# EMBEDDED COMPUTING SYSTEMS

**Course Code: 13EC2209**                                        **L P C**
                                                                 **4 0 3**

**Pre requisites:** Microcontroller & Embedded Systems.

**Course Educational Objectives:**
1. To identify design aspects of scheduling,
2. To identify design aspects Tasking processes embedded systems
3. Design Real-time Operating systems.

**Course Outcomes:**
1. Analysis of embedded computations for RTOS
2. Implement real-time operating systems on embedded processors.

## UNIT-I
## INTRODUCTION TO DESIGN AND ARCHITECTURE:
Requirements, specifications, structural and behavioral descriptions, UML; Embedded Processors: RISC, super scalar, and VLIW architectures, memory organization and Instruction level parallelism; CPU architectures: Input/output, interrupts, modes, cache memories
Embedded bus architectures: Bus architectures and transactions, Serial interconnects, Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller

## UNIT-II
## DESIGN OF COMPILERS:
Compilers and optimization. Testing, Performance Analysis, Hardware Accelerators: FPGA architectures, RISC IP Cores, Verilog HDL.

## UNIT-III
## OPERATING SYSTEMS &RTOS-I:
Operating system concepts: Embedded operating systems ,Network operating systems, Layers, functions kernel, Tasks, Scheduling Thread, Interrupt process, communication, Device drivers, codes, pseudo codes for OS.Introduction, Modeling Timing constraints Scheduling Real-Time Tasks: Types of Schedulers Table-driven scheduling cyclic schedulers EDF  RMA.

## UNIT-IV
## OPERATING SYSTEMS & RTOS-II:

Handling Resource sharing among real-time tasks Scheduling Real-Time Tasks in Multiprocessor and Distributed systems Commercial Real-time operating systems: Tasks, context switches, Operating system support (inter-process communication, networking), Scheduling, Development environment.

## UNIT-V
## DESIGN COMPUTATIONS &EMBEDDED SYSTEM APPLICATION:

Database Systems, Product design process and testing Design Computations Design challenge – optimizing design metrics, processor technology, design technology; real time-operating system: system modeling, static scheduling, Priority drive scheduling, Synchronization & mutual exclusion (real-time and non-real-time); H/W and S/W co-design; embedded multiprocessor.

## TEXT BOOKS:

[1]     W. Wolf, "*Computers as Components: Principles of Embedded Computer System Design*"

[2]     LYLA B DAS,"*Embedded Systems*".

## REFERENCES:

[1]     Rajib Mall, "*Real-Time Systems: Theory and Practice*," Pearson, 2008.

[2]     Jane W. Liu, "*Real-Time Systems*" Pearson Education, 2001.

[3]     Krishna and Shin, "*Real-Time Systems*," Tata McGraw Hill. 1999.