SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
Murukambattu, Chittoor

MCA DEPARTMENT

QUESTION BANK

For

24MCA121 –Operating Systems Regulation – R24

Academic Year 2025 – 26

Prepared by

Mrs. G Geetha, Assistant Professor

SUBJECT NAME : OPERATING SYSTEMS **SUBJECT CODE : 24MCA121**

YEAR & SEMESTER : I & II **ACADEMIC YEAR : 2025-26**

UNIT - 1 : OPERATING SYSTEMS INTRODUCTION

Definition & Views of OS - Operating Systems objectives and functions - Computer System Architecture - OS Structure - OS Operations. **Evolution of Operating Systems:** Simple Batch - Multi programmed – Time shared - Parallel - Distributed Systems - Real-Time Systems -Operating System services - User OS Interface -System Calls - Types of System Calls - System Boot.

PART –A

Q.No.	Questions	Blooms Taxonomy Level
1	What is an Operating System?	L1
2	Define time-sharing system.	L1
3	What is a bootstrap program?	L1
4	Explain the user view of an Operating System.	L2
5	What is multiprogramming?	L2
6	Describe OS services briefly.	L2
7	Give an example of process management in OS.	L3
8	How does an OS handle system calls?	L3
9	Differentiate between parallel and distributed systems.	L4
10	Distinguish between monolithic and layered OS structure.	L4
11	Why is time-sharing system more efficient than batch system?	L5
12	Justify the need for dual mode operation in OS.	L5
13	Write the steps involved in system booting process.	L6

PART –B

1	a) Define operating system and state its objectives. b) Explain computer system architecture and its components.	L1,L2
2	a) Explain the functions of an operating system. b) Analyze different operating system structures.	L2,L4
3	a) Describe operating system operations. b) Explain the services provided by an operating system.	L2,L2
4	Explain Simple Batch Systems and Multiprogramming Systems with examples	L3
5	List and explain various Operating System Services.	L1
6	Compare and evaluate Multiprogramming, Time-sharing, and Real-time systems.	L5
7	Explain the System Booting Process and its types.	L3

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UNIT II : PROCESS CONCEPTS AND CPU SCHEDULING		
Concepts: The Process - Process State - Process Control Block - Processes & Threads. Process Scheduling Principle: Scheduling Queues – Schedulers - Context Switch - Preemptive Scheduling – Dispatcher - Scheduling Criteria. CPU Scheduling: Scheduling algorithms –FCFS – SJF – Priority - Round Robin - Multi level Queue – Multiple processors.		
PART –A		
1	What is a process?	**L1**
2	Define Process Control Block (PCB).	**L1**
3	What is a thread?	**L1**
4	Explain the different states of a process.	**L2**
5	What is the role of PCB in process management?	**L2**
6	What is context switching?	**L2**
7	Give an example of process scheduling in a real system.	**L3**
8	How does a scheduler select a process from the ready queue?	**L3**
9	Differentiate between process and thread.	**L4**
10	Compare preemptive and non-preemptive scheduling.	**L4**
11	Why is Round Robin scheduling suitable for time-sharing systems?	**L5**
12	Evaluate the importance of scheduling criteria in CPU scheduling.	**L5**
13	Construct a simple scheduling queue structure.	**L6**
14	Design a scenario to illustrate context switching.	**L6**
15	Compare FCFS and SJF scheduling algorithms.	**L4**
PART –B		
1	(a) Define a process. List the basic elements of a process. (b) Explain the difference between a program and a process with examples.	**L1, L2**
2	(a) List the different states of a process. (b) Explain the role of the Process Control Block (PCB) in process management.	**L1, L3**
3	(a) What are threads? Explain the concept of multithreading. (b) Differentiate between processes and threads in terms of memory usage and execution.	**L2 , L4**
4	(a) What are scheduling queues in an operating system? (b) Analyze the roles of long-term, short-term, and medium-term schedulers.	**L1, L4**
5	(a) Explain the concept of context switching. (b) Describe the functions of the dispatcher in CPU scheduling.	**L2, L3**
6	(a) Define preemptive and non-preemptive scheduling. (b) Evaluate different scheduling criteria such as CPU utilization, turnaround time, waiting time, and response time.	**L1, L5**

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7	Explain the working of FCFS and SJF scheduling algorithms with example.	**L2**
8	(a) Describe the Priority Scheduling algorithm. (b) Illustrate the working of Round Robin scheduling with a suitable example.	**L2,L3**
9	(a) What is Multilevel Queue Scheduling? (b) Analyze the challenges in scheduling for multiple processor systems.	**L1 ,L4**
10	Compare Round Robin and Priority Scheduling in a time-sharing environment and justify which is more suitable.	**L5**
UNIT III - PROCESS COORDINATION & DEADLOCK		
Process Coordination : Synchronization Background - The Critical Section Problem - Peterson's solution - Synchronization Hardware – Semaphores - Classic Problems of Synchronization. Deadlocks: System Model -Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance -Deadlock Detection and Recovery from Deadlock.		
PART – A		
1	What is process synchronization?	**L1**
2	Define critical section.	**L1**
3	What is a semaphore?	**L1**
4	Explain the need for synchronization in OS.	**L2**
5	What is the critical section problem?	**L2**
6	Describe Peterson's solution briefly.	**L2**
7	How are semaphores used to control access to shared resources?	**L3**
8	Give an example of a synchronization problem in real life.	**L3**
9	Differentiate between binary semaphore and counting semaphore.	**L4**
10	Compare deadlock prevention and deadlock avoidance.	**L4**
11	Why is mutual exclusion important in synchronization?	**L5**
12	Evaluate the effectiveness of deadlock detection methods.	**L5**
13	Construct a simple scenario illustrating the dining philosophers problem.	**L6**
14	Design steps to recover from a deadlock situation.	**L6**
15	Describe four necessary conditions for deadlock.	**L2**
PART –B		
1	(a) Define process synchronization. Why is synchronization necessary in operating systems? (b) Explain the race condition problem with a suitable example.	**L1, L2**
2	(a) What is the Critical Section Problem?	

	(b) Demonstrate with an example how mutual exclusion can prevent race conditions.	L1, L3
3	(a) Explain Peterson's solution for two processes. (b) Analyze how Peterson's solution ensures mutual exclusion, progress, and bounded waiting.	L2,L4
4	List the hardware instructions used for synchronization with example.	L1
5	(a) Define semaphores and explain the difference between binary and counting semaphores. (b) Explain the use of semaphores in solving the Producer–Consumer problem.	L2, L4
6	(a) List any three classic synchronization problems. (b) Explain the Readers–Writers problem and propose a semaphore- based solution.	L2, L5
7	(a) Define deadlock and explain the system model for deadlocks. (b) Analyze the four necessary conditions for deadlock with examples.	L1, L4
8	Compare Deadlock Prevention and Deadlock Avoidance methods with examples.	L5
9	Explain the deadlock detection algorithm for single-instance resources with example.	L2
10	(a) Explain the methods of recovering from deadlock. (b) Evaluate process termination and resource preemption as deadlock recovery techniques.	L3 , L5

UNIT IV - MASS STORAGE STRUCTURE & MEMORY MANAGEMENT

Mass Storage Structure: Overview of Mass Storage Structure - Disk Structure - Disk Attachment - Disk Scheduling - Disk Management. Memory Management: Logical & Physical Address Space – Swapping - Contiguous Memory Allocation – Paging - Structure of Page Table – Segmentation - Page Replacement-Algorithms.

PART – A(Two Marks)

1	What is mass storage structure?	L1
2	Define disk scheduling.	L1
3	What is paging?	L1
4	Explain disk structure briefly.	L2
5	What is the difference between logical and physical address space?	L2
6	Describe contiguous memory allocation.	L2
7	How does disk scheduling improve system performance?	L3
8	Give an example of swapping in memory management.	L3
9	Differentiate between paging and segmentation.	L4

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10	Compare FCFS and SSTF disk scheduling algorithms.	**L4**
11	Why is page replacement necessary in memory management?	**L5**
12	Evaluate the importance of disk management techniques.	**L5**
13	Design a simple page table structure.	**L6**
14	Construct a scenario illustrating disk scheduling.	**L6**
15	Analyze the advantages of segmentation over paging.	**L4**
	PART –B(Ten Marks)	
1	Describe the difference between primary, secondary, and tertiary storage with examples.	**L2**
2	(a) Explain the structure of a disk including tracks, sectors, and cylinders. (b) Illustrate how logical block addressing maps to physical locations on a disk.	**L1, L3**
3	Describe the different methods of disk attachment with example.	**L2**
4	Compare FCFS, SSTF, SCAN, and C-SCAN disk scheduling algorithms with examples.	**L4**
5	(a) What are the main functions of disk management in an operating system? (b) Illustrate how free-space management is handled using bit vector and linked list methods.	**L1, L3**
6	Explain the role of the Memory Management Unit (MMU) in mapping logical to physical addresses.	**L2**
7	(a) Explain the concept of swapping and its advantages. (b) Analyze contiguous memory allocation methods and their limitations.	**L2, L4**
8	(a) Explain the concept of paging in memory management. (b) Describe the structure of a page table and how it is used to map logical addresses to physical addresses.	**L2 , L3**
9	(a) Define segmentation and explain how it differs from paging. (b) Illustrate a segmented memory system with an example and explain how it manages program segments.	**L2 , L4**
10	Compare and analyze the following page replacement algorithms: FIFO, LRU, Optimal, and Clock algorithm.	**L5**
	UNIT V - FILE SYSTEM	
File System Interface: The Concept of a File - Access methods – Directory & Disk Structure - File System Mounting - File Sharing – File System Implementation. Case Studies: The Linux System-Linux History-Design Principles . Windows 2000 Operating system-History-Design Principles .		
	PART –A	
1	What is a file in an operating system?	**L1**

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2	List any two file access methods.	**L1**
3	What is file system mounting?	**L1**
4	Explain the concept of a directory structure.	**L2**
5	What is file sharing in OS?	**L2**
6	Describe disk structure briefly.	**L2**
7	How is sequential access used to read a file?	**L3**
8	Give an example of file sharing in a multi-user system.	**L3**
9	Differentiate between sequential and direct access methods.	**L4**
10	Compare single-level and tree-structured directories.	**L4**
11	Why is file system mounting important?	**L5**
12	Evaluate the design principles of the Linux system.	**L5**
13	Design a simple directory structure for storing student records.	**L6**
14	Construct a basic model for file system implementation.	**L6**
15	List out the design principles of Linux and Windows 2000 OS.	**L1**
	PART –B	
1	Define a file and explain the difference between a text file and a binary file with examples.	**L2**
2	Explain the sequential and direct access methods in file systems with example	**L2**
3	(a) Explain the concept of a root directory and subdirectories. (b) Compare the tree-structured and acyclic-graph directory structures in terms of flexibility and complexity.	**L1, L4**
4	(a) Explain the concept of disk blocks, sectors, and tracks. (b) Illustrate how a file is stored across multiple disk blocks using linked allocation.	**L2, L3**
5	(a) What is the purpose of mounting a file system in an OS? (b) Analyze how mounting multiple file systems in Linux allows for a unified directory structure.	**L1, L4**
6	(a) Explain the concept of shared files and access rights. (b) Evaluate the security challenges involved in file sharing in multi- user systems.	**L2, L4**
7	Explain the structure and purpose of File Allocation Table (FAT) in a file system.	**L2**
8	**(a)** List the major distributions of Linux and their historical significance. (b) Analyze how Linux's modular design supports flexibility and hardware compatibility.	**L1, L4**
9	Explain the concept of Windows 2000 Active Directory.	**L2**
10	Compare the file management approaches in Linux and Windows 2000.	**L3**

Note: L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating