

# **Birla Institute of Technology & Science, Pilani, Hyderabad Campus**

## **ACADEMIC-GRADUATE STUDIES AND RESEARCH DIVISION**

### **First Semester 2023-2024**

#### **Course Handout: Part-II**

03/08/2023

In addition to Part-I (General Handout for all courses appended to the Time-Table) this document provides specific details regarding the course.

**Course No.:** BITS G553  
**Course Title:** REAL TIME SYSTEMS  
**Instructor-In-Charge:** SOUMYA J

**1. Course Description:** Real time software, Real time operating systems-scheduling, virtual memory issues and file systems, real time data bases, fault tolerance and exception handling techniques, reliability evaluation, data structures and algorithms for real time/embedded systems, programming languages, compilers and run time environment for real time/embedded systems, real time system design, real time communication and security, real time constraints and multi processing and distributed systems.

#### **2.Objective:**

Real-time systems need deterministic upper time-bound for the execution of a job. The objective of the course is to expose the students in characterization, design and validation issues of Real-time systems. After the completion of the course, students should be able to design complex real time systems using formal methods.

#### **3.Scope:**

The course focuses on the basic theory of Real-Time systems, tools, and real time operating systems. Specifically we discuss Real-Time Scheduling and validation, Real-Time communication, Real-Time Operating Systems, and Performance analysis and Optimization.

#### **4.Text Books:**

[T1] Jane Liu W. S.: Real-Time Systems, Pearson Education, India 2003

#### **Reference books:**

[R1] Laplante Phillip A.: Real-Time System Design and Analysis. Third Edition PHI 2005.

[R2] Krishna C.M. & Shin K.G.: Real-Time Systems, McGraw-Hill 1997

### **5.Course Plan and Learning Objectives**

<b>Module</b>	<b>Title</b>	<b>No of classes</b>	<b>Reference</b>	<b>Learning Objectives</b>
1	Typical real-time applications	2	Ch2-T1	Understand several representative classes of real-time applications, the characteristics of the workloads generated by the applications and the relation between their timing and functional requirements

2	Reference model of Real-Time Systems	4	Ch3-T1	Understand a reference model characterizing 1)a workload model ,2) a resource model and (3) algorithms that define how the application uses the resources at all times.
3	Approaches to Real-Time Scheduling	4	Ch4-T1	Understand commonly used approaches for scheduling realtime systems
4	Clock-driven Scheduling	4	Ch5-T1	Understand details of clock-driven scheduling its merits and de-merits.
5	Priority-driven Scheduling of periodic tasks	4	Ch6-T1	Understand priority-driven algorithms for scheduling periodic tasks on a processor and examine the merits and de-merits.
6	Scheduling Aperiodic and Sporadic jobs	4	Ch7-T1	Understand algorithms for scheduling aperiodic and sporadic jobs in a priority-driven system.
7	Resource Management	5	Ch8-T1	Study resource contention affects on the execution behavior and schedulability of jobs and study various resource access-control protocols .
8	Real time communications	4	Ch11-T1	Study networking protocols with deterministic responses .
9	Real-Time Operating Systems (RTOS)	5	Ch12-T1	Study operating systems supporting real-time scheduling and resource management policies. POSIX is taken as example standard.
10	Advanced topics	4	Research papers	Discussion on advance topics and the current research in the field of real tie systems

## 6. Evaluation Scheme:

EC No.	Evaluation Component	Type	Duration	Weight	Date
1	Mid Sem Examination	Closed Book	90 minutes	25% (75 M)	09/10 - 2.00 - 3.30PM
2	Assignments+ Project+Presentations	Open Book	-	40% (120 M)	To be announced
3	Comprehensive Exam	Closed Book	3 hours	35% (105 M)	07/12 FN

## 7.Make-up Policy:

Prior Permission of the Instructor-in-Charge is required to take a make-up for any component. A make-up test shall be granted only in **genuine** cases. There will be no make-up for the project /term paper presentations.

**8. Chamber Consultation Hours:** To be announced in the class.

**9. Notices:** All notices will be posted on CMS.

**10. Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor-in-Charge-  
BITS G553**