IV B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
Code: R20CC4OE08	EMBEDDED AND REAL TIME OPERATING SYSTEMS *(Open Elective - IV)*						

COURSE OBJECTIVES:
1. To survey the basics of an embedded system.
2. To survey the general structure of a real-time system.
3. To develop task scheduling and task communication algorithms.
4. To develop task synchronization algorithms.
5. To identify the design methods of embedded systems.

COURSE OUTCOMES:
After completion of the course, the student will be able to
CO1: Survey the basics of an embedded system. **[K4]**
CO2: Survey the general structure of a real-time system. **[K4]**
CO3: Develop task scheduling and task communication algorithms. **[K3]**
CO4: Develop task synchronization algorithms. **[K3]**
CO5: Identify the design methods of embedded systems. **[K3]**

SYLLABUS:
UNIT-I: INTRODUCTION TO EMBEDDED SYSTEMS
Embedded system vs. General computing system, classification, major application areas, purpose of embedded systems, core of embedded system, memory, sensors and actuators, communication interface.

UNIT-II: INTRODUCTION TO RTOS
Operating System basics, types, RTOS, Architecture of the Kernel, Kernel objects, tasks/process and threads, Context Switching, Interrupt service routines- Interrupt latency, interrupt response time, interrupt recovery time, How to choose an RTOS?

UNIT-III: TASK SCHEDULING AND TASK COMMUNICATION
Task Scheduling - Types of multitasking, non-preemptive and preemptive scheduling algorithms, Task Communication - shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signalling, RPC and sockets.

UNIT-IV: TASK SYNCHRONIZATION
Task Communication/Synchronization issues, racing, deadlock, Conditions favoring deadlock situation, deadlock handling, the dining philosopher's problem, Task Synchronization techniques- Semaphore, Mutex,

UNIT-V: DESIGN TECHNOLOGY
Introduction, Automation, Synthesis, Parallel evolution of compilation and synthesis, Logic Synthesis, RT synthesis, Behavioural Synthesis, Systems Synthesis and Hardware/Software Co-Design.

TEXT BOOKS:
1. Introduction to embedded systems, Shibu. K.V, TMH, 2009.
2. Embedded / Real Time Systems, KVKK Prasad, Dreamtech Press, 2005.
3. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid, Tony D. Givargis, John Wiley, 2002.

REFERENCE BOOKS:
1. 8051 Microcontroller & Embedded Systems using Assembly and C, Ayala & Gadre: Cengage
2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Pearson.

WEB RESOURCES:
1. https://www.youtube.com/watch?v=F321087yYy4
2. https://www.youtube.com/watch?v=JIr7Xm_riRs&list=PLEBQazB0HUyQ4hAPU1cJED6t3DU0h34bz&index=2
3. https://www.youtube.com/watch?v=95yUbClyf3E&list=PLEBQazB0HUyQ4hAPU1cJED6t3DU0h34bz&index=3
4. https://www.youtube.com/watch?v=pHJ3lxOoWeI&list=PLEBQazB0HUyQ4hAPU1cJED6t3DU0h34bz&index=5
5. https://www.youtube.com/watch?v=5JcMtbA9QEE&list=PLEBQazB0HUyQ4hAPU1cJED6t3DU0h34bz&index=7