# 23CS22T1 - OPERATING SYSTEMS

**(Common to CSE and IT)**

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| Course Category: | Professional Core | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Awareness of hardware components and their functionalities (e.g., CPU, memory, storage devices, I/O devices) | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 30  70  100 |
| Objectives: | **Students undergoing this course are expected:** | | |
| * Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection. * Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. * Illustrate different conditions for deadlock and their possible solutions. | | |

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| Course Outcomes | **Upon successful completion of the course, the students will be able to:** | |
| CO1 | Describe the basics of the operating systems. (L1) |
| CO2 | Understand the mechanisms of OS to handle processes, threads, and their communication. (L2) |
| CO3 | Make use of process scheduling algorithms and synchronization techniques and deadlock mechanisms to achieve better performance of a computer system. (L3) |
| CO4 | Analyze the memory management and its allocation policies. (L4) |
| CO5 | Gain proficiency in file system implementation techniques such as allocation methods, free space management, file system mounting, and file sharing. (L3) |
| Course Content | UNIT-I  **Operating Systems Overview:** Introduction, Operating system functions, Operating systems operations.  **System Structures:** Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure.  UNIT-II  **Processes:** Process Concept, Process scheduling, Operations on processes, Inter-process communication.  **Threads and Concurrency:** Multithreading models, Thread libraries, Threading issues.  **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.  UNIT-III  **Synchronization Tools:** The Critical Section Problem, Peterson’s Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.  **Deadlocks:** system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.  UNIT-IV  **Memory-Management Strategies:** Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.  **Virtual Memory Management:** Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing.  **Storage Management:** Overview of Mass Storage Structure, HDD Scheduling, RAID.  UNIT-V  **File System:** File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File System Mounting, Partitions and Mounting, File Sharing.  **Protection:** Goals of protection. | |
| Text Books &  References  Books | **TEXTBOOKS:**   1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.   **REFERENCE BOOKS:**   1. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson, 2016 2. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018 3. Operating Systems: A Concept-Based Approach, D.M Dhamdhere, 3rd Edition, McGraw-Hill, 2013 | |
| E-Resources | 1. <https://nptel.ac.in/courses/106/106/106106144/> 2. http://peterindia.net/OperatingSystems.html | |