DURGAPUR INSTITUTE OF ADVANCED TECHNOLOGY AND MANAGEMENT

(Affiliated to MAKAUT and recognized by AICTE, New Delhi)

Subject Code: IT 503 Subject Name: Operating System

Semester : V Year: 3RD Session : 2018

Branch Name: Information Technology Faculty Name: SK SALIM

Assistant Professor

IT Department

Syllabus

Introduction [4L]
Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, timesharing, real-time, distributed, parallel.

System Structure[3L]
Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Process Management [17L]
Processes [3L]: Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication.

Threads [2L]: overview, benefits of threads, user and kernel threads.

CPU scheduling [3L]: scheduling criteria, preemptive& non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, and priority), and algorithm evaluation, multi-processor scheduling.

Process Synchronization [5L]: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.

Deadlocks [4L]: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Storage Management [19L]

Memory Management [5L]: background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory [3L]: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

File Systems [4L]: file concept, access methods, directory structure, file system structure, allocation methods(contiguous, linked, and indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance

I/O Management [4L]: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering,caching, spooling and device reservation, error handling), performance.

Disk Management [3L]: disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN), disk reliability, disk formatting, boot block, bad blocks.

Protection & Security [4L]
Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

TEXT BOOK:

1. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
2. Dhamdhere: Operating System TMH.

REFERENCE BOOK:

a) Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.

b) Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992.

c) Dietel H. N., "An Introduction to Operating Systems", Addison Wesley

Course Objectives:

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication.
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
5. To know the components and management aspects of concurrency management.
6. To learn programmatically to implement simple OS mechanisms.

Course Outcomes:

- Master functions, structures and history of operating systems.
- Master understanding of design issues associated with operating systems.
- Master various process management concepts including scheduling, synchronization, and deadlocks.
- Be familiar with multithreading.
- Master concepts of memory management including virtual memory.
- Master system resources sharing among the users.
- Master issues related to file system interface and implementation, disk management.
- Be familiar with protection and security mechanisms.
- Be familiar with various types of operating systems including UNIX.

LESSION PLAN

Sr. No.	Day	Reference of the Syllabus	Remarks
1	Lecture 1	Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel.	
2	Lecture 2	Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections.	
3	Lecture 3	Operating system structure (simple, layered, virtual machine), O/S services, and system calls.	
4	Lecture 4		
5	Lecture 5	Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process Communication, overview of thread , benefits of threads, user and kernel threads.	
6	Lecture 6		
7	Lecture 7	Scheduling criteria, preemptive& non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR priority), algorithm evaluation, multi-processor scheduling.	
8	Lecture 8		
9	Lecture 9		
10	Lecture 10	Background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.	
11	Lecture 11		
12	Lecture 12		
13	Lecture 13	Deadlocks:system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.	
14	Lecture 14		
15	Lecture 15		
16	Lecture 16	Memory Management:background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.	
17	Lecture 17		
18	Lecture 18		
19	Lecture 19	Virtual Memory:background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.	
20	Lecture 20		
21	Lecture 21		
22	Lecture 22	File Systems:file concept, access methods, directory	

23	Lecture 23	structure, file system structure, allocation methods (contiguous, linked, and indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performances.	
24	Lecture 24		
25	Lecture 25		
26	Lecture 26	I/O Management :I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance	
27	Lecture 27		
28	Lecture 28		
29	Lecture 29		
30	Lecture 30	Disk Management:disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN), disk reliability, disk formatting, boot block, bad blocks.	
31	Lecture 31		
32	Lecture 32		
33	Lecture 33	Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.	
34	Lecture 34		