CSA04	**OPERATING SYSTEMS**	**3**	**0**	**2**	**4**
Prerequisite	NIL				
Course Objectives	The course on Operating Systems aims to provide the students with the following: 1. To understand the trade-off and internal operations of operating systems by analysing the structure, functionalities and its characteristics. 2. To gain knowledge on process scheduling, inter-process communication, process synchronization and deadlocks. 3. To understand the concepts of memory management techniques like paging, segmentation, and virtual memory. 4. To develop knowledge on file allocation and disk scheduling. 5. Learn the basics of Linux system and perform administrative tasks on Linux Servers.				
Course Outcomes	On successful completion of the course, the student will be able to: 1. Interpret the types, roles and functions of Operating Systems using system calls. 2. Comprehend the concepts of Synchronization techniques, Deadlock principles and Process Management. 3. Demonstrate the Linking, Paging and Segmentation mechanisms used in memory. 4. Demonstrate the different file allocation techniques and various disk scheduling algorithms. 5. Comprehend the basic functionalities, components of Linux Operating Systems and Virtualization concepts. 6. Implement the objectives and services of operating systems with their applications. 7. Implement the algorithms in Operating Systems with software tools. 8. Demonstrate oneself in individual and team activities thereby able to communicate that explore the concepts of Operating Systems.				
UNIT I	**INTRODUCTION**				
Introduction, OS history, Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Hand held Systems – Operating Systems structures: System Components – Operating System Services – System Calls – System Programs – System Design and Implementation, functionalities and characteristics of OS, Hardware concepts related to OS, CPU states, I/O channels, memory hierarchy, microprogramming.					
UNIT II	**PROCESS MANAGEMENT**				
Process Concepts – Process Scheduling – Operation on Process – Cooperating process – Inter Process Communication – Threads – Multithreading Models – Process Synchronization – The Critical Section Problem – Synchronization Hardware. Semaphores – Classical problem of Synchronization – Monitors – Deadlock – Deadlock Characterization – Methods for handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock, Bankers Algorithm					

UNIT III	MEMORY MANAGEMENT

Sequential circuits- Linkers and Dynamic Linking, Dynamic Storage Management, Background – Swapping – Contiguous Memory Allocation – Paging – Segmentation –Segmentation with Paging – Virtual Memory – Demand Paging – Page Replacement–Thrashing and working sets, Disk Devices.

UNIT IV	FILE SYSTEMS

File Systems: Contiguous, Sequential and Indexed Allocation, File system interface, File System implementation, Case study of Unix File system - Buffer Cache, Inodes, The system calls - ialloc, ifree, namei, alloc and free, Mounting and Unmounting files systems, Network File systems I/O System: Disk Scheduling, Device drivers - block and character devices, streams, Character and Block device switch tables.

UNIT V	CASE STUDY

Linux System- Basic Concepts; System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization- Basic Concepts, Setting Up Xen,VMware on Linux Host and Adding Guest OS.

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Inc., 2018.
2. Design of the Unix Operating System - Maurice Bach, Prentice Hall
3. William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Prentice Hall, 2021.
4. Andrew S. Tanenbaum, "Modern Operating Systems", 5th Edition, Addison Wesley, 2022.

REFERENCES

1. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", 3rd Edition, Tata McGraw- Hill Education, 2017.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 2017.