EMBEDDED COMPUTING SYSTEMS

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

Course Outcomes

At the end of the course the student will be able to

CO1: Comprehend concepts of UML architectures, CPU architectures BUS architectures for Embedded computations.

CO2: Design of generic compilers for Embedded systems and its test procedures.

CO3: Demonstrate operating system concepts.

CO4: Discuss real time task scheduling context switching.

CO5: Outline design aspects of real-time operating system, modeling and working on Real-time environment.

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.