OPERATING SYSTEMS

IV Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AITB04	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand the functionalities of main components in operating systems.
II. Analyze the algorithms used in memory and process management.
III. Understand the clock synchronization protocols
IV. Interpret the concepts of input and output storage for file management.
V. Understand the need of protection and security mechanisms in computer systems

COURSE OUTCOMES:

I. Describe the concept operating system and operating system design
II. Determine Process And CPU Scheduling, Process Coordination
III. An ability to identify and evaluate Memory Management And Virtual Memory
IV. To describe the File System Interface, Mass-Storage Structure
V. Understand Deadlocks, Protection.

COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

1. Describe the structure of operating system and basic architectural components involved in operating system design.
2. Describe how the computing resources are managed by the operating system.
3. Understand the objectives and functions of modern operating systems.
4. Analyze and design the applications to run in parallel either using process or thread models of different operating system.
5. Understand and analyze implementation of virtual memory.
6. Understand the various resource management techniques for timesharing and distributed systems.
7. Describe the mutual exclusion, deadlock detection in operating system.
8. Describe the common algorithms used for both pre-emptive and non-pre-emptive scheduling of tasks in operating systems, such a priority and performance comparison.
9. Understand the difference between a process and a thread.
10. Explain the state diagram that describes the states and state transitions during the whole lifetime of a process; likewise, interpret such a state transition diagram.
11. Identify the mapping between virtual memory address into a physical address.
12. Explain how a shared memory area can be implemented using virtual memory addresses in different processes.
13. Identify the need of memory management in operating systems and understand the limits of fixed memory allocation schemes.
14. Understand the fragmentation in dynamic memory allocation, and identify dynamic allocation approaches.
15. Understand how program memory addresses relate to physical memory addresses, memory management in base-limit machines, and swapping.
16. Understand the mechanisms adopted for file distribution in applications.
17. Describe different Mass storage structure and I/O systems.
18. Understand issues related to file system interface and implementation, disk management.
19. Identify the mechanisms adopted for file sharing in distributed applications.
20. Understand the concepts of Storage Management, disk management and disk scheduling.

MODULE-I	INTRODUCTION	Hours: 10
Operating systems objectives and functions: Computer system architecture, operating systems structure, operating systems operations; Evolution of operating systems: Simple batch, multi programmed, time shared, personal computer, parallel distributed systems, real time systems, special purpose systems, operating system services, user operating systems interface; Systems calls: Types of systems calls, system programs, protection and security, operating system design and implementation, operating systems structure, virtual machines.		
MODULE -II	**PROCESS AND CPU SCHEDULING, PROCESS COORDINATION**	**Hours: 10**
Process concepts: The process, process state, process control block, threads; Process scheduling: Scheduling queues, schedulers, context switch, preemptive scheduling, dispatcher, scheduling criteria, scheduling algorithms, multiple processor scheduling; Real time scheduling; Thread scheduling; Case studies Linux windows; Process synchronization, the critical section problem; Peterson's solution, synchronization hardware, semaphores and classic problems of synchronization, monitors.		
MODULE -III	**MEMORY MANAGEMENT AND VIRTUAL MEMORY**	**Hours: 08**
Logical and physical address space: Swapping, contiguous memory allocation, paging, structure of page table. Segmentation: Segmentation with paging, virtual memory, demand paging; Performance of demand paging: Page replacement, page replacement algorithms, allocation of frames, thrashing.		
MODULE -IV	**FILE SYSTEM INTERFACE, MASS-STORAGE STRUCTURE**	**Hours: 09**
The concept of a file, access methods, directory structure, file system mounting, file sharing, protection, file system structure, file system implementation, allocation methods, free space management, directory implementation, efficiency and performance; Overview of mass storage structure: Disk structure, disk attachment, disk scheduling, disk management, swap space management; Dynamic memory allocation**:** Basic concepts; Library functions.		
MODULE -V	**DEADLOCKS, PROTECTION**	**Hours: 08**
System model: Deadlock characterization, methods of handling deadlocks, deadlock prevention, dead lock avoidance, dead lock detection and recovery form deadlock system protection, 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.		

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Principles", Wiley Student Edition, 8th Edition, 2010.
2. William Stallings, "Operating System- Internals and Design Principles", Pearson Education, 6th Edition, 2002.

Reference Books:

1. Andrew S Tanenbaum, "Modern Operating Systems", PHI, 3rd Edition, 2007.
2. D. M. Dhamdhere, "Operating Systems a Concept based Approach", Tata McGraw Hill, 2nd Edition, 2006.

Web References:

1. www.smartzworld.com/notes/operatingsystems
2. www.scoopworld.in
3. www.technofest2u.blogspot.com

E-Text Books:

1. https://it325blog.files.wordpress.com/2012/09/operating-system-concepts-7-th-edition.pdf
2. http://mpathinveco.blog.com/2014/11/25/operating-systems-william-stalling-6th-edition/
3. http://www.e-booksdirectory.com/details.php?ebook=10050
4. http://www.e-booksdirectory.com/details.php?ebook=9907
5. http://www.e-booksdirectory.com/details.php?ebook=9460