Subject Name : Operating System

Subject Code : IT 503 / CE 503

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
04	00	02	06	5	3	70	30	20	30	150

Learning Objectives:

- To learn and understand the Concepts of operating system
- To Learn and understand operating system services
- The core structure, functions and design principles of operating system
- Interposes communications and basic concepts of virtualization

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Introduction	5
2	Process Management	10
3	Concurrency control	8
4	Memory Management	10
5	I/O management & Disk scheduling	6
6	Inter Process Communication	8
7	Multi-Processor Based and Virtualization Concepts	8
8	Advanced Operating System	5

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weightage (%)
1	**Introduction** Architecture, Goals & Structures of O.S, Basic functions, Interaction of O. S. & hardware architecture, System calls, Batch, multiprogramming. Multitasking, time sharing, parallel, distributed & real -time O.S.	5	10
2	**Process Management** Process Concept, Process states, Process control, Threads, Uni-processor Scheduling: Types of scheduling: Preemptive, Non preemptive, Scheduling algorithms: FCFS, SJF, RR, Priority, Thread Scheduling, Real Time Scheduling. System calls like ps, fork, join, exec family, wait.	10	15
3	**Concurrency control** **Concurrency:** Principles of Concurrency, Mutual Exclusion: S/W approaches, H/W Support, Semaphores, pipes, Message Passing, signals, Monitors, Classical Problems of **Synchronization**: Readers-Writers, Producer Consumer, and Dining Philosopher problem. **Deadlock:** Principles of deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, System calls like signal, kill.	8	15
4	**Memory Management** Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Swapping, and Paging. Segmentation, Demand paging **Virtual Memory**: Concepts, management of VM, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing.	10	15
5	**I/O management & Disk scheduling**: I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), RAID, Disk Cache.	6	10
6	**Inter Process Communication** Basic Concepts of Concurrency, Cooperating process, Advantage of Cooperating process, Bounded- Buffer - Shared-Memory Solution, Inter-process Communication (IPC), Basic Concepts of Inter-process Communication and Synchronization	8	15
7	**Multi-Processor Based and Virtualization Concepts** Virtual machines; supporting multiple operating systems simultaneously on a single hardware platform; running one	8	15

	operating system on top of another. Reducing the software engineering effort of developing operating systems for new hardware architectures. True or pure virtualization. Para virtualization; optimizing performance of virtualization system; hypervisor call interface.		
8	**Advanced Operating System** Basics of Network Operating System, Server Operating System and Real Time Operating System	5	5
	Total	**60**	**100**

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Learning Outcome:

Students will be having understanding of following concepts of Operating System:

- Process Management
- Memory Management
- File & I/O Management

Reference Books:

- Operating System Concepts, 9th edition Peter B. Galvin, Greg Gagne, Abraham Silberschatz, John Wiley & Sons, Inc.
- Modern Operating Systems -By Andrew S. Tanenbaum (PHI)
- Operating Systems 5th Edition, William Stallings, Pearson Education India

Web References:

http://www.cs.pdx.edu/~walpole/class/cs533/papers/RPC.pdf
http://www.cs.pdx.edu/~walpole/class/cs533/papers/lrpc.pdf

List of experiments:

Pract. No.	Title
1	**Basic Linux Commands and Overview**
2 to 5	**Write Shell Script for followings** • To find the global complete path for any file. • To broadcast a message to a specified user or a group of users logged on any terminal. • To copy the file system from two directories to a new directory in such a way that only the latest file is copied in case there are common files in both the directories. • To compare identically named files in two different directories and if they are same, copy one of them in a third directory. • To delete zero sized files from a given directory (and all its sub-directories). • To display the name of those files (in the given directory) which are having multiple links. • To display the name of all executable files in the given directory. • Write a script to display the date, time and a welcome message (like Good Morning etc.). The time should be displayed with "a.m." or "p.m." and not in 24 hours notation. • Write a script to display the directory in the descending order of the size of each file. • Write a script to implement the following commands: Tree (of DOS) which (of UNIX)
6	Implementation Of FCFS (First Come First Serve) CPU Scheduling.
7	Implementation Of SJF (Shortest Job First) CPU Scheduling.
8	Implementation Of Round Robin (RR) CPU Scheduling.
9	Implementation Of Priority CPU Scheduling Algorithm.
10	Implementation Of FIFO Replacement Algorithm.
11	Implementation Of Optimal Page Replacement Algorithm.
12	Implementation Of LRU Page Replacement Algorithm by Stack method.
13	Implement the producer-consumer problem using threads.
14	Write a program to implement Echo service using socket programming