In addition to Part 1 (General Handout for all courses appended to the Time Table), this portion gives further specific details regarding the course.

Course Number : **CS F444/ EEE F444/ INSTR F444**

Course Title : **Real Time Systems**

Instructor-in-charge : **MAYURI DIGALWAR**

1. **Objectives:**

   Real time systems are rapidly increasing over the past few years. Today, computers are found embedded in almost everything we use in our day to day life for example cell phones, digital cameras, cars, airplanes etc. These devices are equipped with real time applications which are required to produce timely outputs otherwise they may degrade the performance or even harm the system. The objective of this course is to introduce various aspects of real time operating system that include real time task model, scheduling on uniprocessor and multiprocessor platform, resource access control etc.

2. **Text and Reference:**

   2-a. Text Book:

   T1: Jane W. S. Liu: Real-Time Systems, Pearson Education.

   2-b. References:

   R1: Krishna C.M. & Shin K.G.: Real-Time Systems, McGraw-Hill.

   R2: Rajib Mall: Real-Time Systems, Theory and Practice, Pearson Education.

   R3: IEEE /ACM conference and journal papers.

3. **Course Plan:**

Sr. No.	Topic	Lecture No.	Text/Reference
1	Introduction to Real Time Systems: Motivation, Semester Plan, Overview of Course Handout, Applications of Real Time Systems.	1	Ch 1 T1, Ch1 R2
2	What is Real Time ?, Types of Real Time Applications and Example Systems, A Basic Model of Real Time System.	2, 3	Ch 1 T1, Ch1 R2

3	Hard versus Soft Real Time Systems: Basic concepts and terminologies used while understanding different issues in these systems.	4-7	Ch 2 T1
4	A Reference model of Real Time Systems: Basics of processors and resources, temporal parameters of real time workload, real time task model which include periodic, aperiodic and sporadic task models, precedence constraints between the tasks, data dependencies etc.	8-12	Ch 3 T1
5	Real Time Scheduling: Introduction to different approaches to real time scheduling such as clock driven scheduling and priority driven scheduling. Dynamic versus static systems, introduction to real scheduling algorithms.	13-15	Ch 4 T1
6	Clock Driven Scheduling: Notations and assumptions, static and time driven scheduler, general structure of cyclic schedules.	16-18	Ch 5 T1
7	Priority Driven Scheduling of Periodic Tasks: Fixed priority scheduling algorithms, dynamic priority scheduling algorithms, maximum schedulable utilization of different algorithms, optimality of RM and DM algorithms, Schedulability test.	19-22	Ch 6 T1
8	Scheduling Aperiodic and Sporadic Jobs in Priority Driven Systems: Different scheduling algorithms for mixed task set : deferrable server, sporadic server, constant utilization server, total bandwidth server, slack stealing in deadline driven systems and fixed priority systems, scheduling of sporadic jobs, real time performance of jobs with soft timing constraints.	23-28	Ch 7 T1
9	Multiprocessor Scheduling: Model of multiprocessor and multi-core systems, task allocation strategies, scheduling on multiple processors/cores for periodic task model and	29-34	Ch 9 T1, research papers

	mixed task model.		
10	Resources and Resource Access Control: Resources and their usage, effects of resource contention and resource access control, non-preemptive critical sections, basic priority inheritance protocol, basic priority ceiling protocol.	35-40	Ch 8 T1

4. Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage	Date and Time	Nature of Component
1	Mid-Sem Test	90 min	30 %	6/10 10:00 - 11:30 AM	Closed Book
2	5 Quizzes (Surprise)	20 mins each	5% (1% per quiz)	-	Closed Book
2	Project	-	25%	To be announced	Open Book
3	Comprehensive Exam	3 hours	40 %	2/12 FN	Partially Open Book

5. Chamber Consultation: Saturday (11:30 am to 12:30 pm)

6. Notices: All notices concerning this course will be displayed on CSIS notice board.

7. Make-up Policy:

7-a. Prior Permission of the Instructor-in-Charge is required to get make-up for a test.
7-b. A make-up test shall be granted only in genuine cases where - in the Instructor's judgment - the student would be physically unable to appear for the test. Instructor's decision in this matter would be final.
7-c. Requests for make-up for the comprehensive examination – under any circumstances – can only be made to Dean, Instruction Division.

Instructor –In- Charge

Mayuri Digalwar