

EC-410B**REAL TIME OPERATING SYSTEM
(ELECTIVE - VI)****L T P C
4 - - 3****COURSE OBJECTIVES:**

1. To explain the concept of a real-time system and why these systems are usually implemented as concurrent processes
2. To describe a design process for real-time systems.
3. To explain the role of a real-time operating systems.
4. To introduce generic process architectures for monitoring and control and data acquisition systems

COURSE OUTCOMES:**After successful completion of the course, the students are able to**

1. present the mathematical model of the system and to develop real time algorithm for task scheduling.
2. understand capabilities Handling Resource Sharing and dependencies among Real-time Tasks
3. generate a high-level analysis for Scheduling Real-time tasks in multiprocessor and distributed systems
4. understand the working of real time operating systems and real time database.
5. understand the fault tolerance techniques, evaluation of reliability.

UNIT I*Text Book - 1 (12)*

REAL-TIME SYSTEMS Introduction : What is real time, Applications of Real-Time systems, A basic model of Real-time system, Characteristics of Real-time system, Safety and Reliability, Types of Real-time tasks, timing constraints, Modeling timing constraints Some important concepts, Types of Real-time tasks and their characteristics, Task scheduling, Clock-Driven scheduling, Hybrid schedulers, Event-Driven scheduling, Earliest Deadline First (EDF) scheduling.

UNIT II*Text Book - 1 (12)*

Rate monotonic algorithm (RMA) : Some issues associated with RMA. Issues in using RMA practical situations. Handling Resource Sharing and dependencies among Real-time Tasks: Resource sharing among real-time tasks. Priority inversion. Priority Inheritance Protocol (PIP), Highest Locker Protocol (HLP). Priority Ceiling Protocol (PCP). Different types of priority inversions under PCP. Important features of PCP. Some issues in using a resource sharing protocol. Handling task dependencies.

UNIT III*Text Book - 1 (12)*

Scheduling Real-time tasks in multiprocessor and distributed systems : Multiprocessor task allocation, Dynamic allocation of tasks. Fault tolerant scheduling of tasks. Clock in distributed Real-time systems, Centralized clock synchronization Commercial Real-time operating systems: Time services, Features of a Real-time operating system, Unix as a Real-time operating system, Unix-based Real-time operating systems, Windows as a Real-time operating system, POSIX-RT, A survey of contemporary Real-time operating systems. Benchmarking real-time systems.

UNIT IV*Text Book - 2 (10)*

Real-time Databases : Example applications of Real-time databases. Review of basic database concepts, Real-time databases, Characteristics of temporal data. Concurrency control in real-time databases. Commercial real-time databases. Real-time Communication: Basic concepts, Examples of applications, Real-time communication in a LAN and Real-time communication over packet switched networks.

UNIT V

Text Book - 2 (10)

Fault tolerance techniques : Introduction: Faults, Errors and Failures, Fault types, Detection and Containment, Redundancy, Integrated Failure Handling. Reliability evaluation: Introduction, Parameters, Reliability Models for Hardware, Software Error Models.

LEARNING RESOURCES:

TEXT BOOK(s):

1. Rajib Mall - Real-time System Theory and Practice, Pearson Publication, 2008.
2. Krishna C. M. & Kang Shin G., Real Time Systems, Mc Graw Hil, 1997

REFERENCE BOOK(s):

1. Jane W. S. Liu, Real-Time Systems, Pearson Education, 2000.
2. Stuart Bennett, Real time computer control, phl 1997.

WEB RESOURCES:

<http://nptel.ac.in/courses/>