system architecture and embedded development Strategies
2.	To understand the bus Communication in processors and peripheral interfacing
3.	To understand basics of Real Time Operating System

Unit I	BASICS OF EMBEDDED SYSTEMS	8	+	0

Introduction - Fundamental Components of Embedded Systems - Challenges for Embedded Systems - Examples - Programming Languages - Recent Trends in Embedded Systems - Architecture of Embedded Systems - Embedded Design Life Cycle - Selection Process - Hardware Software Partitioning - Development Environment.

Unit II	MEMORY MANAGEMENT AND INTERRUPTS	9	+	0

Memory Access Procedure - Types of Memory - Memory Management Methods - DMA - Memory Interfacing - Polling Vs Interrupts - Types of Interrupts - Interrupt Latency - Interrupt Priority - Programmable Interrupt Controllers - Interrupt Service Routines.

Unit III	COMMUNICATION INTERFACES	9	+	0

Interfacing Buses - Serial Interfaces - RS232/UART - RS422/RS485 - I2C Interface - SPI Interface - USB - CAN - IRDA - Ethernet - IEEE 802.11 - Bluetooth.

Unit IV	REAL TIME OPERATING SYSTEMS	10	+	0

Real-Time Concepts - Task Management - Task Scheduling - Classification of Scheduling Algorithms - Clock Driven Scheduling - Event Driven Scheduling - Resource Sharing - Priority Inheritance Protocol - Priority Ceiling Protocol - Inter Task Communication - Mutex - Semaphores - Message Queues - Timers - Commercial RTOS.

Unit V	VALIDATION AND DEBUGGING	9	+	0

Host and Target Machines - Validation Types and Methods - Host Testing - Host-Based Testing Setup - Target Testing - Remote Debuggers and Debug Kernels - ROM Emulator - Logical Analyzer - Background Debug Mode - InCircuit Emulator CASE STUDY: RFID Systems - GPS Navigation System - Development of Protocol Converter

Total (L+T)= 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Outline the concepts of embedded systems.
CO2	:	Understand the concept of memory management system and interfaces.
CO3	:	Understand real time operating system
CO4	:	Design and Analyze the real-time applications of embedded-systems

Text Books:

1.	Arnold S Berger, ‾Embedded Systems Design - An Introduction to Processes, Tools and Techniques, Elsevier, New Delhi, 2011.
2.	Prasad K V K K, ‾Embedded/Real-Time Systems: Concepts, Design and Programming - The Ultimate Reference, Himal Impressions, New Delhi, 2003.

Reference Books:

1.	Sriram V Iyer and Pankaj Gupta, ‾Embedded Real-time Systems Programming‖, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2006.
2.	Steve Heath, ‾Embedded Systems Design‖, Newnes an Imprint of Elsevier, Massachusetts, 2003.
3.	Tammy Noergaard, ‾Embedded Systems Architecture‖, Newnes an Imprint of Elsevier, Massachusetts, 2006.
4.	Raj Kamal, 'Embedded System-Architecture, Programming, Design', McGraw Hill, 2013

E-References:

1	https://lecturenotes.in/subject/225/embedded-system-es
2	https://nptel.ac.in/courses/108102045/19
3	https://www.coursera.org/learn/introduction-embedded-systems.