MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

INFORMATION TECHNOLOGY

3rd Year –V Semester

Course Structure:

Code	Paper	Contact Periods Per Week			Total Contact Hours	Credit
		L	T	P		
IT503	Operating System	3	0	0	3	3

Syllabus:

Introduction [4L]

Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, 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: Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication. **[3L]**

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

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

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

[5L]

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

Storage Management [19L]

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

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

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

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. **[4L]**

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

Protection & Security [4L]:

Goals of protection, domain of protection, security problem, authentication, one-time password, program threats, system threats, threat monitoring, encryption.

Text Books / References:

1. Milenkovie M., “Operating System: Concept & Design”, McGraw Hill.
2. Tanenbaum A.S., “Operating System Design & Implementation”, Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., “Operating System Concepts”, Wiley.
4. Dhamdhere: Operating System TMH
5. Stalling, William, “Operating Systems”, Maxwell McMillan International Editions, 1992.
6. Dietel H. N., “An Introduction to Operating Systems”, Addison Wesley.

B.P. PODDAR INSTITUTE OF MANAGEMENT AND TECHNOLOGY

Department of Information Technology

Lesson Plan

Course : Operating System

Course Code : IT 503

Lecture	Description	Reference	Teaching Methods	Teaching
L1	Introduction to OS	1, GL	Lecture/Discussion	White Board
L2	OS services and Kernel	1, GL	Lecture/Discussion	White Board
L3	Programming and Time Sharing	TB	Lecture/Discussion	White Board
L4	Process Scheduling: preemptive and non-preemptive	GL	Lecture/Discussion	White Board
L5	FCFS, SJF, RR, priority scheduling	GL	Lecture/Discussion	White Board
L6	Critical Section Problem	TB	Lecture/Discussion	White Board
L7	Critical Section Problem cont.	TB	Lecture/Discussion	White Board
L8	Semaphores, monitors	TB	Lecture/Discussion	White Board
L9	Semaphores, monitors cont.	TB	Lecture/Discussion	White Board
L10	Paging, Segmentation Details	GL	Lecture/Discussion	White Board
L11	Demand Paging, Swapping	GL	Lecture/Discussion	White Board
L12	Virtual Memory	GL	Lecture/Discussion	White Board
L13	Introduction to Deadlocks	GL	Lecture/Discussion	White Board
L14	Concurrent Processes	GL	Lecture/Discussion	White Board
L15	Deadlocks graph, Different condition of Deadlocks	GL	Lecture/Discussion	White Board
L16	Bankers Algorithm.	GL	Lecture/Discussion	White Board
L15	Page replacement Algorithm	Re1, GL	Lecture/Discussion	White Board
L16	Introduction to File system and details	Re2	Lecture/Discussion	White Board
L17	Introduction to directory structure	Re2	Lecture/Discussion	White Board
L18	Directory structure details continued	GL	Lecture/Discussion	White Board
L19	I/O hardware, Interrupts	TB	Lecture/Discussion	White Board
L20	DMA	TB	Lecture/Discussion	White Board
L21	Spooling and Device reservation	TB	Lecture/Discussion	White Board
L22	One pass and Two pass	TB	Lecture/Discussion	White Board
L23	Macro processors	TB	Lecture/Discussion	White Board
L24	Loaders	TB	Lecture/Discussion	White Board
L25	Function, Editors	Re4	Lecture/Discussion	White Board
L26	Disk Structures	Re4	Lecture/Discussion	White Board
L27	Disk scheduling (FCFS, SSTF, SCAN)	Re4	Lecture/Discussion	White Board
L28	Disk scheduling continued	Re4	Lecture/Discussion	White Board
L29	Introduction to Distributed OS	Re4	Lecture/Discussion	White Board
L30	Introduction to Protection and Security	GL	Lecture/Discussion	White Board
L31	Protection and Security continued	GL	Lecture/Discussion	White Board
L32	Protection and Security	GL	Lecture/Discussion	White Board
L33	Contiguous Memory allocation	GB, TB	Lecture/Discussion	White Board
L34	Cache Memory	TB	Lecture/Discussion	White Board
L35	System call Details	TB	Lecture/Discussion	White Board
L36	I/O hardware, polling, interrupts, DMA	GB	Lecture/Discussion	White Board
L37	Application I/O interface	TB	Lecture/Discussion	White Board
L38	Goals of protection, domain of protection	TB	Lecture/Discussion	White Board
L39	Security problem,	GB	Lecture/Discussion	White Board
L40	Authentication, one-time password	TB	Lecture/Discussion	White Board

Lecture	Description	Reference	Teaching Methods	Teaching
L41	program threats	TB	Lecture/Discussion	White Board
L42	System threats,	GB	Lecture/Discussion	White Board
L43	Threat monitoring	TB	Lecture/Discussion	White Board
L44	Encryption.	TB	Lecture/Discussion	White Board
L45	Sums on different calculation from chapters	GB	Lecture/Discussion	White Board
L46	Different OS features and usage advantages	TB	Lecture/Discussion	White Board
L47	Summary of all the Chapters.	TB	Lecture/Discussion	White Board

Text Book: (TB)

[1] Silbersehatz A. & Galvin, "Operating System Concept", Addision Wesley/Pearson Education [GB]

[2] Tanenbaum "odern OS" Prentice Hall of India/Pearson Education [TB]

Reference: (Re)

1. Milenkovie M., "Operating System: Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implemen tation", Practice Hall NJ.
3. Silbersehatz A. And Peterson J. L., "Operating Syst em Concepts", Wiley.
4. Dhamdhere: Operating System TMH
5. Stalling, William, "Operating Systems", Maxwell McM illan International Editions, 1992.

Course Outcomes

Students will be able to:

IT503.1	Understand the structures and functions of operating system.
IT503.2	Identify process scheduling, synchronization and deadlocks.
IT503.3	Classify various approaches to memory management.
IT503.4	Analyze virtual memory concept and disk scheduling.
IT503.5	Explain the implementation of file systems, protection and security issues.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
IT503.1	2	1	1	-	-	-	-	-	-	-	-	-
IT503.2	2	2	2	1	-	-	-	-	-	-	-	1
IT503.3	2	2	2	1	-	-	-	-	-	-	-	1
IT503.4	3	3	3	1	-	-	-	-	-	-	-	1
IT503.5	2	3	3	1	-	-	-	-	-	-	-	1

CO-PSO Mapping

CO	PSO1	PSO2
IT503.1	1	-
IT503.2	2	1
IT503.3	2	1
IT503.4	3	1
IT503.5	3	-