



CO2	M	L	M	-	-	-	-	-	-	-	-	L	-	M
CO3	-	-	L	-	M	-	-	-	L	-	-	L	M	L
CO4	M	-	-	L	M	-	-	-	L	-	-	L	M	L
CO5	L	-	-	L	M	-	-	L	M	L	-	M	H	H

**g) Course Content**

**UNIT I INTRODUCTION TO OPERATING SYSTEMS 9**

Basic Principles, Operating System Structures, System Calls & Types, Processes: Concept – Scheduling - Inter Process Communication, Introduction to Distributed Operating System, Types of network based OS.

**UNIT II OVERVIEW OF RTOS 9**

RTOS Task and Task State, Preemptive Scheduler, Process Synchronization, Message Queues, Mailboxes, Pipes, Critical Section, Semaphores, Classical Synchronization Problem –Deadlocks.

**UNIT III BOARD SUPPORT PACKAGES 9**

Inserting BSP in Kernel Build Procedure, Boot loader Interface, Memory Map, Interrupt Management, PCI Subsystem: Timers - UART- Power Management. Embedded Storage: MTD – MTD Architecture - MTD Driver for NOR Flash - Flash Mapping Driver

**UNIT IV EMBEDDED KERNEL & COMPONENTS 9**

Embedded File System: RAMDisk – RAMFS – CRAMFS, Journaling Flash File Systems: JFFS and JFSS2, NFS: PROC File system, Optimizing storage Space: Kernel space optimization - Application Space Optimization, Applications for Embedded Linux - Tuning kernel memory.

**UNIT V LINUX DEVICE DRIVERS 9**

Embedded Drivers: Linux Serial Driver - Ethernet Driver - I<sup>2</sup>C Subsystem on Linux - USB Gadgets, Watchdog Timer, Kernel Modules.

Total 45 Hrs

**Practical Exercises 15**

- 1 Explore features of RTX51 and KEIL
- 2 Task Creation and scheduling using RTX51 in KEIL
- 3 Processing Critical Section using RTX51 in KEIL

- 4 Task Synchronization using RTX51 in KEIL
- 5 Explore features of Raspberry Pi 3 board
- 6 Linux Installation
- 7 Building Cross-Compilation Tool chain
- 8 Implementing GPIO driver Initialization function
- 9 Implementing GPIO driver Entry Point function
- 10 Implementing GPIO driver Exit function
- 11 Implementing GPIO driver Interrupt function
- 12 Testing GPIO device driver

**Total 75 Hrs**

## **h) Learning Resources**

### **Text Books**

1. Silberschatz, Galvin, Gagne, "Operating System Concepts", 6th edition, John Wiley, 2003.
2. Raj Kamal, "Embedded Systems -Architecture, Programming and Design", Tata McGrawHill,2006.
3. P. Raghavan, Amol Lad, SriramNeelakandan, "Embedded Linux System Design and development", Auerbach Publications 2005.
4. Jonathan Corbet, AllesandroRubini& Greg Kroah-Hartman, "Linux Device Drivers",O' Rielly, 3rdedition, 2005.

### **Online Resources**

1. <https://www.youtube.com/watch?v=PEzpOembKNc>
2. <https://www.youtube.com/watch?v=mCs21yByQqk>
3. <https://www.youtube.com/watch?v=hDn4hM148V8>