Satyug Darshan Institute of Technology,Faridabad		
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Unit -1

Short Questions

S. No.	Questions	Bloom Taxonomy (KL)
1	Define the term "Operating System."	1
2	List the four main generations of operating systems.	1
3	What is a "System Call" in the context of an OS?	1
4	State the primary purpose of a Microkernel.	1
5	Distinguish between a Monolithic kernel and a Layered OS structure.	2
6	Summarize the core services provided by an operating system.	2
7	Explain the concept of "Batch Processing" systems.	2
8	How does a Time-Sharing OS differ from a Real-Time OS?	2
9	Identify which OS type is best suited for embedded medical devices.	3
10	Show how a system call acts as an interface between a process and the OS.	3
11	Contrast the efficiency of a Monolithic kernel vs. a Microkernel.	4
12	Deconstruct the components of a Layered OS approach.	4
13	Justify why modern operating systems often move away from pure Monolithic designs.	5
14	Appraise the impact of the "Generations of OS" on modern computing speed.	5
15	Propose a simple architectural diagram for a Microkernel-based system.	6
16	Design a hypothetical system call sequence for "Reading a File."	6

Long Questions

1	Describe in detail the evolution of Operating Systems through various generations.	1
2	Identify and define the various types of Operating Systems (Batch, Multi-programmed, Time-sharing, etc.).	1
3	Discuss the various services provided by an Operating System to the user and to the system itself.	2
4	Explain the architecture, advantages, and disadvantages of a Monolithic OS structure.	2

5	Illustrate the mechanism of System Calls and how they are handled by the OS kernel.	3
6	Organize and compare the Layered approach versus the Microkernel approach in OS design.	4
7	Analyze how the transition from vacuum tubes to ICs influenced the development of OS types.	4
8	Evaluate the trade-offs between system performance and security in a Microkernel architecture.	5
9	Critically assess why "System Calls" are essential for maintaining hardware protection.	5
10	Create a comprehensive comparison table for all OS types based on response time and resource utilization.	6
11	Develop a conceptual framework for a new OS structure that combines Layered and Microkernel features.	6

Unit -2

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Define a "Process" in the context of an operating system.	1
2	What is a Process Control Block (PCB)?	1
3	List the different states of a process.	1
4	Define "Context Switching".	1
5	What is a "Thread"?	1
6	State two benefits of using threads over processes.	1
7	Identify the three types of schedulers typically found in an OS.	2
8	Explain the term "CPU Utilization" as a scheduling criterion.	2
9	Define "Turnaround Time" and "Waiting Time".	2
10	Contrast preemptive and non-preemptive scheduling.	2
11	Describe the "Round Robin" (RR) scheduling algorithm.	2
12	Illustrate how a process transitions from the 'Running' state to the 'Waiting' state.	3
13	Calculate the Throughput of a system if 10 processes are completed in 2 seconds.	3
14	Compare "User-level threads" and "Kernel-level threads".	4
15	Analyze why First-Come, First-Served (FCFS) scheduling can lead to the "Convoy Effect".	4
16	Justify the use of Multithreading in a modern web browser.	5

Long Questions

S. No.	Question	Bloom's Taxonomy
1	Describe the Process Life Cycle by explaining each process state and the transitions between them.	1
2	Detail the structure and components of a Process Control Block (PCB) and explain its role in context switching.	2
3	Discuss the concept of Multithreading, including its benefits and the various types of thread models.	2
4	Explain the various Scheduling Criteria used to evaluate the performance of a scheduling algorithm.	2

5	Demonstrate the working of the Shortest Job First (SJF) algorithm with both preemptive and non-preemptive examples.	3
6	Apply the Round Robin (RR) scheduling algorithm to a set of processes and calculate the average waiting time.	3
7	Distinguish between a Process and a Thread, focusing on resource sharing and overhead.	4
8	Compare and contrast FCFS, SJF, and RR scheduling algorithms based on throughput and response time.	4
9	Evaluate the impact of different Time Quantum sizes on the performance of Round Robin scheduling.	5
10	Appraise the necessity of different levels of schedulers (Long-term, Short-term, Medium-term) in a complex OS.	5
11	Design a scenario where a specific scheduling policy might lead to process starvation and propose a solution.	6

Unit -3

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Define "Inter-process Communication" (IPC).	1
2	What is a "Race Condition"?	1
3	List the two types of Semaphores.	1
4	Define the "Critical Section" of a program.	1
5	What is "Mutual Exclusion"?	1
6	State the basic principle of "Message Passing."	1
7	Explain the concept of "Strict Alternation."	2
8	Summarize the role of a "Monitor" in process synchronization.	2
9	Describe the "Producer/Consumer Problem" in brief.	2
10	How does a hardware solution like "Test-and-Set" help in IPC?	2
11	Illustrate a scenario where a Race Condition might occur.	3
12	Show how a binary semaphore can be used to achieve mutual exclusion.	3
13	Distinguish between Semaphores and Monitors.	4
14	Analyze the limitations of Peterson's Solution.	4
15	Justify why "Busy Waiting" is considered inefficient in most systems.	5
16	Propose a way to prevent the "Reader's Problem" from starving writers.	6

Long Questions

S. No.	Question	Bloom's Taxonomy
1	Explain the four necessary conditions to achieve a successful solution to the Critical Section problem.	1
2	Provide a detailed description of the "Dining Philosopher Problem" and its significance in IPC.	2
3	Discuss "Peterson's Solution" for two processes and explain how it ensures mutual exclusion.	2
4	Explain the "Producer/Consumer Problem" using a bounded buffer and Semaphores.	2

5	Demonstrate how "Message Passing" facilitates communication in a distributed system environment.	3
6	Solve the "Reader-Writer Problem" using Semaphores, ensuring no process is left in a state of permanent wait.	3
7	Compare and contrast Hardware-based and Software-based solutions for Mutual Exclusion.	4
8	Break down the structure of a Monitor and explain how it simplifies synchronization compared to Semaphores.	4
9	Evaluate the effectiveness of "Strict Alternation" as a software-based solution for the critical section.	5
10	Appraise the use of "Message Passing" versus "Shared Memory" in terms of performance and complexity.	5
11	Design a synchronization protocol for a "Three-Process" system using modified Peterson's logic.	6

Unit -4

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Define the term "Deadlock".	1
2	List the four necessary conditions for a deadlock to occur.	1
3	What is the primary purpose of the Banker's algorithm?	1
4	State the difference between Deadlock Prevention and Deadlock Avoidance.	2
5	Explain the "Mutual Exclusion" condition in the context of deadlocks.	2
6	Describe the "Hold and Wait" condition.	2
7	Define "Circular Wait".	2
8	What is meant by "No Preemption" in deadlock theory?	2
9	Show how a Resource Allocation Graph (RAG) represents a deadlock.	3
10	Use the concept of "Safe State" to explain deadlock avoidance.	3
11	Contrast Deadlock Detection with Deadlock Prevention.	4
12	Analyze the role of "Recovery" once a deadlock is detected.	4
13	Examine why the Banker's algorithm is often considered conservative.	4
14	Appraise the efficiency of terminating all deadlocked processes as a recovery method.	5
15	Justify the necessity of both "Necessary" and "Sufficient" conditions for deadlock.	5
16	Design a simple scenario illustrating a "Resource-Request" cycle.	6

Long Questions

S. No.	Question	Bloom's Taxonomy
1	Describe in detail the four necessary and sufficient conditions for a Deadlock to occur.	1
2	Explain the Banker's algorithm for deadlock avoidance including the safety and resource-request algorithms.	2
3	Discuss various strategies for Deadlock Prevention by negating each of the four necessary conditions.	2
4	Elaborate on the methods used for Deadlock Detection and the process of Recovery from it.	2

5	Demonstrate the application of the Banker's algorithm with a numerical example involving multiple resource types.	3
6	Illustrate how a system can transition from a "Safe State" to an "Unsafe State."	3
7	Distinguish between Resource Allocation Graphs for single-instance vs. multi-instance resource types.	4
8	Compare the overhead of Deadlock Prevention versus the flexibility of Deadlock Avoidance.	4
9	Evaluate the trade-offs of using "Process Termination" versus "Resource Preemption" for deadlock recovery.	5
10	Appraise the Ostrich Algorithm (ignoring the problem) as a practical approach in modern OS like UNIX.	5
11	Formulate a set of protocols for a distributed system to detect and recover from deadlocks without a central coordinator.	6

Unit -5

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Define the terms "Logical Address" and "Physical Address".	1
2	What is "Internal Fragmentation" in the context of memory partitions?	1
3	State the "Principle of Locality of Reference".	1
4	Define a "Page Fault".	1
5	What is the purpose of a "Dirty Bit" (Modify bit) in demand paging?	1
6	Name the hardware support required for Paging.	1
7	Explain the difference between Fixed and Variable Partitioning.	2
8	Summarize the concept of "Demand Paging".	2
9	Describe the "Working Set" concept in virtual memory.	2
10	Explain how "Compaction" resolves External Fragmentation.	2
11	Illustrate how a Logical Address is mapped to a Physical Address.	3
12	Demonstrate how the FIFO page replacement algorithm works.	3
13	Distinguish between Paging and Virtual Memory concepts.	4
14	Analyze the disadvantages associated with the Paging technique.	4
15	Appraise why the "Optimal" page replacement algorithm is difficult to implement.	5
16	Design a small Page Table for a system with 4 pages and 8 frames.	6

Long Questions

S. No.	Question	Bloom's Taxonomy
1	Describe the basic concept of Memory Management and the mapping of Logical to Physical addresses.	1
2	Explain the Paging principle, including page allocation and hardware support for paging.	2
3	Discuss the differences between Contiguous and Non-contiguous memory allocation.	2
4	Elaborate on Virtual Memory basics, focusing on hardware structures and control mechanisms.	2

5	Apply the LRU (Least Recently Used) and Optimal page replacement algorithms to a given reference string.	3
6	Demonstrate how Internal and External fragmentation occur in different partitioning schemes.	3
7	Compare and contrast the FIFO, LRU, and Optimal page replacement algorithms in terms of page fault rates.	4
8	Analyze the role and implementation of Page Protection and Sharing within a Paged system.	4
9	Evaluate the impact of the "Working Set" model on system performance and thrashing prevention.	5
10	Critically assess the trade-offs between Paging and Segmentation-like memory management schemes.	5
11	Formulate a memory management strategy that minimizes fragmentation while supporting demand paging.	6

Unit -6

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Define the role of a "Device Controller."	1
2	What is "Direct Memory Access" (DMA)?	1
3	List three types of file access methods.	1
4	State the primary goal of an "Interrupt Handler."	1
5	Define "Disk Scheduling."	1
6	What is a "File Allocation Table" (FAT)?	1
7	Explain the concept of "Device Independent I/O Software."	2
8	Describe the "Bit Vector" method for free-space management.	2
9	Summarize the difference between a "Linear List" and a "Hash Table" for directory implementation.	2
10	Explain the purpose of "Device Drivers" in the I/O subsystem.	2
11	Illustrate how "Linked Allocation" handles file growth.	3
12	Show how "Contiguous Allocation" can lead to disk fragmentation.	3
13	Compare "Indexed Allocation" with "Linked Allocation."	4
14	Analyze the structure of a typical magnetic disk.	4
15	Appraise the efficiency of the "SCAN" disk scheduling algorithm over "FCFS."	5
16	Design a directory structure suitable for a multi-user environment.	6

Long Questions

S. No.	Question	Bloom's Taxonomy
1	Describe the various I/O hardware components, specifically focusing on Device Controllers and DMA.	1
2	Explain the different File Allocation Methods: Contiguous, Linked, and Indexed.	2
3	Discuss the principles of I/O software, including the roles of interrupt handlers and device drivers.	2

4	Elaborate on the various directory structures and their implementations (Linear list vs Hash table).	2
5	Demonstrate the working of different Disk Scheduling algorithms with a numerical example.	3
6	Illustrate the methods used for Free-Space Management, such as bit vectors, linked lists, and grouping.	3
7	Compare and contrast the file systems of UNIX and WINDOWS as per the case study requirements.	4
8	Analyze the trade-offs between different file access methods (Sequential vs Direct).	4
9	Evaluate the effectiveness of "Device Independent I/O Software" in simplifying OS development.	5
10	Appraise the impact of disk structure (tracks, sectors, cylinders) on overall I/O performance.	5
11	Formulate a comprehensive file management strategy for an OS that maximizes both access speed and storage efficiency.	6