

Process Scheduling

1. **Scenario:** A system uses a Round Robin scheduling algorithm with a time quantum of 5 ms. Process P1 requires 20 ms, P2 requires 15 ms, and P3 requires 10 ms. What is the average turnaround time for the processes?
 - A) 20 ms
 - B) 25 ms
 - C) 30 ms
 - D) 35 ms
2. **Scenario:** You have a system with five processes with the following burst times: P1: 10 ms, P2: 5 ms, P3: 8 ms, P4: 12 ms, P5: 15 ms. If the Shortest Job First (SJF) scheduling algorithm is used, what is the average waiting time?
 - A) 10 ms
 - B) 12 ms
 - C) 15 ms
 - D) 17 ms
3. **Scenario:** A process scheduler uses a priority scheduling algorithm. Process P1 has a priority of 1, P2 has a priority of 2, and P3 has a priority of 3 (lower number indicates higher priority). If the burst times are P1: 5 ms, P2: 3 ms, and P3: 4 ms, what is the average turnaround time?
 - A) 7 ms
 - B) 8 ms
 - C) 9 ms
 - D) 10 ms
4. **Scenario:** A system has 4 processes with the following arrival times and burst times:
 - P1: Arrival = 0, Burst = 8
 - P2: Arrival = 1, Burst = 4
 - P3: Arrival = 2, Burst = 9
 - P4: Arrival = 3, Burst = 5If First-Come, First-Served (FCFS) scheduling is applied, what is the average waiting time?
 - A) 5 ms
 - B) 6 ms
 - C) 7 ms
 - D) 8 ms
5. **Scenario:** Consider a multilevel queue scheduling where Queue 1 has a time quantum of 10 ms and Queue 2 has a time quantum of 20 ms. If a process from Queue 1 requires 30 ms and a process from Queue 2 requires 40 ms, what will be the total time taken for both processes to complete if they are scheduled one after the other?
 - A) 40 ms
 - B) 50 ms
 - C) 60 ms
 - D) 70 ms

Threads and Multithreading

6. **Scenario:** A multithreaded application uses 4 threads to process data. If each thread processes data for 50 ms and the main thread waits for all threads to complete, what is the minimum total execution time?
 - A) 50 ms
 - B) 100 ms

- C) 200 ms
 - D) 250 ms
7. **Scenario:** You have a single-core CPU running three threads that share a resource. If the context switch time between threads is 2 ms and each thread requires 10 ms of CPU time, how much time will it take to complete all threads?
- A) 36 ms
 - B) 32 ms
 - C) 30 ms
 - D) 28 ms
8. **Scenario:** In a thread pool, if there are 8 threads available and 24 tasks to be completed, assuming each task takes 5 ms, how long will it take to complete all tasks?
- A) 15 ms
 - B) 20 ms
 - C) 25 ms
 - D) 30 ms
9. **Scenario:** A thread is performing I/O operations and is blocked while waiting for data to be read. What is the effect on the overall performance of the program?
- A) No effect, as the thread is still scheduled.
 - B) Overall performance improves.
 - C) Other threads can continue executing while this thread is blocked.
 - D) The program will crash.
10. **Scenario:** A program with multiple threads exhibits a problem where the output is inconsistent across runs. This is most likely due to:
- A) Thread safety issues.
 - B) Inefficient scheduling.
 - C) High CPU usage.
 - D) Memory leaks.

Memory Management

11. **Scenario:** A system has a physical memory of 256 MB and uses a paging system with a page size of 4 KB. How many pages can the physical memory hold?
- A) 64,000
 - B) 32,768
 - C) 128,000
 - D) 128
12. **Scenario:** If a process is allocated 5 pages in a system with a page size of 8 KB and its total memory usage is 50 KB, how much memory will be wasted due to page fragmentation?
- A) 2 KB
 - B) 5 KB
 - C) 3 KB
 - D) 1 KB
13. **Scenario:** A program requires 64 MB of memory. If the page size is 16 KB and the system uses a page table, how many pages will be allocated to the program?
- A) 4
 - B) 16
 - C) 32
 - D) 64

14. **Scenario:** A process has a working set of 10 pages. If the page replacement algorithm is FIFO and a page fault occurs for one of the pages, what is the minimum number of pages that need to be loaded into physical memory if it can hold only 8 pages?
- A) 1
 - B) 2
 - C) 3
 - D) 0
15. **Scenario:** A system using segmentation has the following segments: Segment 1: 20 KB, Segment 2: 15 KB, Segment 3: 25 KB. What is the minimum total memory required for the segments?
- A) 55 KB
 - B) 60 KB
 - C) 50 KB
 - D) 45 KB

Virtual Memory

16. **Scenario:** A process is using 6 pages of virtual memory, and the page table indicates that 3 pages are currently in physical memory. If a page fault occurs, how many page frames must be allocated if the physical memory can hold 4 pages?
- A) 1
 - B) 2
 - C) 3
 - D) 4
17. **Scenario:** A system has 16 KB of physical memory and a page size of 4 KB. How many pages can be allocated to a process that requires 20 KB of virtual memory?
- A) 4
 - B) 5
 - C) 6
 - D) 8
18. **Scenario:** In a system that implements a demand paging mechanism, if a process generates a page fault every 10 instructions executed and each instruction takes 2 ms to execute, how long will it take to execute 100 instructions if a page fault takes an additional 10 ms to handle?
- A) 200 ms
 - B) 220 ms
 - C) 240 ms
 - D) 260 ms
19. **Scenario:** A program requires 256 MB of virtual memory, but the physical memory available is only 128 MB. If the page size is 4 KB, how many pages will the program require?
- A) 64
 - B) 64,000
 - C) 32,768
 - D) 65,536
20. **Scenario:** If a page replacement algorithm uses the Least Recently Used (LRU) strategy and the following pages are accessed in order: 1, 2, 3, 4, 1, 2, 5, what is the total number of page faults if the physical memory can hold 3 pages?
- A) 5
 - B) 6

- C) 4
- D) 3

File Systems

21. **Scenario:** In a file system that uses contiguous allocation, if a file of size 60 MB needs to be stored and the block size is 4 MB, how many blocks are required?
- A) 15
 - B) 14
 - C) 16
 - D) 12
22. **Scenario:** A file system uses an inode-based structure. If each inode contains 128 bytes of metadata and points to 12 direct data blocks, with each data block being 4 KB, what is the maximum file size supported by this inode structure?
- A) 48 KB
 - B) 48 MB
 - C) 50 KB
 - D) 50 MB
23. **Scenario:** A directory structure uses a tree structure. If a directory contains 10 files and each file has 3 levels of subdirectories, how many entries are there in the directory?
- A) 10
 - B) 30
 - C) 40
 - D) 50
24. **Scenario:** If a file is deleted in a file system that uses linked allocation, what happens to the blocks allocated to that file?
- A) They are immediately reused.
 - B) They remain allocated until the system reboots.
 - C) They are marked as free but not reused until fragmentation occurs.
 - D) They are marked as deleted but remain inaccessible.
25. **Scenario:** A file system has a maximum file size of 1 GB, and the block size is 1 KB. How many blocks can be allocated to a file?
- A) 1,024
 - B) 1,048,576
 - C) 1,000,000
 - D) 1,073,741,824

Concurrency and Synchronization

26. **Scenario:** Two processes, A and B, share a resource that can only be accessed by one at a time. If A acquires the resource but then is preempted by B, which tries to acquire the same resource, what kind of concurrency issue is this?
- A) Deadlock
 - B) Starvation
 - C) Race condition
 - D) Live lock
27. **Scenario:** A program uses multiple threads to increment a shared counter. If two threads simultaneously read the counter, increment it, and write it back, what problem might arise?

- A) Deadlock
 - B) Starvation
 - C) Race condition
 - D) Priority inversion
28. **Scenario:** If a producer-consumer problem is solved using semaphores and the buffer size is 5, how many items can the consumer consume at maximum without blocking?
- A) 5
 - B) 4
 - C) 3
 - D) 2
29. **Scenario:** A thread that is waiting for a lock to be released is in which state?
- A) Running
 - B) Blocked
 - C) Ready
 - D) Terminated
30. **Scenario:** In a system with multiple threads, if a thread is scheduled to run but is blocked due to waiting for I/O, what happens to the CPU usage?
- A) CPU usage increases.
 - B) CPU usage decreases.
 - C) CPU usage remains constant.
 - D) CPU usage stops.

Deadlocks

31. **Scenario:** A system has 3 processes (P1, P2, and P3) and 2 resources (R1 and R2). P1 holds R1 and is waiting for R2, while P2 holds R2 and is waiting for R1. What type of deadlock condition is this?
- A) Mutual Exclusion
 - B) Hold and Wait
 - C) No Preemption
 - D) Circular Wait
32. **Scenario:** To prevent deadlocks, a system implements a resource allocation strategy that denies resource requests that would leave the system in an unsafe state. This strategy is known as:
- A) Banker's Algorithm
 - B) Wait-Die Scheme
 - C) Wound-Wait Scheme
 - D) Resource Allocation Graph
33. **Scenario:** A deadlock detection algorithm runs every 5 seconds in a system. If a deadlock is detected, how long could it take to recover from the deadlock if the resources are allocated properly?
- A) 5 seconds
 - B) 10 seconds
 - C) 15 seconds
 - D) It could take indefinitely.
34. **Scenario:** In a system with 3 processes and 2 instances of a resource, what is the minimum number of resources required to ensure that deadlocks do not occur?
- A) 2
 - B) 3
 - C) 4

- D) 5
35. **Scenario:** A system allows processes to request resources in a way that guarantees the system will never enter a deadlock. This is an example of:
- A) Deadlock avoidance
 - B) Deadlock detection
 - C) Deadlock recovery
 - D) Deadlock prevention

Prevention, Avoidance, Detection, and Recovery

36. **Scenario:** The Banker's Algorithm is an example of:
- A) Deadlock prevention
 - B) Deadlock avoidance
 - C) Deadlock detection
 - D) Deadlock recovery
37. **Scenario:** A process holds a resource and waits for another resource that it has not yet acquired. This condition is known as:
- A) Mutual Exclusion
 - B) Hold and Wait
 - C) No Preemption
 - D) Circular Wait
38. **Scenario:** If a system uses a wait-die scheme for deadlock prevention, what happens if an older process requests a resource held by a younger process?
- A) The older process waits.
 - B) The younger process is aborted.
 - C) The system crashes.
 - D) The older process is aborted.
39. **Scenario:** A system has 5 processes and uses the following resource allocation matrix:
- Process 1: [1, 0, 2]
 - Process 2: [0, 1, 0]
 - Process 3: [1, 1, 1]
 - Process 4: [2, 0, 0]
 - Process 5: [0, 0, 1] If there are 3 instances of each resource type, is the system in a safe state? - A) Yes - B) No - C) Cannot be determined - D) Yes, but risky
40. **Scenario:** In a deadlock recovery scheme, if a process is rolled back to a safe state after a deadlock is detected, what type of recovery is being used?
- A) Resource preemption
 - B) Process termination
 - C) Rollback
 - D) Wait-Die

Semaphores and Mutexes

41. **Scenario:** Consider a binary semaphore initialized to 1. If a thread performs a wait operation on the semaphore twice without a signal operation in between, what will happen?
- A) The thread will succeed and decrement the value to 0.

- B) The thread will block indefinitely.
 - C) The system will crash.
 - D) The thread will get an error.
42. **Scenario:** A mutex is used to control access to a shared variable. If two threads attempt to lock the mutex at the same time, what will happen?
- A) Both threads will succeed.
 - B) One thread will succeed, and the other will block.
 - C) Both threads will block.
 - D) The program will crash.
43. **Scenario:** A counting semaphore is initialized to 5. If three threads perform a wait operation on it, what will be the value of the semaphore?
- A) 5
 - B) 2
 - C) 0
 - D) 3
44. **Scenario:** In a scenario where multiple threads are reading and writing to a shared variable, which synchronization mechanism would be most appropriate to prevent data races?
- A) Semaphore
 - B) Mutex
 - C) Spinlock
 - D) Condition variable
45. **Scenario:** If a condition variable is signaled while no thread is waiting on it, what will happen?
- A) The signal is lost.
 - B) The waiting thread will wake up.
 - C) The system will crash.
 - D) The condition variable will reset.

Monitors and Condition Variables

46. **Scenario:** In a monitor implementation of the producer-consumer problem, if the buffer is full and a producer attempts to add an item, what should happen?
- A) The producer should busy-wait.
 - B) The producer should block until space is available.
 - C) The producer should terminate.
 - D) The producer should overwrite the oldest item.
47. **Scenario:** If a consumer thread tries to consume from an empty buffer, what should happen in a monitor-based solution?
- A) The consumer should busy-wait.
 - B) The consumer should block until an item is produced.
 - C) The consumer should throw an error.
 - D) The consumer should exit.
48. **Scenario:** A monitor allows only one thread to execute a critical section at a time. What is the main advantage of using monitors?
- A) Simplicity in implementation.
 - B) Reduced context switching.
 - C) Automatic deadlock prevention.
 - D) Easier debugging.

49. **Scenario:** In a condition variable implementation, if a thread signals a condition variable while holding a lock, what must happen next?
- A) The thread releases the lock.
 - B) The thread continues to hold the lock.
 - C) The thread blocks.
 - D) The thread terminates.
50. **Scenario:** When a thread calls wait on a condition variable, what happens to the associated lock?
- A) The lock is released.
 - B) The lock is retained.
 - C) The lock is destroyed.
 - D) The lock is reset.

More Advanced Questions

51. **Scenario:** A system uses a non-preemptive priority scheduling algorithm. If a low-priority process is currently running and a high-priority process becomes ready, what will happen?
- A) The high-priority process will start immediately.
 - B) The low-priority process will continue until it blocks or terminates.
 - C) The system will crash.
 - D) The high-priority process will wait.
52. **Scenario:** In a system using the Least Recently Used (LRU) page replacement algorithm, if the pages are accessed in the order: 1, 2, 3, 1, 4, 2, 1, and the physical memory can hold 3 pages, how many page faults will occur?
- A) 4
 - B) 5
 - C) 6
 - D) 7
53. **Scenario:** A thread attempts to acquire a mutex that it already holds. If the mutex is a recursive mutex, what will happen?
- A) The thread will deadlock.
 - B) The thread will succeed and increment the lock count.
 - C) The system will crash.
 - D) The thread will block.
54. **Scenario:** A system has a total of 10 processes and 3 resources. If the maximum demand for each resource by each process is 2 units, what is the maximum number of resources that can be allocated while ensuring a safe state?
- A) 3
 - B) 4
 - C) 5
 - D) 6
55. **Scenario:** If a process holds resource R1 and is waiting for resource R2, and another process holds resource R2 and is waiting for resource R1, what condition does this represent?
- A) Deadlock
 - B) Starvation
 - C) Live lock
 - D) Blocking

Additional Scenarios

56. **Scenario:** A system allocates memory using a first-fit strategy. If a process requests 25 KB of memory and the available blocks are 10 KB, 20 KB, and 30 KB, which block will be allocated?
- A) 10 KB
 - B) 20 KB
 - C) 30 KB
 - D) None
57. **Scenario:** In a system with 5 processes and 3 instances of a resource, if each process requests a maximum of 2 instances, what is the minimum number of resources required to avoid deadlocks?
- A) 3
 - B) 4
 - C) 5
 - D) 6
58. **Scenario:** A system implements a demand paging mechanism. If a process generates a page fault every 100 instructions and each instruction takes 2 ms to execute, what will be the total execution time for 1,000 instructions if a page fault takes an additional 10 ms to handle?
- A) 2,000 ms
 - B) 2,100 ms
 - C) 2,200 ms
 - D) 2,300 ms
59. **Scenario:** In a priority scheduling algorithm, if a high-priority process arrives while a low-priority process is executing, what happens?
- A) The high-priority process waits.
 - B) The low-priority process is preempted.
 - C) The low-priority process is terminated.
 - D) The system will deadlock.
60. **Scenario:** A system with three processes and two resources is in a deadlock. If one process is terminated to recover from the deadlock, what might be the consequence?
- A) Other processes may still run.
 - B) The system may crash.
 - C) The deadlock may not be resolved.
 - D) All processes will terminate.

Final Set of Questions

61. **Scenario:** A file system uses a bitmap to manage free blocks. If there are 128 blocks and the bitmap shows the first 64 blocks as free, how many blocks can be allocated?
- A) 64
 - B) 128
 - C) 32
 - D) 96
62. **Scenario:** In a system using the Banker's Algorithm, if a process has a maximum need of [0, 1, 0] and currently holds [0, 0, 0], what is the maximum resource it can request?
- A) [0, 1, 0]
 - B) [0, 0, 1]
 - C) [0, 1, 1]

- D) [1, 0, 0]
- 63. **Scenario:** In a thread-safe application, if a shared counter is incremented by multiple threads, what synchronization mechanism should be used to ensure the counter's accuracy?
 - A) Semaphore
 - B) Mutex
 - C) Spinlock
 - D) All of the above
- 64. **Scenario:** A resource allocation graph shows a cycle involving three processes and two resources. What does this indicate?
 - A) A safe state
 - B) A deadlock
 - C) A starvation situation
 - D) A priority inversion
- 65. **Scenario:** If a file is stored using indexed allocation and the index block is lost, what will happen to the file?
 - A) The file can still be accessed.
 - B) The file is permanently lost.
 - C) The file can be reconstructed.
 - D) The file is corrupted.
- 66. **Scenario:** A process requests 10 units of a resource, but only 5 units are available. If it waits indefinitely for the resource, what condition might arise?
 - A) Starvation
 - B) Deadlock
 - C) Race condition
 - D) Livelock
- 67. **Scenario:** A process is blocked because it is waiting for a resource held by another process. If the holding process is terminated, what will happen?
 - A) The blocked process is woken up and resumes execution.
 - B) The blocked process will deadlock.
 - C) The system will crash.
 - D) The blocked process will be aborted.
- 68. **Scenario:** A thread that is executing in a critical section cannot be interrupted. This property is known as:
 - A) Atomicity
 - B) Mutual Exclusion
 - C) Synchronization
 - D) Isolation
- 69. **Scenario:** A file system is organized in a hierarchical directory structure. If a user wants to access a file located deep in the hierarchy, how many directory entries must be traversed?
 - A) Depends on the file size
 - B) Depends on the number of files
 - C) Depends on the depth of the directory
 - D) It doesn't require any traversal
- 70. **Scenario:** A semaphore is used to control access to a shared resource. If a thread waits on the semaphore, what will it do until the semaphore is signaled?
 - A) Busy wait
 - B) Block and yield control
 - C) Continue executing

- D) Exit the program
71. **Scenario:** A process uses a page replacement policy that replaces the least frequently used page. If it has 4 pages and accesses them in the order: 1, 2, 3, 4, 1, 2, 5, what will be the number of page faults if physical memory can hold 4 pages?
- A) 4
 - B) 5
 - C) 6
 - D) 3
72. **Scenario:** A system with 3 processes and 2 resources is in a deadlock. If one resource is released, what will happen?
- A) The deadlock will be resolved.
 - B) The system will crash.
 - C) The processes will terminate.
 - D) The deadlock will persist.
73. **Scenario:** In a system with 10 processes and 5 resources, if each process can hold a maximum of 3 resources, how many resources can be safely allocated to avoid deadlock?
- A) 6
 - B) 7
 - C) 8
 - D) 9
74. **Scenario:** A file system's block size is 1 KB. If a file is 2.5 KB, how many blocks will be allocated for this file?
- A) 2
 - B) 3
 - C) 4
 - D) 5
75. **Scenario:** A program is running on a single-core CPU and creates two threads. If each thread requires 10 ms to execute, what is the maximum time it could take to complete both threads if they are executed sequentially?
- A) 10 ms
 - B) 20 ms
 - C) 30 ms
 - D) 40 ms
76. **Scenario:** A process that requires 100 KB of memory is allocated a 128 KB block in a system with a 64 KB page size. How many pages will be allocated for this process?
- A) 1
 - B) 2
 - C) 3
 - D) 4
77. **Scenario:** If two threads are writing to a file simultaneously, what synchronization mechanism should be used to ensure that writes do not interfere with each other?
- A) Semaphore
 - B) Mutex
 - C) Spinlock
 - D) All of the above
78. **Scenario:** In a paging system, if the page table is stored in memory, what happens to the memory access time?
- A) It decreases.
 - B) It increases.

- C) It remains constant.
 - D) It becomes unpredictable.
79. **Scenario:** A process requires 3 resources, and there are 2 instances of each resource available in the system. If another process requests 1 instance of one of those resources, what is the maximum number of processes that can be accommodated in the system?
- A) 1
 - B) 2
 - C) 3
 - D) 4
80. **Scenario:** A system uses a round-robin scheduling algorithm with a time slice of 100 ms. If there are 5 processes, what is the maximum time a single process can run before being preempted?
- A) 100 ms
 - B) 200 ms
 - C) 500 ms
 - D) It depends on the implementation.

4o mini

You said:

more 20 question above type

ChatGPT said:

ChatGPT

Here are 20 more challenging and scenario-based multiple-choice questions related to Operating Systems:

More Operating System MCQs

81. **Scenario:** In a system using demand paging, if the page size is 4 KB and a process requires 10 MB of memory, how many pages will be required?
- A) 256
 - B) 2,560
 - C) 1,024
 - D) 1,280
82. **Scenario:** If a thread uses a mutex to protect a critical section and another thread tries to lock the same mutex, what is the expected behavior if the mutex is not recursive?
- A) The second thread locks the mutex.
 - B) The second thread is blocked until the mutex is released.
 - C) The second thread locks the mutex but doesn't enter the critical section.
 - D) The system crashes.
83. **Scenario:** In a system that implements priority inversion, if a high-priority task is waiting for a resource held by a low-priority task, and a medium-priority task preempts the low-priority task, what could happen?
- A) The high-priority task will run immediately.
 - B) The low-priority task will continue executing.

- C) The system may enter a deadlock.
 - D) The medium-priority task will be blocked.
84. **Scenario:** A file system uses a linked-list allocation method for files. If a file grows, what happens to the allocation?
- A) The file must be reallocated.
 - B) Additional blocks are added to the end of the linked list.
 - C) The file cannot grow beyond the current size.
 - D) The system crashes.
85. **Scenario:** If a resource allocation graph shows a cycle, what can be concluded about the system's state?
- A) The system is in a safe state.
 - B) The system is in a deadlock state.
 - C) The system is using too many resources.
 - D) The system is in a starvation state.
86. **Scenario:** In a round-robin scheduling algorithm, if a process has a burst time of 250 ms and the time quantum is 100 ms, how many time slices will the process require to complete?
- A) 2
 - B) 3
 - C) 4
 - D) 5
87. **Scenario:** A virtual memory system uses a page replacement algorithm. If a process accesses the following page sequence: 0, 1, 2, 3, 0, 1, 4, and the physical memory can hold 3 pages, how many page faults will occur using the FIFO replacement algorithm?
- A) 4
 - B) 5
 - C) 6
 - D) 7
88. **Scenario:** In a memory management system, if the total available memory is 16 MB and each process can request a maximum of 4 MB, how many processes can run concurrently if no fragmentation occurs?
- A) 2
 - B) 3
 - C) 4
 - D) 5
89. **Scenario:** If a semaphore is initialized to 3 and three threads perform a wait operation on it, what will be the value of the semaphore?
- A) 0
 - B) 1
 - C) -1
 - D) 3
90. **Scenario:** In a priority scheduling algorithm, if a high-priority task is blocked, which of the following can occur?
- A) The low-priority task continues executing.
 - B) The high-priority task will wait indefinitely.
 - C) The low-priority task is preempted.
 - D) All processes are blocked.

91. **Scenario:** In a deadlock prevention strategy, if a system uses a resource allocation policy that always allocates resources only if it does not lead to an unsafe state, which algorithm could be implemented?
- A) Banker's Algorithm
 - B) First-Come-First-Served
 - C) Shortest Job First
 - D) Round Robin
92. **Scenario:** If a process generates a page fault that cannot be resolved because the page replacement policy has reached a threshold, what is this condition called?
- A) Thrashing
 - B) Starvation
 - C) Deadlock
 - D) Blocking
93. **Scenario:** In a multilevel feedback queue scheduling algorithm, a process that uses its entire time slice will be moved to which queue?
- A) A higher-priority queue
 - B) The same priority queue
 - C) A lower-priority queue
 - D) Terminated
94. **Scenario:** A system is using a file allocation table (FAT) file system. If a file's data is fragmented across non-contiguous blocks, how does the system handle file access?
- A) It becomes slower due to the need for multiple I/O operations.
 - B) It requires more memory to store the file allocation information.
 - C) It accesses the file faster due to parallel I/O operations.
 - D) The file cannot be accessed.
95. **Scenario:** If two processes are competing for the same resources and both are waiting indefinitely for each other to release the resources, which condition does this represent?
- A) Starvation
 - B) Deadlock
 - C) Resource contention
 - D) Live lock
96. **Scenario:** In a system using multiple threads, if a thread enters a critical section, what must happen to ensure that other threads do not enter the same critical section until it is exited?
- A) Other threads are busy-waiting.
 - B) A lock or mutex must be used.
 - C) The thread runs indefinitely.
 - D) All threads are terminated.
97. **Scenario:** If a file system uses the extents allocation method, what is the primary advantage over linked allocation?
- A) Better space utilization
 - B) Faster access times due to fewer pointers
 - C) Easier management of fragmentation
 - D) Simplified recovery from crashes
98. **Scenario:** In a system with N processes and M resources, what is the maximum number of processes that can run concurrently without causing deadlock, assuming each process can request all resources?
- A) M
 - B) N

- C) $M + 1$
 - D) $N + 1$
99. **Scenario:** If a system's scheduler decides to use an aging technique to prevent starvation, how is this accomplished?
- A) Increasing the priority of waiting processes over time.
 - B) Decreasing the priority of newly arrived processes.
 - C) Removing low-priority processes from the queue.
 - D) Killing long-running processes.
100. **Scenario:** In a system implementing a Least Recently Used (LRU) page replacement algorithm, if the pages are accessed in the order: 1, 2, 3, 4, 1, 2, 3, 4, and the physical memory can hold 4 pages, how many page faults occur? - A) 5 - B) 6 - C) 4 - D) 7

Answers to the Questions

1. B) 2
2. A) 8
3. A) Long-term scheduler
4. C) Time-sharing
5. B) 6
6. B) No
7. B) Ready
8. B) Starvation
9. B) Semaphore
10. C) Round-robin
11. C) 4
12. A) 1
13. B) 3
14. A) A page fault occurs.
15. B) 15
16. B) It increases.
17. B) Blocked
18. A) Deadlock
19. A) 0
20. C) 5
21. C) 4
22. A) 128
23. B) 256
24. D) They are marked as deleted but remain inaccessible.
25. B) 1,048,576
26. C) Race condition
27. C) Race condition
28. A) 5
29. B) Blocked
30. B) CPU usage decreases.

31. D) Circular Wait
32. A) Banker's Algorithm
33. A) 5 seconds
34. C) 4
35. A) Deadlock avoidance
36. B) Deadlock avoidance
37. B) Hold and Wait
38. A) The older process waits.
39. A) Yes
40. C) Rollback
41. B) The thread will block indefinitely.
42. B) One thread will succeed, and the other will block.
43. B) 2
44. B) Mutex
45. A) The signal is lost.
46. B) The producer should block until space is available.
47. B) The consumer should block until an item is produced.
48. A) Simplicity in implementation.
49. A) The thread releases the lock.
50. A) The lock is released.
51. B) The low-priority process will continue until it blocks or terminates.
52. B) 5
53. B) The thread will succeed and increment the lock count.
54. C) 5
55. A) Deadlock
56. D) None
57. B) 4
58. B) 2,100 ms
59. B) The low-priority process is preempted.
60. A) Other processes may still run.
61. A) 64
62. A) [0, 1, 0]
63. D) All of the above
64. B) A deadlock
65. B) The file is permanently lost.
66. A) Starvation
67. A) The blocked process is woken up and resumes execution.
68. A) Atomicity
69. C) Depends on the depth of the directory
70. B) Block and yield control
71. B) 5
72. A) The deadlock will be resolved.
73. C) 8
74. B) 3
75. B) 20 ms
76. B) 2
77. B) Mutex
78. B) It increases.
79. B) 2
80. A) 100 ms

- 81. A) 256
- 82. B) The second thread is blocked until the mutex is released.
- 83. A) The high-priority task will run immediately.
- 84. B) Additional blocks are added to the end of the linked list.
- 85. B) The system is in a deadlock state.
- 86. B) 3
- 87. B) 5
- 88. C) 4
- 89. A) 0
- 90. A) The low-priority task continues executing.
- 91. A) Banker's Algorithm
- 92. A) Thrashing
- 93. C) A lower-priority queue
- 94. A) It becomes slower due to the need for multiple I/O operations.
- 95. B) Deadlock
- 96. B) A lock or mutex must be used.
- 97. B) Faster access times due to fewer pointers
- 98. C) $M + 1$
- 99. A) Increasing the priority of waiting processes over time.
- 100. A) 5