Semester: 5th				
Paper code: AIDS301/AIML301		**L**	**T/P**	**Credits**
Subject: Operating Systems		**4**	**0**	**4**
Marking Scheme: 1. Teachers Continuous Evaluation: As per university examination norms from time to time 2. End Term Theory Examination: As per university examination norms from time to time				
INSTRUCTIONS TO PAPER SETTERS: Maximum Marks: As per university norms				
1. There should be 9 questions in the end term examination question paper. 2. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. 3. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, students may be asked to attempt only 1 question from each unit. 4. The questions are to be framed keeping in view the learning outcomes of course/paper. The standard/ level of the questions to be asked should be at the level of the prescribed textbooks. 5. The requirement of (scientific) calculators/ log-tables/ data-tables may be specified if required.				
Course Objectives:				
1.	To understand the basic concepts and functions of operating systems.			
2.	To use different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.			
3.	To understand Processes, Threads and Deadlocks and Memory Management algorithms of operating systems.			
4.	To analyze the several operating systems and their utilities such Linux, Unix, Window to develop operating system functions in programming.			
Course Outcomes:				
CO1	Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.			
CO2	Apply process scheduling and memory management concepts.			
CO3	Analyze the operating system's resource management techniques, deadlock management techniques, memory management techniques.			
CO4	Design device drivers and multi-threading libraries for a tiny OS and develop application programs using UNIX system calls.			

Course Outcomes (CO) to Programme Outcomes (PO)

Mapping **(**Scale 1: Low, 2: Medium, 3: High

CO/ PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	1	1	1	-
CO2	3	1	-	-	-	-	-	-	1	1	1	-
CO3	2	2	-	1	1	-	-	-	2	1	1	1
CO4	2	1	2	1	1	-	1	-	2	1	2	1

Course Overview:
This course covers the fundamentals of operating systems, mechanisms, and their implementations. The core of the course contains concurrent programming (threads and synchronization), inter process communication, process scheduling, memory management, input output devices and organization.

Unit I [10]
Introduction: Operating system and function, Evolution of operating system, Batch, Interactive, Time Sharing and Real Time System, System protection. Operating System Structure: System Components, System structure, Operating System Services.
CPU Scheduling: Scheduling Concept, process scheduling strategies- First-Come, First-Served (FCFS) Scheduling, Shortest-Job-Next (SJN) Scheduling, Priority Scheduling, Shortest Remaining Time, Round Robin (RR) Scheduling, Multiple-Level Queues Scheduling, Performance Criteria of Scheduling Algorithm, Evolution, Multiprocessor Scheduling.

Unit II [10]
Concurrent Processes: Process concept, Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Binary and counting semaphores, P() and V() operations, Classical problems in Concurrency, Inter Process Communication, Process Generation, Process Scheduling.
Deadlocks: examples of deadlock, resource concepts, necessary conditions for deadlock, deadlock solution, deadlock prevention, deadlock avoidance with Bankers algorithms, deadlock detection, deadlock recovery.

Unit III [10]
Memory Organization & Management: Memory Organization, Memory Hierarchy, Memory Management Strategies, Contiguous versus non- Contiguous memory allocation, Partition Management Techniques, Logical versus Physical Address space, swapping, Paging, Segmentation, Segmentation with Paging Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Thrashing, Demand Segmentation, and Overlay Concepts.

Unit IV [10]
I/O Device and the organization: I/O Device and the organization of the I/O function, I/O Buffering, Disk I/O, Disk Scheduling Algorithms, File system: File Concepts, attributes, operations, File organization and Access mechanism, disk space allocation methods, Directory structure, free disk space management, File sharing, Implementation issues. Case studies: Unix system, Windows XP.

Textbooks:
1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", Wiley, 9th Edition
2. Tannenbaum, "Morden Operating Systems", Pearson, 4th Edition, 2014

Reference Books:

1. William Stallings, "Operating Systems –Internals and Design Principles", 8/E, Pearson Publications, 2014.
2. Dietel, "An introduction to operating system", Addison Wesley, 1983