Department Core Course-14 (DCC)

EC304: Embedded Systems

Details of Course: -

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Embedded Systems	3	0	2	Knowledge of Computer Architecture and Microprocessor

Course Objective:

To introduce fundamentals of 16 and 32-bit Microcontrollers and assembly language programming. The course also focuses on the interfacing of different interrupt-driven peripherals. It also covers in detail Real-Time Operating Systems, Bus architecture, and Digital Signal Processors.

Course Outcomes:

CO1:Explain the basic principles, architecture, and significance of microcontrollers.
CO2:Demonstrate programming skills using PIC and ARM microcontrollers, focusing on memory interfacing and peripherals.
CO3:Describe the internal architecture and interfacing of peripheral devices with microcontrollers.
CO4:Illustrate the principles, applications, and working of digital signal processors and their variants.
CO5:Analyze the memory organization of ARM microcontrollers, RT-Linux introduction, RTOS kernels, and real-time scheduling bus structures.

Syllabus:

Unit	Content	Contact Hours
1	Overview of Embedded Systems: Characteristics of Embedded Systems. Comparison of Embedded Systems with general purpose processors. General architecture and functioning of micro controllers. PIC micro controllers: Architecture, memory interfacing, interrupts, instructions, programming and peripherals.	12
2	ARM: Architecture, memory interfacing, interrupts, instructions and Assembly Language programming. Exception processing and pipeline architecture and applications.	12
3	Digital Signal Processors: DSP Architecture, DSP applications, algorithms, data path, memory, addressing modes, peripherals. TI and Sharc family of DSP processors.	6
4	SRAM, DRAM working and organization. Interfacing memory with ARM 7.	8

5	RTOS: RT-Linux introduction, RTOS kernel, Real-Time Scheduling Bus structure: Time multiplexing, serial, parallel communication bus structure. Bus arbitration, DMA, PCI, AMBA, I2C and SPI Buses.	4
	Total	42

Books:-

S. No	Name of Books/Authors/Publisher
1	Computers as components: Principles of Embedded Computing System Design/ Wayne Wolf/ Morgan Kaufman Publication/ 2000
2	ARM System Developer's Guide: Designing and Optimizing System Software/ Andrew N. Sloss, Dominic Symes, Chris Wright, Morgan Kaufman Publication/ 2004
3	Design with PIC Microcontrollers/ John B. Peatman, Pearson Education Asia/ 2002
4	The Design of Small-Scale embedded systems/ Tim Wilmshurst, Palgrav/ 2003
5	Embedded System Design/Marwedel, Peter, Kluwer Publishers/ 2004