

REAL TIME OPERATING SYSTEMS

(Elective-IV)

Course Code:13EC1139

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Course Educational Objectives:

The objective of the course is to introduce the principles shared by many real-time operating systems, and their use in the development of embedded multitasking application software.

Course Outcomes:

After completing the course students will understand the fundamental concepts of real-time operating systems.

UNIT-I

(10 Lectures)

INTRODUCTION:

Introduction to Operating System: Computer Hardware Organization, BIOS and Boot Process, Multi-threading concepts, Processes, Threads, Scheduling

UNIT-II

(13 Lectures)

BASICS OF REAL-TIME CONCEPTS:

Terminology: RTOS concepts and definitions, real-time design issues, examples, Hardware Considerations: logic states, CPU, memory, I/O, Architectures, RTOS building blocks, Real-Time Kernel

UNIT-III

(13 Lectures)

PROCESS MANAGEMENT:

Concepts, scheduling, IPC, RPC, CPU Scheduling, scheduling criteria, scheduling algorithms Threads: Multi-threading models, threading issues, thread libraries, synchronization Mutex: creating, deleting, prioritizing mutex, mutex internals

UNIT-IV**(12 Lectures)****INTER-PROCESS COMMUNICATION:**

Messages, Buffers, mailboxes, queues, semaphores, deadlock, priority inversion,

PIPES MEMORY MANAGEMENT:-

Process stack management, run-time buffer size, swapping, overlays, block/page management, replacement algorithms, real-time garbage collection

UNIT-V**(12 Lectures)****CASE STUDIES:**

Case study Linux POSIX system, RTLinux / RTAI, Windows system, Vxworks, ultron Kernel Design Issues: structure, process states, data structures, inter-task communication mechanism, Linux Scheduling

TEXT BOOKS:

1. J. J Labrosse, “*MicroC/OS-II: The Real –Time Kernel*”, Newnes, 2002.
2. Jane W. S. Liu, “*Real-time systems*”, Prentice Hall, 2000.

REFERENCES:

1. W. Richard Stevens, “*Advanced Programming in the UNIX® Environment*”, 2nd Edition, Pearson Education India, 2011.
2. Philips A. Laplante, “*Real-Time System Design and Analysis*”, 3rd Edition, John Wley& Sons, 2004
3. Doug Abbott, “*Linux for Embedded and Real-Time Applications*”, Newnes, 2nd Edition, 2011.

