

BCSC0004: OPERATING SYSTEMS

Objective: The objective of the course is to provide basic knowledge of computer operating system structures and functioning including CPU scheduling, memory management, concurrent processes, deadlocks, security, and integrity.

Credits:03

L-T-P-J:3-0-0-0

Module No.	Content	Teaching Hours
I	<p>Introduction: Operating System and its Classification - Batch, Interactive, Multiprogramming, Time sharing, Real Time System, Multiprocessor Systems, Multithreaded Systems, System Protection, System Calls, Reentrant Kernels, Operating System Structure- Layered structure, Monolithic and Microkernel Systems, Operating System Components, Operating System Functions and Services.</p> <p>Processes: Process Concept, Process States, Process State Transition Diagram, Process Control Block (PCB), Process Scheduling Concepts, Threads and their management.</p> <p>CPU Scheduling: Scheduling Concepts, Performance Criteria, Scheduling Algorithms, Multiprocessor Scheduling.</p>	14
II	<p>Process Synchronization: Principle of Concurrency, Implementation of concurrency through fork/join and parbegin/parend, Inter Process Communication models and Schemes, Producer / Consumer Problem, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Synchronization Hardware.</p> <p>Classical Problem in Concurrency: Dining Philosopher Problem, Readers Writers Problem.</p> <p>Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock, Combined Approach.</p>	13
III	<p>Memory Management: Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Paging, Segmentation, Paged segmentation.</p> <p>Virtual memory concepts: Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Locality of reference.</p> <p>I/O Management and Disk Scheduling: I/O devices, I/O subsystems, I/O buffering, Disk storage and disk scheduling.</p> <p>File System: File concept, File organization and access mechanism, File directories, File allocation methods, Free space management.</p>	13

Text Books:

- Silberschatz, Galvin and Gagne (2012), "Operating Systems Concepts", 9th Edition, Wiley.

Reference Books:

- Sibsankar Halder and Alex A Aravind (2009), "Operating Systems", 6th Edition, Pearson Education.
- Harvey M Dietel (2002), "An Introduction to Operating System", 2nd Edition, Pearson Education.
- D M Dhamdhare (2006), "Operating Systems: A Concept Based Approach", 2nd Edition.
- M. J. Bach. (1986), "Design of the Unix Operating System", PHI.

Outcome: After completion of course, the student will be able to:

- Identify the services provided by operating systems.
- Understand the internal structure of an operating system and be able to write programs using system calls.
- Understand and solve problems involving process control, mutual exclusion, deadlock and synchronization.