1/3 MCA Second Semester

CA2T5 **Operating Systems** **Credits : 4**

Lecture Hours : 4 periods / week Internal assessment : 30 Marks
Semester and Examination: 70 Marks

Course Description:

The course provides an introduction to the concepts and methodology of Operating systems. The concepts of process management, memory management, storage management, protection and security issues on computer system.

Course Objectives:

- Understand major concepts of Process management.
- Understanding the concpets of Concurrency
- Experiencing the concpets of Memory Management.
- Experiencing the problems of Deadlocks.
- Certain skills in File system Interface, and Mass storage.

UNIT I:

Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems and special purpose systems, operating system structures and systems calls, operating systems generation.

UNIT II:

Process Management: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication, Threads, Multithreading Models.

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms-FCFS, SJF (preemptive & non-preemptive), Priority, RR Algorithms and their evaluation, Thread scheduling, Case studies: UNIX, Linux, Windows.

UNIT III:

Concurrency: Process synchronization, the critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, and atomic transactions. Case studies: UNIX, Linux, and Windows.

UNIT IV :

Memory Management : Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page replacement, algorithms, Case studies: UNIX, Linux, Windows.

UNIT V:

Deadlocks: Principles of deadlocks, System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock, I/O systems, Hardware, application interface, kernel I/O subsystem, Transforming I/O requests Hardware operation, STREAMS, performance.

UNIT VI:

File System Interface - The concept of a file, Access Methods, Directory structure, File system mounting, and file sharing, protection. File System implementation - File system structure, file system implementation, directory implementation, directory implementation allocation methods, free-space

management, efficiency and performance, Case studies: UNIX, Linux, and Windows.

UNIT VII:

Mass-storage: Structure overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

UNIT VIII :

Protection and Security: Goals of Protection, Principles of Protection, Domain of protection Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability-Based systems, Language–Based Protection.

Security: The Security problem, program threats, system and network threats, cryptography as a security tool, user authentication, implementing security defenses, firewalling to protect systems and networks, computer–security classifications, Case studies: UNIX, Linux, and Windows.

Learning Resources

Text Books:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne,John Wiley, 7/e, 2010.
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, TMH, 2/e, 2006.

References Books:

1. Operating Systems' – Internal and Design Principles Stallings, Pearson education/PHI, 6/e, 2009.
2. Operating System A Design Approach-Crowley, TMH, 1/e, 2009.
3. Modern Operating Systems, Andrew S Tanenbaum, Pearson/PHI, 2/e, 2001.