

REAL TIME OPERATING SYSTEMS (RTOS)

Unit I

Introduction, Real-time Versus Conventional Software, Computer Hardware for Monitoring and Control, Software Engineering Issues. Process and State-based Systems model, Periodic and Sporadic Process, Cyclic Executives, CE definitions and Properties, Foreground-Background Organizations, Standard OS and Concurrency – Architectures, Systems Objects and Object-Oriented Structures, Abstract Data Types, General Object Classes

Unit II

Requirements and Design Specifications: Classification of Notations, Data Flow Diagrams, Tabular Languages, State Machine, Communicating Real Time State Machine- Basic features, Timing and clocks, Semantics Tools and Extensions, State charts - Concepts and Graphical Syntax, Semantics and Tools. Declarative Specifications: Regular Expressions and Extensions, Traditional Logics - Propositional Logic, Predicates, Temporal logic, Real time Logic

Unit III

Deterministic Scheduling : Assumptions and Candidate Algorithms, Basic RM and EDF. Results, Process Interactions-Priority Inversion and Inheritance Execution Time Prediction: Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Schema. Practice, Prediction by optimisation, System Interference and Architectural Complexities

Unit IV

Timer Application, Properties of Real and ideal clocks, Clock Servers – Lamport's Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization- Centralized Synchronization, Distributed Synchronization. Programming Languages: Real Time Language Features, Ada-Core Language, Annex Mechanism for Real Time Programming, Ada and Software Fault Tolerance, Java and Real-time Extensions, CSP and Occam

Unit V

Operating Systems: Real Time Functions and Services, OS Architectures-Real Time UNIX and POSIX, Issues in Task management- Processes and Threads, Scheduling, Synchronization and communication

Text book:

1. Real – Time Systems and software by Alan C. Shaw ; John Wiley & Sons Inc,2002