CS 2254 OPERATING SYSTEMS

SUBJECT DESCRIPTION AND OBJECTIVES

An **operating system** (**OS**) is a collection of software that manages computer hardwareresources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function.

OBJECTIVES:

- A program that mediates between application programs and the hardware
- A set of procedures that enable a group of people to use a computer system.
- A program that controls the execution of application programs
- An interface between applications and hardware

CS 2254 OPERATING SYSTEMS

AIM:

To learn the various aspects of operating systems such as process management, memory management, and I/O management.

UNIT I PROCESSES AND THREADS 9

Introduction to operating systems – review of computer organization – operating system structures – system calls – system programs – system structure – virtual machines. Processes: Process concept – Process scheduling – Operations on processes –Cooperating processes – Interprocess communication – Communication in client-server systems. Case study: IPC in Linux. Threads: Multi-threading models – Threading issues. Case Study: Pthreads library

UNIT II PROCESS SCHEDULING AND SYNCHRONIZATION 10

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Case study: Process scheduling in Linux. Process Synchronization: The critical-section problem Synchronization hardware – Semaphores – Classic problems of synchronization –critical regions – Monitors. Deadlock: System model – Deadlock characterization –Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance –Deadlock detection – Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 9

Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background –Demand paging – Process creation – Page replacement – Allocation of frames –Thrashing. Case Study: Memory management in Linux

UNIT IV FILE SYSTEMS 9

File-System Interface: File concept – Access methods – Directory structure – File system mounting – Protection. File-System Implementation : Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery– log-structured file systems. Case studies: File system in Linux – file system in Windows XP

UNIT V I/O SYSTEMS 8

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem –streams – performance. Mass-Storage Structure: Disk scheduling – Disk management –Swap-space management – RAID – disk attachment – stable storage – tertiary storage.Case study: I/O in Linux

Total: 45

TEXT BOOK:

1. Silberschatz, Galvin, and Gagne, “Operating System Concepts”, Sixth Edition, Wiley India Pvt Ltd, 2003.

REFERENCES:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Pearson Education, 2004.
2. Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004.
3. Harvey M. Deital, “Operating Systems”, Third Edition, Pearson Education

MICROLESSON PLAN

HOURS	LECTURE TOPICS	READING
	UNIT-I PROCESSES AND THREADS	
1	Introduction-operating system	T1
2	Review of Computer organization	T1
3	Operating system structures	T1
4	System calls (AV CLASS)	T1
	System programs	T1
5	System structure	T1
	Virtual machines	T1
6	Process concept	T1
	Process scheduling	T1
7	Operations on processes	T1
	Cooperating processes	T1
8	Inter process communication	T1
	Communication in client-server system	T1
9	Threads: Multi-threading models	T1
	Threading issues.	T1
	UNIT-II PROCESS SCHEDULING AND SYNCHRONIZATION	
10	CPU Scheduling	T1
	Scheduling criteria	T1
11	Scheduling algorithms	T1
12	Multiple-processor scheduling	T1
	Real time scheduling	T1
13	Algorithm Evaluation	T1
	Process Synchronization:Critical-Section problem	T1
14	Synchronization hardware	T1
	Semaphores(AV CLASS)	T1
	Classic problems of synchronization	T1
15	Critical regions	T1
	Monitors	T1
16	System model	T1
	Deadlock characterization	T1
17	Methods for handling deadlock	T1
	Deadlock prevention	T1
18	Deadlock avoidance	T1
19	Deadlock detection	T1
	Recovery from deadlock	T1

HOURS	LECTURE TOPICS	READING
	UNIT-III STORAGE MANAGEMENT	
20	Memory management Background	T1
21	Swapping	T1
	Contiguous memory allocation	T1
22,23	Paging	T1
24	Segmentation	T1
	Segmentation with paging	T1
25	Virtual Memory: Background (AV CLASS)	T1
	Demand paging	T1
26	Process creation	T1
	Page replacement	T1
27	Allocation of frames	T1
28	Thrashing	T1
	UNIT-IV FILE SYSTEMS	
29	File-System Interface: File concept	T1
30	Access methods	T1
31	Directory structure	T1
32	File system mounting	T1
	Protection	T1
33	File system implementation(AV CLASS)	T1
34	Directory implementation	T1
35	Allocation methods	T1
36	Free space management	T1
	Efficiency and performance	T1
37	Recovery	T1
	Log-structured file systems	T1
	UNIT-V I/O SYSTEMS	
38	I/O Systems	T1
	I/O Hardware	T1
39	Application I/O interface	T1
	Kernel I/O subsystem	T1
40	Streams	T1
	Performance	T1
41	Mass-Storage StructureDisk scheduling(AV CLASS)	T1
42	Disk management	T1
	Swap-space management	T1
43	RAID	T1
44	Disk attachment	T1
	Stable storage	T1
45	Tertiary storage ,Case study: I/O in Linux	T1

PREPARED BY
Mrs.M.Arockia Pravina
A.P/CSE