



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Internet of Things

Subject Code : ME02062011

Subject Name : OS and Device Drivers for IoT

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	PCC

<b>Prerequisite:</b>	Microcontroller and Microprocessor
<b>Rationale:</b>	Describe the importance of device drivers developed using basics of LINUX application of operating system for IoT.

## Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level*
01	Understand the basic concepts of operating system and distributed system	UN
02	Explain the components of RTOS.	AP
03	Familiarize the concept of board support package and embedded storage.	AP
04	Analyze the components of embedded kernel.	AN
05	Evaluate the importance of device drivers developed using LINUX.	EL

\*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

## Teaching and Examination Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Practical		
				ESE (E)	PA(M)	ESE (V)	PA (I)	
03	00	02	04	70	30	30	20	150



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## Course Content:

Sr No	Course Content	No of Hours	% weightage
1	<b>UNIT-I: Introduction To Operating Systems</b> : Basic Principles, Operating System Structures, System Calls & Types, Processes: Concept – Scheduling - Inter Process Communication, Introduction to Distributed Operating System, Types of network based OS.	7	15
2	<b>UNIT-II Overview of RTOS:</b> RTOS Task and Task State, Preemptive Scheduler, Process Synchronization, Message Queues, Semaphores, Classical Synchronization Problem –Deadlocks.	6	15
3	<b>UNIT- III Board Support Packages:</b> Inserting BSP in Kernel Build Procedure, Boot loader Interface, Memory Map, Interrupt Management, Timers – UART- Power Management. Embedded Storage: MTD – MTD Architecture – MTD Driver for NOR Flash – Flash Mapping Driver	7	15
4	<b>UNIT- IV Embedded Kernel &amp; Components:</b> 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.	9	20
5	<b>UNIT- V LINUX Device Drivers:</b> Embedded Drivers: Linux Serial Driver – Ethernet Driver – I2C Subsystem on Linux – USB Gadgets, Watchdog Timer, Kernel Modules.	7	15
6	<b>UNIT- VI Real Time LINUX :</b> Real-Time Operating System , Linux and Time , Interrupt Latency , ISR Duration , Scheduler Latency, Scheduler Duration , User-Space Real-Time , Real-Time Programming in Linux , Process Scheduling, Memory Locking, POSIX Shared Memory , POSIX Message Queues, POSIX Semaphores, Real-Time Signals , POSIX.1b Clock and Timers, Asynchronous I/O.	9	20
<b>TOTAL</b>		<b>45</b>	<b>100</b>



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## **Reference Book:**

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

## **Suggested Course Practical List:**

The practical work will be carried out based on the content covered during the academic session.

## **List of Laboratory/Learning Resources Required:**

- List of Hardware: NIL
- List of Software: NIL
- List of Open Source Tools/Simulator: NIL
- List of Useful websites/MOOCs: NIL

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