COURSE TITLE	**:**	**OPERATING SYSTEMS**
COURSE CODE	**:**	**4134**
COURSE CATEGORY	**:**	**B**
PERIODS/WEEK	**:**	**4**
PERIODS/SEMESTER	**:**	**60**
CREDITS	**:**	**4**

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Introduction to Operating System	**15**
2	Process Management	**15**
3	Memory Management	**15**
4	File Systems and I/O Systems	**15**

Course General Outcomes:

Sl.	G.O	On completion of this course the student will be able :
1	1	To understand The concept of System Software
	2	To Understand Operating System
2	1	To understand process and threads
	2	To understand CPU scheduling
3	1	Understand memory management
	2	Understand virtual memory
4	1	Understand the file system
	2	Understand I/O systems

Specific Outcomes:

Module I - INTRODUCTION TO OPERATING SYSTEM.

1.1 To understand the Concept of System Software
- 1.1.1 State system software.
- 1.1.2 Discuss assembler and its functions
- 1.1.3 Discuss loader and its functions
- 1.1.4 Discuss compilers and interpreters and their functions
- 1.1.5 Discuss operating system and its functions

1.2 To Understand operating systems
- 1.2.1 Discuss different features of operating systems
- 1.2.2 List the functions of Operating Systems
- 1.2.3 Discuss batch systems
- 1.2.4 Discuss multiprogramming systems
- 1.2.5 Discuss time sharing
- 1.2.6 Describe multiprocessor systems
- 1.2.7 Describe real time systems
- 1.2.8 Discuss Unix, Windows, and Linux operating systems

MODULE II: PROCESS MANAGEMENT

2.1 To Understand processes and threads
- 2.1.1 Define process
- 2.1.2 Desribe process control block (PCB) and its general structure.
- 2.1.3 Explain the different states of a process with the help of state diagram.
- 2.1.4 Define a thread
- 2.1.5 Compare between threads and processes
- 2.1.6 Explain multi-threading.

2.2 To Understand CPU scheduling
- 2.2.1 Discuss about various schedulers – long, medium and short term.
- 2.2.2 Explain context switching
- 2.2.3 Describe CPU and I/O burst cycles
- 2.2.4 Explain CPU bound and I/O bound processes
- 2.2.5 Discuss the difference between preemptive and non-preemptive scheduling
- 2.2.6 Discuss various scheduling criteria
- 2.2.7 Explain FCFS, SJF, Priority, and RR scheduling algorithms and their Gantt charts
- 2.2.8 Discuss Multilevel queue and Multilevel feedback queue scheduling

2.3 To Understand Process synchronization
- 2.3.1 Discuss co-operating processes
- 2.3.2 Explain race condition
- 2.3.3 Explain critical section of processes
- 2.3.4 Define Critical Section Problem and its solutions
- 2.3.5 Explain resource allocation graphs
- 2.3.6 Explain deadlock and its causes
- 2.3.7 Discuss deadlock avoidance, prevention and detection & recovery.

MODULE III: MEMORY MANAGEMENT

3.1 To Understand memory management
- 3.1.1 Discuss different address bindings – compile, link and run time bindings
- 3.1.2 Differentiate the logical address and physical address.
- 3.1.3 Explain contiguous memory allocation – fixed partition and variable partition
- 3.1.4 Explain first fit, best fit and worst fit allocation strategies
- 3.1.5 Define fragmentation – internal and external, and suggest solutions
- 3.1.6 Explain paging and paging hardware
- 3.1.7 Discuss segmentation, and the advantages of segmentation over paging

3.2 Understand virtual memory
- 3.2.1 Discuss the concept of virtual memory
- 3.2.2 Explain demand paging
- 3.2.3 Explain page-faults and how to handle page faults.
- 3.2.4 Discuss page replacement algorithms: FIFO, optimal, LRU,
- 3.2.5 Explain the concept of thrashing

MODULE IV: FILE SYSTEMS AND I/O SYSTEMS

4.1 Understand the file system
- 4.1.1 Discuss the concept of file and directory
- 4.1.2 Discuss the various file operations
- 4.1.3 Describe the file organization concepts – sequential and indexed
- 4.1.4 Explain about different directory structures – single level, two-level, and tree structured directories
- 4.1.5 Explain about different allocation methods – contiguous, linked and indexed allocations

4.2 Understand Virtualization
- 4.2.1 Discuss the concept of virtualization
- 4.2.2 Discuss different types of virtualization
- 4.2.3 Discuss the overview of Vmware
- 4.2.4 Explain virtual Box
- 4.2.5 Explain about thin client

CONTENT DETAILS

MODULE I

Introduction to systems software – assembler, loader, compilers, interpreters and their functions. Operating system – definition - goals of OS - different types of Operating Systems - batch systems - multiprogramming systems - time sharing - multiprocessor systems - real time systems. Comparison of DOS, Unix, Windows, and Linux operating systems - Operating System components

MODULE II

Define process - process control block (PCB) and its general structure - different states of a process with the help of state diagram.- Define a thread – Comparison between threads and processes. - Multi-threading.

Schedulers – long, medium and short term- queuing diagrams. - context switching. CPU and I/O burst cycles - CPU bound and I/O bound processes- difference between preemptive and non-preemptive scheduling- Various scheduling criteria - FCFS, SJF, Priority, and RR scheduling algorithms and their Gantt charts - Multilevel queue and Multilevel feedback queue scheduling

Process synchronization - Co-operating processes - Race condition - Critical section of processes - Critical Section Problem and its solutions- Resource allocation graphs - Deadlock and its causes – Deadlock avoidance, prevention and detection &recovery.

MODULE III

Memory management - Different address bindings – compile, link and run time bindings. - Difference between logical address and physical address - Contiguous memory allocation – fixed partition and variable partition – Allocation Strategies - first fit, best fit and worst fit - Define fragmentation – internal and external, and suggest solutions - Paging and paging hardware - Segmentation, and the advantages of segmentation over paging

Concept of virtual memory - Demand paging - Page-faults and how to handle page faults. - Page replacement algorithms: FIFO, optimal, LRU, LRU Approximation, Counting based (LFU and MFU) - Learn the concept of thrashing

MODULE IV

File system - Concept of file and directory - Various file operations - File organization concepts – sequential and indexed. Different directory structures – single level, two-level, and tree structured directories. - Different allocation methods – contiguous, linked and indexed allocations.

Virtualization : Need of virtualization – cost , administration , fast deployment , reduce infrastructure cost – limitations.. Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization. Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization..Vmware features and infrastructure – Virtual Box - Thin client

Text Book(s)

1. Operating System Concepts – Abraham Silberschatz, Peter Gaer Galvin and Greg Gagne. Wiley Publicaions-Eighth Edition
2. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter TATA McGraw- Hill , 2010

References

1. Operating Systems-Internals and Design Principles – William Stallings . – PEARSON Publicaions- **Seventh Edition**
2. Operating Systems - Rohit Khurana, Vikas Publbishing-Second Edition
   Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008