1.The policy in which a process waits for a resource to be released before acquiring it is called:

a) Deadlock Avoidance

b) Deadlock Prevention

c) Deadlock Detection

d) Deadlock Ignorance

2.The technique used to improve the performance of a single-user system by overlapping the computation of one job with the I/O operations of another job is called:

a) Multiprogramming

b) Multitasking

c) Spooling

d) Batch Processing

3.Using the Shortest Remaining Time First (SRTF) scheduling algorithm, five processes with burst times P1 = 8 ms, P2 = 4 ms, P3 = 6 ms, P4 = 5 ms, and P5 = 10 ms arrive in the system in the same order. The process that completes first is:

a) P1

b) P2

c) P3

d) P4

4.The Banker's algorithm is used for:

a) Page Replacement

b) CPU Scheduling

c) Deadlock Avoidance

d) Memory Allocation

5.In the Page Replacement Algorithm, which algorithm suffers from the Belady's Anomaly?

a) FIFO

b) LIFO

c) Optimal Page Replacement

d) LRU

6.In which CPU scheduling algorithm, the average waiting time does not depend on the size of the processes' burst times?

a) Shortest Job Next (SJN)

b) Round Robin (RR)

c) Priority Scheduling

d) Multilevel Queue Scheduling

7.Which of the following is true about thrashing in operating systems?

a) It leads to increased CPU utilization

b) It occurs when the degree of multiprogramming is high

c) It improves system performance

d) It is caused by excessive I/O operations

8.In the Banker's algorithm for deadlock avoidance, which data structure is used to store the available resources?

a) Queue

b) Stack

c) Matrix

d) List

9.The page replacement algorithm that selects a victim page based on the page's past usage is:

a) FIFO

b) LRU

c) Optimal Page Replacement

d) Random Page Replacement

10.In the context of process synchronization, the mutual exclusion problem refers to:

a) Ensuring that processes are executed in their original order

b) Ensuring that no two processes are in their critical sections simultaneously

c) Allowing multiple processes to access shared resources concurrently

d) Avoiding deadlock situations

11.In the context of CPU scheduling, which scheduling algorithm gives the highest average turnaround time for a set of processes with varying burst times?

a) Round Robin (RR)

b) Shortest Job Next (SJN)

c) Priority Scheduling

d) First Come First Serve (FCFS)

12.In a multi-level feedback queue scheduling algorithm, how are processes promoted or demoted among different queues based on their behavior?

a) By increasing or decreasing their priority levels

b) By adjusting their time quantum in each queue

c) By increasing or decreasing their burst times

d) By changing their process IDs

13.The replacement of a page from the main memory with a page from the secondary storage when a page fault occurs is called:

a) Paging

b) Swapping

c) Demand Paging

d) Page Replacement

14.In a priority-based preemptive CPU scheduling algorithm, which process will be selected for execution if two processes have the same priority?

a) The process that arrived first

b) The process that uses the least CPU time

c) The process with the lowest process ID

d) The process that uses the most CPU time

15.The term "kernel" in operating systems refers to:

a) The central processing unit (CPU)

b) The core part of the operating system that remains in main memory

c) The graphical user interface (GUI) of the operating system

d) The part of the operating system that communicates with hardware devices

16.Which of the following algorithms is used in disk scheduling to minimize the movement of the disk arm?

a) First Come First Serve (FCFS)

b) Shortest Seek Time First (SSTF)

c) Priority Scheduling

d) Round Robin (RR)

17.A system uses the Least Recently Used (LRU) page replacement algorithm with 4 page frames. Consider the page reference string: 1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6. How many page faults occur using the LRU algorithm?

a) 9

b) 10

c) 11

d) 12

18.Which of the following is NOT a benefit of using a multi-level page table?

a) Reduced memory overhead

b) Faster page table access

c) Improved address translation speed

d) Increased virtual address space

19.In virtual memory management, the logical address is composed of:

a) Segment Number + Page Number + Offset

b) Page Number + Offset

c) Segment Number + Offset

d) Frame Number + Offset

20.In the context of deadlock, the method used to remove a process from the deadlock state by preemption is called:

a) Deadlock Avoidance

b) Deadlock Detection

c) Deadlock Ignorance

d) Deadlock Recovery

21.The main purpose of an operating system is to:

a) Manage hardware devices

b) Execute application programs

c) Provide a user-friendly interface

d) Manage system resources

22.Which of the following is NOT a function of an operating system?

a) Process management

b) Memory management

c) Disk formatting

d) Device driver management

23.In the context of memory management, the term "thrashing" refers to:

a) The process of moving data between main memory and secondary storage

b) The phenomenon of excessive swapping of processes, leading to a decrease in performance

c) The allocation of memory to a process

d) The process of swapping out a process from main memory

24.In the context of file systems, the allocation method that suffers from external fragmentation is:

a) Contiguous allocation

b) Linked allocation

c) Indexed allocation

d) Segmented allocation

25.In the context of CPU scheduling, the process scheduling algorithm that assigns the highest priority to the process with the shortest burst time is called:

a) First Come First Serve (FCFS)

b) Shortest Job Next (SJN)

c) Round Robin (RR)

d) Priority Scheduling

26.The main advantage of using the demand-paging technique in virtual memory management is:

a) Reducing disk I/O operations

b) Increasing the size of the virtual address space

c) Reducing page faults

d) Minimizing memory overhead

27.Which of the following is an advantage of using the First Come First Serve (FCFS) scheduling algorithm?

a) Low context switch overhead

b) Short average waiting time

c) High CPU utilization

d) Easy to implement

28.In the context of file systems, the process of combining multiple disk blocks into a larger contiguous block is called:

a) Fragmentation

b) Defragmentation

c) Allocation

d) Concatenation

29.The process of moving a process from the running state to the ready state, so that another process can run, is called:

a) Scheduling

b) Dispatching

c) Context switching

d) Preemption

30.In a multi-programming system, the process scheduler uses the _____ algorithm to select the next process to run on the CPU.

a) Shortest Job Next (SJN)

b) First Come First Serve (FCFS)

c) Round Robin (RR)

d) Priority Scheduling

31.Which of the following is NOT a state in the process state transition diagram?

a) New

b) Ready

c) Running

d) Sleeping

32.The Shortest Job Next (SJN) scheduling algorithm is also known as:

a) Preemptive scheduling

b) Non-preemptive scheduling

c) Round Robin scheduling

d) Priority scheduling

33.Consider the same processes as in the previous question (P1, P2, P3) and apply Shortest Job First (SJF) scheduling. What is the average waiting time?

a) 1.67 ms

b) 2.33 ms

c) 3.67 ms

d) 2.00 ms

34.Consider four processes with burst times P1 = 5 ms, P2 = 8 ms, P3 = 3 ms, and P4 = 6 ms. Using Priority Scheduling with priorities P1 = 3, P2 = 2, P3 = 4, and P4 = 1, the average turnaround time will be:

a) 6.5 ms

b) 8.25 ms

c) 9.25 ms

d) 10.25 ms

35.Which scheduling algorithm can lead to starvation?

a) First Come First Serve (FCFS)

b) Shortest Job Next (SJN)

c) Round Robin (RR)

d) Priority Scheduling

36.Which of the following is an advantage of using the Priority Scheduling algorithm?

a) Guaranteed fairness among processes

b) Low overhead in context switching

c) Shorter average response time for high-priority processes

d) Easy to implement

37.An virtual memory management, the unit of data transfer between main memory and disk is called a:

a) Page

b) Frame

c) Segment

d) Block

38.The operating system component responsible for managing the execution of processes and deciding which process will run next is called the:

a) Scheduler

b) Dispatcher

c) Process Manager

d) CPU Allocator

39.The process of allocating memory to a process in multiple equal-sized partitions is known as:

a) Fixed Partitioning

b) Dynamic Partitioning

c) Segmentation

d) Paging

40.What is the maximum number of processes that can be in the "Running" state in a single-core processor system?

a) 1

b) 2

c) 4

d) Depends on the OS implementation

41.The process of mapping a virtual address to a physical address during demand-paging is performed by:

a) TLB (Translation Lookaside Buffer)

b) CPU Cache

c) Disk Controller

d) Secondary Memory

42.What is the main advantage of using demand-paging over pure demand paging in virtual memory management?

a) Reduced disk I/O operations

b) Reduced page faults

c) Improved CPU utilization

d) More efficient use of secondary memory

43.What is the function of the "spooler" in the context of operating systems?

a) To manage the CPU scheduling queue

b) To provide virtual memory support

c) To manage I/O devices

d) To manage print jobs

44.An virtual memory management, what is the role of the "page replacement algorithm"?

a) To manage the allocation of pages to processes

b) To translate virtual addresses to physical addresses

c) To decide which page to remove from main memory when a page fault occurs

d) To handle TLB misses

45.In the context of process synchronization, what is the purpose of the "semaphore"?

a) To protect critical sections of code from concurrent access

b) To manage the allocation of resources to processes

c) To provide inter-process communication

d) To ensure fairness in process scheduling

46.The "fork" system call in UNIX-like operating systems is used for:

a) Creating a new process

b) Terminating a process

c) Suspending a process

d) Resuming a process

47.Which of the following is a benefit of using multithreading in a program?

a) Reduced CPU utilization

b) Improved process isolation

c) Enhanced program performance

d) Simplified process management

48.A CPU has a TLB (Translation Lookaside Buffer) with a hit rate of 90%. If the time taken to access the TLB is 1 ns and the time taken to access the main memory is 100 ns, what is the effective memory access time when using the TLB?

a) 1.01 ns

b) 1.09 ns

c) 10 ns

d) 91 ns

49.A system uses the LRU (Least Recently Used) page replacement policy. If the system has 4 frames in memory and the following page references occur in sequence: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, what is the total number of page faults?

a) 4

b) 5

c) 6

d) 7

50.A computer system uses a fixed partition memory management technique with partition sizes of 2 KB, 4 KB, and 8 KB. If a process requires 6 KB of memory, which partition will be allocated to this process using the Best-Fit algorithm?

a) 2 KB partition

b) 4 KB partition

c) 8 KB partition

d) None of the partitions

51.In a demand-paging system, the page table for a process has 1024 entries, and each entry requires 6 bytes. If the page table is stored in memory, how much memory is needed to store the page table for this process?

a) 6 KB

b) 12 KB

c) 24 KB

d) 48 KB

52. A system uses a four-level page table to translate virtual addresses to physical addresses. If each page table entry is 8 bytes and the size of each page is 16 KB, what is the total size of the page tables when the virtual address space is 64 bits?

a) 1 TB

b) 2 TB

c) 4 TB

d) 8 TB

53.In a demand-paging memory system, the page table is held in memory, and each entry occupies 4 bytes. If the virtual address space is 32 bits and the page size is 4KB, how much memory (in megabytes) is required for the page table of a process?

a) 4 MB

b) 8 MB

c) 16 MB

d) 32 MB

54.A CPU has a TLB (Translation Lookaside Buffer) with a hit rate of 80%. If the time taken to access the TLB is 1.5 ns and the time taken to access the main memory is 100 ns, what is the effective memory access time when using the TLB?

a) 102.5 ns

b) 112.5 ns

c) 120.5 ns

d) 130.5 ns

55.A system has a disk with an average seek time of 6 ms, a rotational delay of 4 ms, and a transfer time of 0.3 ms per block. If the disk is rotating at 7200 RPM and has 2000 sectors per track, what is the average time taken to read a block from the disk?

a) 10.7 ms

b) 11.5 ms

c) 12.2 ms

d) 13.8 ms

56.A system uses a three-level page table to translate virtual addresses to physical addresses. The first level table contains 512 entries, the second-level table contains 256 entries, and the third-level table contains 128 entries. If each page table entry is 4 bytes and the size of each page is 4 KB, what is the total size of the page tables when the virtual address space is 32 bits?

a) 2 MB

b) 4 MB

c) 8 MB

d) 16 MB

57.A computer system uses a fixed partition memory management technique with partition sizes of 2 KB, 4 KB, and 8 KB. If a process requires 10 KB of memory, which partition will be allocated to this process using the First-Fit algorithm?

a) 2 KB partition

b) 4 KB partition

c) 8 KB partition

d) None of the partitions

58.A CPU has a TLB (Translation Lookaside Buffer) with a hit rate of 88%. If the time taken to access the TLB is 4 ns and the time taken to access the main memory is 300 ns, what is the effective memory access time when using the TLB?

a) 4.25 ns

b) 4.50 ns

c) 4.75 ns

d) 5.00 ns

59.A system uses a three-level page table to translate virtual addresses to physical addresses. The first level table contains 128 entries, the second-level table contains 256 entries, and the third-level table contains 512 entries. If each page table entry is 8 bytes and the size of each page is 2 KB, what is the total size of the page tables when the virtual address space is 48 bits?

a) 512 KB

b) 1 MB

c) 2 MB

d) 4 MB

60.Consider three processes with burst times P1 = 6 ms, P2 = 4 ms, and P3 = 8 ms. Using Round Robin (RR) scheduling with a time quantum of 3 ms, the average turnaround time will be:

a) 7 ms

b) 9 ms

c) 11 ms

d) 13 ms

61.In a preemptive Priority Scheduling algorithm, five processes arrive with priorities P1 = 4, P2 = 3, P3 = 2, P4 = 1, and P5 = 5. The average turnaround time for these processes with burst times of 4 ms each will be:

a) 4 ms

b) 6 ms

c) 8 ms

d) 10 ms

62.A system employs three scheduling algorithms: FCFS, SJF, and RR with a time quantum of 5 ms. Five processes with burst times P1 = 10 ms, P2 = 6 ms, P3 = 12 ms, P4 = 4 ms, and P5 = 8 ms arrive in the system in the same order. Which algorithm will give the lowest average turnaround time?

a) FCFS

b) SJF

c) RR

63.In a multi-level feedback queue scheduling, four processes with burst times P1 = 10 ms, P2 = 5 ms, P3 = 8 ms, and P4 = 12 ms arrive in the system. The process that will be given the CPU first is:

a) P1

b) P2

c) P3

d) P4

64.A CPU-bound process with a burst time of 20 ms and an I/O-bound process with a burst time of 5 ms arrive at the same time. Which process will have a shorter turnaround time when using SJF preemptive scheduling?

a) CPU-bound process

b) I/O-bound process

c) Both will have the same turnaround time

d) Cannot be determined from the given information

65.What is the purpose of a TLB (Translation Lookaside Buffer) in virtual memory management?

a) To store page tables of all active processes

b) To speed up the translation of virtual addresses to physical addresses

c) To buffer disk blocks for efficient I/O operations

d) To manage shared memory between processes

1. b) Deadlock Prevention
2. c) Spooling
3. c) P3
4. c) Deadlock Avoidance
5. a) FIFO
6. b) Round Robin (RR)
7. b) It occurs when the degree of multiprogramming is high
8. c) Matrix

9. b) LRU

10 b) Ensuring that no two processes are in their critical sections simultaneously

11. d) First Come First Serve (FCFS)

12. b) By adjusting their time quantum in each queue

13. c) Demand Paging

14. a) The process that arrived first

15. b) The core part of the operating system that remains in main memory

16. b) Shortest Seek Time First (SSTF)

17. a) 9

18. a) Reduced memory overhead

19. b) Page Number + Offset

20. d) Deadlock Recovery

21. d) Manage system resources

22. c) Disk formatting

23. b) The phenomenon of excessive swapping of processes, leading to a decrease in performance

24. a) Contiguous allocation

25. b) Shortest Job Next (SJN)

26. d) Minimizing memory overhead

27. d) Easy to implement

28. d) Concatenation

29. d) Preemption

30. c) Round Robin (RR)

31. d) Sleeping

32. b) Non-preemptive scheduling

33. a) 1.67 ms

34. d) 10.25 ms

35. d) Priority Scheduling

36. c) Shorter average response time for high-priority processes

37. a) Page

38. a) Scheduler

39. a) Fixed Partitioning

40. a) 1

41. a) TLB (Translation Lookaside Buffer)

42. d) More efficient use of secondary memory

43. d) To manage print jobs

44. c) To decide which page to remove from main memory when a page fault occurs

45. a) To protect critical sections of code from concurrent access

46. a) Creating a new process

47. c) Enhanced program performance

48. b) 1.09 ns

49. c) 6

50. b) 4 KB partition

51. c) 24 KB

52. b) 2 TB

53. c) 16 MB

54. b) 112.5 ns

55. b) 11.5 ms

56. b) 4 MB

57. d) None of the partitions

58. b) 4.50 ns

59. b) 1 MB

60. c) 11 ms

61. a) 4 ms

62. b) SJF

63. a) P1

64. b) I/O-bound process

65. b) To speed up the translation of virtual addresses to physical addresses