Course Code : UCS4003

L-T-P : 3-0-0

Semester : 4

Batch : 2024-28

Syllabus

Prerequisite:

The student should have the understanding of:

- Computer Architecture,Mathematics
- Various concepts of Data Structures and Algorithms
- Basic programming skills.

Course Outcomes:

At the end of the course, students will be able to:

CO1	To demonstrate a comprehensive understanding of operating systems, including their classification based on functionality and structure.
CO2	To understand the CPU scheduling principles, and expertise in deadlock management.
CO3	Gain expertise in concurrent processes, and process generation, enhancing their understanding of operating system concepts and mechanisms.
CO4	Describe the master memory management concepts and page replacement algorithms, optimizing resource utilization and performance in operating systems.
CO5	Gain proficiency in disk scheduling techniques and RAID configurations

Unit No	Topics	CO No.	No. of Lecture
1	Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Parallel Systems, Distributed Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.	**1**	**8**

Unit No	Topics	CO No.	No. of Lecture
2	CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	**2**	**9**
3	Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.	**3**	**9**
4	Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Locality of reference.	**4**	**9**
5	Disk Scheduling: Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.	**5**	**8**

Text Book:

1."Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne - This is a widely used textbook that covers fundamental concepts in operating systems. It's comprehensive and suitable for both undergraduate and graduate-level courses.
2."Modern Operating Systems" by Andrew S. Tanenbaum - Another classic textbook that covers modern operating system principles. It provides a good balance between theory and practice.
3."Operating Systems: Internals and Design Principles" by William Stallings - This book delves into the internal structures and design principles of operating systems, providing in-depth knowledge on how various components work together.
4."Operating Systems: Principles and Practice" by Thomas Anderson and Michael Dahlin - This textbook takes a hands-on approach to understanding operating systems, with a focus on practical aspects and implementation details.

Reference Book:

1. "UNIX and Linux System Administration Handbook" by Evi Nemeth, Garth Snyder, Trent R. Hein, and Ben Whaley - This book is an invaluable resource for system administrators working with Unix and Linux operating systems. It covers a wide range of topics relevant to system administration.
2. "Linux Kernel Development" by Robert Love - For those interested in understanding the Linux kernel, this book provides detailed insights into its design and development process.
3. "Windows Internals" by Mark Russinovich and David A. Solomon - This book is essential for anyone interested in understanding the internals of the Windows operating system. It covers various aspects, including processes, memory management, file systems, and more.
4. "Operating Systems Design and Implementation" by Andrew S. Tanenbaum and Albert S. Woodhull - This book provides a detailed look at the design and implementation of operating systems, with a focus on practical examples and case studies.