

CS405: Real Time System	L	T	P	Data Structures, Algorithms
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Course Objective: The course addresses basic concepts of real-time systems, presents examples of real-time systems, covers real-time systems analysis and design, and gives an in-depth treatment of timing analysis and scheduling

S. No.	Course Outcomes (CO)
CO1	Define real-time systems and their key concepts, including deadlines and timing constraints.
CO2	Compare scheduling approaches and evaluate EDF and LST algorithms.
CO3	Apply resource access control protocols for managing contention and data access.
CO4	Develop and analyze scheduling strategies for multiprocessor systems.
CO5	Describe real-time communication models, protocols, and real-time operating systems.

S. No	Contents	Contact Hours
UNIT 1	Introduction : Definition, Typical Real Time Applications; Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints. Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time. Systems: Processors and Resources, Temporal Parameters of Real Time Workload. Periodic Task Model, Precedence Constraints and Data Dependency.	10

UNIT 2	Real Time Scheduling: Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First(LST) Algorithms, Offline Versus Online Scheduling, Scheduling A periodic and Sporadic jobs in Priority Driven and Clock Driven Systems.	10
UNIT 3	Resources Access Control: Effect of Resource Contention and Resource Access Control (RAC), Non preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols,mStack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Pre-emption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects	10
UNIT 4	Multiprocessor System Environment : Multiprocessor and Distributed System Model, Multiprocessor Priority-CeilingProtocol, Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for End-to-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems,Predictability and Validation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.	8
UNIT 5	Real Time Communication : Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols, RealTime Protocols, Communication in Multicomputer System, An Overview of Real Time Operating Systems.	10
	Total	48