**Chapter 3: Memory Management: Virtual Memory**

**TRUE/FALSE**

1. One sector will hold one page of job instructions and fit into one page frame of memory.

ANS: T PTS: 1 REF: 64

2. Paged memory allocation usually results in internal fragmentation, but never external fragmentation.

ANS: F PTS: 1 REF: 65

3. The Job Table (JT) contains two entries for each active job: the size of the job and the memory location where its Page Map Table is stored.

ANS: T PTS: 1 REF: 66

4. To find the address of a given program line, the line number is multiplied by the page size.

ANS: F PTS: 1 REF: 68

5. Each page of a job is actually stored in a page frame that can be located anywhere in available main memory.

ANS: T PTS: 1 REF: 69

6. To find the exact position of an instruction in memory, after the page number has been calculated, the operating system refers to the job’s PMT to find out which page frame contains the page.

ANS: T PTS: 1 REF: 69

7. The address of the beginning of a page frame is found by multiplying the page frame number by the number of frames.

ANS: F PTS: 1 REF: 70

8. Every time an instruction is executed, or a data value is used, the operating system (or the hardware) must translate the job space address, which is relative, into its physical address, which is absolute.

ANS: T PTS: 1 REF: 71

9. Demand paging was the first widely used scheme that removed the restriction of having the entire job in memory from the beginning to the end of its processing.

ANS: T PTS: 1 REF: 71

10. The key to the successful implementation of demand paging is the use of a direct access memory device that can work directly with the CPU.

ANS: F PTS: 1 REF: 72

11. Demand paging requires that the Page Map Table for each job keep track of each page as it is loaded or removed from main memory.

ANS: T PTS: 1 REF: 73

12. To move in a new page, a resident page must be swapped back into primary storage.

ANS: F PTS: 1 REF: 74

13. Demand paging offers a perfect solution to inefficient memory limitations.

ANS: F PTS: 1 REF: 75

14. The first-in first-out (FIFO) page replacement policy will remove the pages that have been in memory the shortest.

ANS: F PTS: 1 REF: 77

15. A page interrupt is generated when a new page is brought into memory.

ANS: T PTS: 1 REF: 78

16. When using a FIFO scheme, more memory will always result in better performance.

ANS: F PTS: 1 REF: 79

17. A variation of the LRU page replacement algorithm is known as the clock page replacement policybecause it is implemented with a circular queue and uses a pointer to step through the reference bits of the active pages, simulating a clockwise motion.

ANS: T PTS: 1 REF: 80

18. The process of shifting bits to the right and resetting the leftmost bit to 1 when a page is referenced gives a history of each page’s usage.

ANS: T PTS: 1 REF: 81

19. A job’s working set is the set of pages residing in memory that can be accessed indirectly.

ANS: F PTS: 1 REF: 84

20. Within the Memory Manager the Segment Link Table lists details about each segment (one for each job).

ANS: F PTS: 1 REF: 87

21. The segmented/demand paged memory allocationscheme offers the logical benefits of segmentation, as well as the physical benefits of paging.

ANS: T PTS: 1 REF: 89

22. In general, when a job is allocated to the CPU its Page Map Table is loaded into main memory while the Segment Map Tables are loaded only as needed.

ANS: F PTS: 1 REF: 91

23. The use of virtual memory requires cooperation between the Memory Manager (which tracks each page or segment) and the processor hardware (which issues the interrupt and resolves the virtual address).

ANS: T PTS: 1 REF: 93

24. Cache memory is a small high-speed memory unit that a processor can access less rapidly than main memory.

ANS: F PTS: 1 REF: 95

25. The optimal selection of cache size and replacement algorithm can result in 80 to 90 percent of all requests being in the cache.

ANS: T PTS: 1 REF: 98

**MULTIPLE CHOICE**

1. The primary advantage of storing programs in noncontiguous locations is that \_\_\_\_.

|  |  |
| --- | --- |
| a. | multiple programs can run at the same time |
| b. | every program will be able to run |
| c. | secondary storage is accessed more quickly |
| d. | main memory is used more efficiently |

ANS: D PTS: 1 REF: 65

2. There are \_\_\_\_ entries per page in the PMT.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0 | c. | 2 |
| b. | 1 | d. | 5 |

ANS: B PTS: 1 REF: 66

3. If the page size is 100 lines,\_\_\_\_ is the displacement for line 214 of a program.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.5 | c. | 14 |
| b. | 2 | d. | 21400 |

ANS: C PTS: 1 REF: 68

4. Assume that the Page Map Table below is in effect. The number of lines per page is 400. The actual memory location for line 433 is \_\_\_\_.

Job Page Number Page Frame Number

0 8

1 10

2 5

3 11

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1 | c. | 4000 |
| b. | 33 | d. | 4033 |

ANS: D PTS: 1 REF: 69|70

5. A page size that is too small will generate \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | very long PMTs | c. | more difficult to calculate actual position |
| b. | excessive internal fragmentation | d. | excessive external fragmentation |

ANS: A PTS: 1 REF: 71

6. With demand paging, jobs are divided into equally sized \_\_\_\_ that initially reside in secondary storage.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | pages | c. | frames |
| b. | blocks | d. | sets |

ANS: A PTS: 1 REF: 71

7. One of the most important innovations of demand paging was that it made \_\_\_\_ feasible.

|  |  |
| --- | --- |
| a. | memory demand |
| b. | virtual demand |
| c. | virtual paging |
| d. | virtual memory |

ANS: D PTS: 1 REF: 72

8. In demand paging when a job requires a certain page to be loaded and there is no empty page frame,\_\_\_\_ .

|  |  |
| --- | --- |
| a. | A resident page must be swapped back into secondary storage. |
| b. | The page cannot be loaded and the job will exit. |
| c. | The job must wait until a page frame is freed by another job. |
| d. | The page will share a page frame with another page from the same job. |

ANS: A PTS: 1 REF: 74

9. Consider the following page fault handler algorithm. Replace the \* in the algorithm with \_\_\_\_.

1 If there is no free page frame

Then

select page to be swapped out using page removal algorithm

update job’s Page Map Table

If content of page had been changed then

\*

End if

End if

2 Use page number from step 3 from the Hardware Instruction Processing Algorithm to get disk address where the requested page is stored

3 Read page into memory

4 Update job’s Page Map Table

5 Update Memory Map Table

6 Restart interrupted instruction

|  |  |  |  |
| --- | --- | --- | --- |
| a. | save page to main memory | c. | mark page as being changed in PMT |
| b. | write page to disk | d. | choose another page |

ANS: B PTS: 1 REF: 75

10. When there is an excessive amount of page swapping between main memory and secondary storage, the operation becomes inefficient, which is called \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | excessive demand paging | c. | thrashing |
| b. | hot swapping | d. | overswapping |

ANS: C PTS: 1 REF: 75

11. The \_\_\_\_ policyis based on the theory that the best page to remove is the one that has been in memory the longest.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | TRU | c. | LIFO |
| b. | LRU | d. | FIFO |

ANS: D PTS: 1 REF: 76

12. Assume that four page frames are available and are numbered 1-4. Pages A-D have been loaded into page frames 1-4 in order. Assume that page E is requested.The page frame to be loaded into when the FIFO algorithm is used is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1 | c. | 3 |
| b. | 2 | d. | 4 |

ANS: A PTS: 1 REF: 77

13. If a particular demand paging configuration has 9 page interrupts out of 11 page requests, failure rate is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 18% | c. | 82% |
| b. | 52% | d. | 95% |

ANS: C PTS: 1 REF: 78

14. Assume that four page frames are available and are numbered 1-4. Pages A-D have been loaded into page frames 1-4 in order. The program has accessed the pages in the following order: B, D, A, C. Assume that page E is requested. The \_\_\_\_ page frame will be loaded when the LRU algorithm is used.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1 | c. | 3 |
| b. | 2 | d. | 4 |

ANS: B PTS: 1 REF: 79

15. When using the clock replacement policy, a page with a reference bit of \_\_\_\_ is replaced.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | -1 | c. | 1 |
| b. | 0 | d. | 5 |

ANS: B PTS: 1 REF: 80

16. In the PMT, the \_\_\_\_ bit for all pages in memory is 1.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | status | c. | modified |
| b. | referenced | d. | frame |

ANS: A PTS: 1 REF: 83

17. Consider the following four cases. The LRU policy,\_\_\_\_, will be lease likely to swap.

Modified Referenced Meaning

Case 1 0 0 Not modified AND not referenced

Case 2 0 1 Not modified BUT was referenced

Case 3 1 0 Was modified BUT not referenced

Case 4 1 1 Was modified AND was referenced

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Case 1 | c. | Case 3 |
| b. | Case 2 | d. | Case 4 |

ANS: D PTS: 1 REF: 83

18. The following phrase\_\_\_\_,means that during any phase of its execution, the program references only a small fraction of its pages.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | dynamic paging | c. | locality of reference |
| b. | structured programming | d. | working set |

ANS: C PTS: 1 REF: 84

19. To access a location in memory when using segmented memory management, the address is composed of two entries: \_\_\_\_.

|  |  |
| --- | --- |
| a. | the segment number and the line number |
| b. | the segment number and the displacement |
| c. | the line number and the displacement |
| d. | the segment number, the line number, and the displacement |

ANS: B PTS: 1 REF: 89

20. There are \_\_\_\_associative registers.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | two | c. | ten |
| b. | five | d. | varies by system |

ANS: D PTS: 1 REF: 91

21. \_\_\_\_ gives users the appearance that their programs are being completely loaded in main memory during their entire processing time.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Segmenting | c. | Shared memory |
| b. | Virtual memory | d. | Multithreading |

ANS: B PTS: 1 REF: 92

22. During the second generation, programmers started dividing their programs into sections that resembled working sets, really segments, originally called roll in/roll out and now called \_\_\_\_.

|  |  |
| --- | --- |
| a. | undermaps |
| b. | overmaps |
| c. | underlays |
| d. | overlays |

ANS: D PTS: 1 REF: 92

23. \_\_\_\_ can be thought of as being an intermediary between main memory and the special-purpose registers, which are the domain of the CPU.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Virtual memory | c. | Paging |
| b. | Cache memory | d. | Segmenting |

ANS: B PTS: 1 REF: 95

24. Studies have shown that having any \_\_\_\_, even a small one, can substantially improve the performance of the computer system.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | cache | c. | page block |
| b. | memory block | d. | block |

ANS: A PTS: 1 REF: 97

25. The cache hit ratio is \_\_\_\_, if the total number of requests is 10 and 6 of those are found in cache memory.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 6% | c. | 60% |
| b. | 10% | d. | 100% |

ANS: C PTS: 1 REF: 98

**Chapter 4: Processor Management**

**TRUE/FALSE**

1. A processis an inactive unit, such as a file stored on a disk.

ANS: F PTS: 1 REF: 112

2. A programis an active entity that requires a set of resources, including a processor and special registers, to perform its function.

ANS: F PTS: 1 REF: 112

3. The processor is also known as the CPU.

ANS: T PTS: 1 REF: 112

4. A single processor can be shared by several jobs, or several processes, but if, and only if, the operating system has a scheduling policy, as well as a scheduling algorithm, to determine when to stop working on one job and proceed to another.

ANS: T PTS: 1 REF: 113

5. The Processor Manager is a composite of two submanagers: one in charge of job scheduling and the other in charge of program scheduling.

ANS: F PTS: 1 REF: 114

6. After a job has been placed on the READY queue by the Job Scheduler, the Process Scheduler takes over.

ANS: T PTS: 1 REF: 114

7. Most computer programs alternate between CPU cycles and I/O cycles.

ANS: T PTS: 1 REF: 115

8. CPU-boundjobs (such as printing a series of documents) have many brief CPU cycles and long I/O cycles

ANS: F PTS: 1 REF: 115

9. As a job moves through the system it’s always in one of five states; these are called the job status or the process status.

ANS: T PTS: 1 REF: 116

10. From HOLD, the job moves to WAITING when it’s ready to run but is waiting for the CPU.

ANS: F PTS: 1 REF: 117

11. The transition from one job or process status to another is initiated by either the Job Scheduler or the Process Scheduler.

ANS: T PTS: 1 REF: 117

12. Each job is uniquely identified by the user’s identification and a pointer connecting it to its descriptor.

ANS: T PTS: 1 REF: 118

13. The process state contains all of the data about the job needed by the operating system to manage the processing of the job.

ANS: F PTS: 1 REF: 119

14. It is possible to minimize response time by running only interactive jobs and letting the batch jobs wait until the interactive load ceases.

ANS: T PTS: 1 REF: 120

15. The Process Scheduler often uses a timing mechanism and periodically interrupts running processes when a predetermined slice of time has expired.

ANS: T PTS: 1 REF: 121

16. First-come, first-served (FCFS) is a preemptive scheduling algorithm that handles jobs according to their arrival time.

ANS: F PTS: 1 REF: 122

17. If one job monopolizes the system, the extent of its overall effect on system performance depends on the scheduling policy and whether the job is CPU-bound or I/O-bound.

ANS: T PTS: 1 REF: 123

18. Shortest job next (SJN)is a nonpreemptive scheduling algorithm (also known as shortest job first, or SJF) that handles jobs based on the length of their CPU cycle time.

ANS: T PTS: 1 REF: 124

19. When using priority scheduling, priorities are assigned to jobs by the owner of the job (the user).

ANS: F PTS: 1 REF: 125

20. The Shortest remaining time (SRT) algorithm is often used in interactive systems.

ANS: F PTS: 1 REF: 126

21. Context switchingis required by all preemptive algorithms.

ANS: T PTS: 1 REF: 127

22. In round robin scheduling, if processing isn’t finished when time expires, the job is preempted and put at the end of the READY queue and its information is saved in its PCB.

ANS: T PTS: 1 REF: 128

23. Multiple-level queuesisn’t really a separate scheduling algorithm but works in conjunction with several other schemes.

ANS: T PTS: 1 REF: 130

24. Aging is used to ensure that jobs in lower-level queues will eventually complete their execution.

ANS: T PTS: 1 REF: 132

25. The control program that handles the interruption sequence of events is called the interrupt scheduler.

ANS: F PTS: 1 REF: 133

**MULTIPLE CHOICE**

1. What is the name for a portion of a process that can run independently?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | thread | c. | miniprocess |
| b. | program | d. | subprocess |

ANS: A PTS: 1 REF: 112

2. What is the high-level scheduler?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Process Scheduler | c. | Program Scheduler |
| b. | Job Scheduler | d. | Thread Scheduler |

ANS: B PTS: 1 REF: 114

3. What does the Job Scheduler seek to do when scheduling jobs?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | run all CPU intensive jobs first | c. | balance CPU and I/O intensive jobs |
| b. | run all I/O intensive jobs first | d. | run the quickest jobs first |

ANS: C PTS: 1 REF: 114

4. The Process Scheduler assigns the CPU to execute the processes of those jobs placed on the \_\_\_\_ queue by the Job Scheduler.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | waiting | c. | process |
| b. | next | d. | ready |

ANS: D PTS: 1 REF: 115

5. In a highly interactive environment there is a third layer of the Processor Manager called the \_\_\_\_ scheduler**.**

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Managing | c. | middle-level |
| b. | Subprocess | d. | Program |

ANS: C PTS: 1 REF: 115

6. What is the initial state for a job?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | HOLD | c. | WAITING |
| b. | RUNNING | d. | READY |

ANS: A PTS: 1 REF: 116

7. Which transition is managed by the Job Scheduler?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | READY to RUNNING | c. | RUNNING back to READY |
| b. | RUNNING to WAITING | d. | HOLD to READY |

ANS: D PTS: 1 REF: 117

8. Which transition is sometimes managed by the Process Scheduler and sometimes by the Job Scheduler?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | WAITING to READY | c. | RUNNING to FINISHED |
| b. | RUNNING to WAITING | d. | HOLD to READY |

ANS: C PTS: 1 REF: 117

9. Which of the following is part of the Process State information maintained in the PCB?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Main Memory | c. | Process Priority |
| b. | Register Contents | d. | All of the above |

ANS: D PTS: 1 REF: 118

10. Which section of the PCB is used primarily for performance measurement?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Accounting | c. | Process Identification |
| b. | Process State | d. | Process Status |

ANS: A PTS: 1 REF: 119

11. The queues used to manage jobs are formed from \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | jobs | c. | PCBs |
| b. | processes | d. | record identifiers |

ANS: C PTS: 1 REF: 119

12. An I/O request is called a(n) \_\_\_\_ waitin multiprogramming environments.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | forced | c. | scheduled |
| b. | natural | d. | indirect |

ANS: B PTS: 1 REF: 121

13. How is the First-come, first-served (FCFS) scheduling algorithm implemented?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | using a FIFO queue | c. | using a circular queue |
| b. | using a LIFO queue | d. | using a directed graph |

ANS: A PTS: 1 REF: 122

14. What is a disadvantage of First Come First Served?

|  |  |
| --- | --- |
| a. | I/O-bound jobs are given priority |
| b. | jobs are frequently interrupted |
| c. | CPU-bound jobs are given priority |
| d. | average turnaround times vary widely and are seldom minimized |

ANS: D PTS: 1 REF: 123

15. Assume that four jobs A-D require the CPU cycles listed below. Using the SJN algorithm, which job is run first?

Job: A B C D

CPU cycle: 5 2 6 4

|  |  |  |  |
| --- | --- | --- | --- |
| a. | A | c. | C |
| b. | B | d. | D |

ANS: B PTS: 1 REF: 124

16. Assume that four jobs A-D require the CPU cycles listed below. Using the SJN algorithm, what is the average turnaround time?

Job: A B C D

CPU cycle: 5 2 6 4

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 5.5 | c. | 9.0 |
| b. | 6.8 | d. | 11.1 |

ANS: C PTS: 1 REF: 124

17. Some systems increase the priority of jobs that have been in the system for an unusually long time to expedite their exit. This is known as \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | lagging | c. | bumping |
| b. | aging | d. | accelerated priority |

ANS: B PTS: 1 REF: 126

18. Assume that jobs A-D arrive in the ready queue in quick succession and have the CPU cycle requirements listed below. Using the SRT algorithm, what is the average turnaround time?

Arrival time: 0 1 2 3

Job: A B C D

CPU cycle: 6 3 1 4

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2.5 | c. | 7.75 |
| b. | 6.25 | d. | 9.0 |

ANS: B PTS: 1 REF: 126

19. Assume jobs A-D arrive in quick succession in the READY queue. Using round robin scheduling, what is the turnaround time for job C?

Arrival time: 0 1 2 3

Job: A B C D

CPU cycle: 8 4 9 5

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 7 | c. | 22 |
| b. | 20 | d. | 24 |

ANS: D PTS: 1 REF: 128-129

20. What is the best time quantum size in round robin scheduling?

|  |  |
| --- | --- |
| a. | it depends on the system |
| b. | it should be long enough to allow 80 percent of the CPU cycles to run to completion |
| c. | it should be at least 100 times longer than the time required to perform one context switch operation |
| d. | All of the above |

ANS: D PTS: 1 REF: 130

21. No movement between queues is a very simple policy that rewards those who have \_\_\_\_ jobs.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | high-priority | c. | CPU-bound |
| b. | low-priority | d. | I/O-bound |

ANS: A PTS: 1 REF: 131

22. Which multiple-level queue management scheme facilitates I/O-bound jobs and is good in interactive systems?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | No movement between queues | c. | Variable time quantum per queue |
| b. | Movement between queues | d. | Aging |

ANS: B PTS: 1 REF: 131-132

23. Which multiple-level queue management scheme allows for faster turnaround of CPU-bound jobs?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | No movement between queues | c. | Variable time quantum per queue |
| b. | Movement between queues | d. | Aging |

ANS: C PTS: 1 REF: 132

24. When the operating system detects a nonrecoverable error, which of the following happens first?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | state of the interrupted process is saved | c. | interrupt is processed |
| b. | type of interrupt is described and stored | d. | processor resumes operation |

ANS: B PTS: 1 REF: 133

25. What is another name for an internal interrupt?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | I/O interrupt | c. | illegal operation |
| b. | illegal job instruction | d. | synchronous interrupt |

ANS: D PTS: 1 REF: 133

**Chapter 5: Process Management**

**TRUE/FALSE**

1. Deadlock is a system-wide tangle of resource requests that begins when two or more jobs are put on hold, each waiting for a vital resource to become available.

ANS: T PTS: 1 REF: 142

2. Deadlock does not usually affect the entire system.

ANS: F PTS: 1 REF: 142

3. Deadlock was a serious problem for early batch systems.

ANS: F PTS: 1 REF: 143

4. Deadlocks are most serious in real-time systems.

ANS: T PTS: 1 REF: 144

5. Locking can be done only at the level of the entire database.

ANS: F PTS: 1 REF: 145

6. If locks are not used to preserve their integrity, the updated records in a database might include only some of the data—and their contents would depend on the order in which each process finishes its execution.

ANS: T PTS: 1 REF: 145

7. A race introduces the element of chance, an element that is desirable in database management.

ANS: F PTS: 1 REF: 146

8. Most systems have transformed the printer into a sharable device by installing a high-speed device, a disk, between it and the CPU.

ANS: T PTS: 1 REF: 148

9. A livelock is caused by two processes accessing different areas of the same disk.

ANS: T PTS: 1 REF: 149

10. A deadlock is preceded by five simultaneous conditions that are not necessary for the operating system to run smoothly.

ANS: F PTS: 1 REF: 150|151

11. In a directed graph used to model deadlock, processes are represented using squares.

ANS: F PTS: 1 REF: 151

12. When modeling deadlock, if there’s a cycle in the graph, then there is a deadlock involving the processes and the resources in the cycle.

ANS: T PTS: 1 REF: 151

13. It is easy to design a foolproof deadlock prevention policy.

ANS: F PTS: 1 REF: 155

14. Mutual exclusion should be eliminated from a computer system to avoid deadlock.

ANS: F PTS: 1 REF: 155

15. Resource holding, where a job holds on to one resource while waiting for another one that’s not yet available, could be sidestepped by forcing each job to request, at creation time, every resource it will need to run to completion.

ANS: T PTS: 1 REF: 156

16. In many cases, there exists at least one allocation of resources sequence that will allow jobs to continue without becoming deadlocked.

ANS: T PTS: 1 REF: 157

17. According to the Banker’s Algorithm an unsafe state always leads to deadlock.

ANS: F PTS: 1 REF: 158

18. The operating system must be sure never to satisfy a request that moves it from a safe state to an unsafe one.

ANS: T PTS: 1 REF: 158

19. Although the Banker’s Algorithm has been used to avoid deadlocks in systems with a few resources, it isn’t always practical for most systems.

ANS: T PTS: 1 REF: 159

20. One problem with the Banker’s Algorithm is that resources aren’t well utilized because the algorithm assumes the worst case and, as a result, keeps vital resources unavailable to guard against unsafe states.

ANS: T PTS: 1 REF: 159

21. There are several recovery algorithms, but they all have one feature in common: they all require at least one victim, an expendable job, which, when removed from the deadlock, will free the system.

ANS: T PTS: 1 REF: 161

22. When recovering from deadlock, jobs close to completion are usually left alone.

ANS: T PTS: 1 REF: 162

23. Starvation is the result of the liberal allocation of resources.

ANS: F PTS: 1 REF: 163

24. In the dining philosophers problem there are five philosophers and four forks.

ANS: F PTS: 1 REF: 163

25. Once starvation has been detected, an algorithm can be implemented in which the system blocks new jobs until the starving jobs have been satisfied.

ANS: T PTS: 1 REF: 165

**MULTIPLE CHOICE**

1. Interactive systems generally improve the use of resources through \_\_\_\_ resource sharing, but this resource sharing capability also increases the possibility of deadlocks.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | interspersed | c. | dynamic |
| b. | group | d. | static |

ANS: C PTS: 1 REF: 143

2. For \_\_\_\_ systems, deadlocks quickly become critical situations.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | batch | c. | real-time |
| b. | interactive | d. | general purpose |

ANS: C PTS: 1 REF: 144

3. Consider the case of a home construction company with two application programs, purchasing (P1) and sales (P2), which are active at the same time. They each need to access two files, inventory (F1) and suppliers (F2), to update daily transactions. The following series of events will cause a deadlock. Fill in the missing event in the sequence.

1. Purchasing (P1) accesses the supplier file (F2).

2. Sales (P2) accesses the inventory file (F1).

3. Purchasing (P1) doesn’t release the supplier file (F2) but requests the inventory file (F1), but P1 is blocked because F1 is being held by P2.

4. Meanwhile, \_\_\_\_

|  |  |
| --- | --- |
| a. | sales (P2) doesn’t release the inventory file (F1) but requests the supplier file (F2) |
| b. | sales (P2) does release the inventory file (F1) and then requests the supplier file (F2) |
| c. | purchasing (P1) does release the supplier file (F2) which is then requested by sales (P2) |
| d. | purchasing (P1) exits |

ANS: A PTS: 1 REF: 144|145

4. Fill in the missing event that causes deadlock in a database. There are two processes (P1 and P2), each of which needs to update two records (R1 and R2) and the following sequence leads to a deadlock:

1. P1 accesses R1 and locks it.

2. P2 accesses R2 and locks it.

3. \_\_\_\_

4. P2 requests R1, which is locked by P1.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | P2 releases R2. | c. | P1 requests R2, which is locked by P2. |
| b. | P1 requests R1 again. | d. | P2 releases R1. |

ANS: C PTS: 1 REF: 145

5. Failure to lock database records before updating them may result in a \_\_\_\_ between processes.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | struggle | c. | deadlock |
| b. | race | d. | livelock |

ANS: B PTS: 1 REF: 145

6. Fill in the missing step in the following deadlock situation. Two users from the local board of education are each running a program (P1 and P2), and both programs will eventually need two tape drives to copy files from one tape to another. Only two tape drives are available and they’re allocated on an “as requested” basis. Soon the following sequence transpires:

1. P1 requests tape drive 1 and gets it.

2. \_\_\_\_

3. P1 requests tape drive 2 but is blocked.

4. P2 requests tape drive 1 but is blocked.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | P1 requests tape drive 2. | c. | P2 requests tape drive 1 but is blocked. |
| b. | P2 requests tape drive 2 and gets it. | d. | P1 releases tape drive 1. |

ANS: B PTS: 1 REF: 147

7. \_\_\_\_ is when, in modern printing systems, a disk accepts output from several users and acts as a temporary storage area for all output until the printer is ready to accept it.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Buffering | c. | Spooling |
| b. | Lagging | d. | Spoofing |

ANS: C PTS: 1 REF: 148

8. Deadlock occurs on a modern printer when \_\_\_\_.

|  |  |
| --- | --- |
| a. | The network connection for the printer overflows with too many requests to use the printer. |
| b. | Too many users attempt to access the printer at the same time. |
| c. | The buffer fills up with too many print jobs and the printer cannot decide which one to print. |
| d. | The printer needs all of a job’s output before it will begin printing, but the spooling system fills the available disk space with only partially completed output. |

ANS: D PTS: 1 REF: 148

9. A network that’s congested or has filled a large percentage of its I/O buffer space can become deadlocked if it doesn’t have \_\_\_\_ to control the flow of messages through the network.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | procedures | c. | policies |
| b. | protocols | d. | rules |

ANS: B PTS: 1 REF: 148

10. Fill in the missing event that causes livelock.

At an insurance company the system performs many daily transactions. One day the following series of events ties up the system:

1. Process P1 wishes to show a payment so it issues a command to read the balance, which is stored in cylinder 20 of a disk pack.

2. \_\_\_\_

3. P2 gains control of the I/O channel and issues a command to write someone else’s payment to a record stored in cylinder 310. If the command is not “locked out,” P2 will be put on hold while the control unit moves the arm to cylinder 310.

4. Because P2 is “on hold,” the channel is free to be captured again by P1, which reconfirms its command to “read from cylinder 20.”

5. Since the last command from P2 had forced the arm mechanism to cylinder 310, the disk control unit begins to reposition the arm to cylinder 20 to satisfy P1. The I/O channel would be released because P1 is once again put on hold, so it could be captured by P2, which issues a WRITE command only to discover that the arm mechanism needs to be repositioned.

|  |  |
| --- | --- |
| a. | While the control unit is moving the arm to cylinder 20, P1 is put on hold and the I/O channel is free to process the next I/O request. |
| b. | P1 discovers that another process has locked the portion of the disk it needs to access. |
| c. | P2 is put on hold while the control unit moves the arm to satisfy P1’s request |
| d. | P1 is unable to find the information it needs, so requests a different READ operation for a different cylinder. |

ANS: A PTS: 1 REF: 150

11. \_\_\_\_ is the act of allowing only one process to have access to a dedicated resource.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | No preemption | c. | Resource holding |
| b. | Circular wait | d. | Mutual exclusion |

ANS: D PTS: 1 REF: 151

12. \_\_\_\_ occurs when two processes do not release control of resources they are using.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | No preemption | c. | Resource holding |
| b. | Circular wait | d. | Mutual exclusion |

ANS: C PTS: 1 REF: 151

13. \_\_\_\_ allows a resource to be held by a process as long as it is needed.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | No preemption | c. | Resource holding |
| b. | Circular wait | d. | Mutual exclusion |

ANS: A PTS: 1 REF: 151

14. **\_\_\_\_** is when each process involved in the impasse is waiting for another to voluntarily release the resource so that at least one will be able to continue on.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Mutual exclusion | c. | Circular wait |
| b. | Resource holding | d. | No preemption |

ANS: C PTS: 1 REF: 151

15. \_\_\_\_ showed how the four conditions can be modeled using directed graphs.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Havender | c. | Dijkstra |
| b. | Holt | d. | Lane & Mooney |

ANS: B PTS: 1 REF: 151

16. In a directed graph used to model deadlock, \_\_\_\_ represents deadlock.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | a solid arrow | c. | a cycle |
| b. | a dashed arrow | d. | any path |

ANS: C PTS: 1 REF: 151

17. Assume the following events and actions take place. The following statement, \_\_\_\_ is true.Event Action

1 P1 requests and is allocated the printer R1.

2 P1 releases the printer R1.

3 P2 requests and is allocated the disk drive R2.

4 P2 releases the disk R2.

5 P3 requests and is allocated the plotter R3.

6 P3 releases the plotter R3.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | There is no deadlock. | c. | Event 5 caused deadlock. |
| b. | Event 4 caused deadlock. | d. | Event 6 caused deadlock. |

ANS: A PTS: 1 REF: 152

18. Assume the following events and actions take place. The following statement,\_\_\_\_ is true.Event Action

1 P1 requests and is allocated R1.

2 P2 requests and is allocated R2.

3 P3 requests and is allocated R3.

4 P1 requests R2.

5 P2 requests R3.

6 P3 requests R1.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | There is no deadlock. | c. | Event 5 caused deadlock. |
| b. | Event 4 caused deadlock. | d. | Event 6 caused deadlock. |

ANS: D PTS: 1 REF: 153

19. \_\_\_\_ is necessary in any computer system because some resources such as memory, CPU, and dedicated devices must be exclusively allocated to one user at a time.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Mutual exclusion | c. | No preemption |
| b. | Resource holding | d. | Circular wait |

ANS: A PTS: 1 REF: 155

20. The scheme of \_\_\_\_ removes the possibility of a circular wait and therefore guarantees the removal of deadlocks.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | hierarchical ordering | c. | saving and restoring job state |
| b. | preemption | d. | requesting all resources before job run |

ANS: A PTS: 1 REF: 156

21. \_\_\_\_ developed the Banker’s Algorithm.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Havender | c. | Dijkstra |
| b. | Holt | d. | Lane & Mooney |

ANS: C PTS: 1 REF: 157

22. The first step in reducing a directed graph to eliminate deadlock is \_\_\_\_.

|  |  |
| --- | --- |
| a. | Remove the process that is holding on to the most resources. |
| b. | Find a process that’s waiting only for resource classes that aren’t fully allocated |
| c. | Find a process that is currently using a resource and not waitingfor one. |
| d. | Find the oldest process and remove it from the graph. |

ANS: C PTS: 1 REF: 159

23. The first and simplest recovery method, and the most drastic, is to \_\_\_\_.

|  |  |
| --- | --- |
| a. | select a nondeadlocked job, preempt the resources it’s holding, and allocate them to a deadlocked process so it can resume execution, thus breaking the deadlock |
| b. | identify which jobs are involved in the deadlock and terminate them one at a time, checking to see if the deadlock is eliminated after each removal |
| c. | terminate only the jobs involved in the deadlock and ask their users to resubmit them |
| d. | terminate every job that’s active in the system and restart them from the beginning |

ANS: D PTS: 1 REF: 162

24. In the “dining philosophers” problem, a philosopher can pick up a fork when\_\_\_\_.

|  |  |
| --- | --- |
| a. | When there is one available |
| b. | When there are two available |
| c. | When no other philosopher is eating |
| d. | When it is his turn, going in numerical order from one philosopher to the next |

ANS: B PTS: 1 REF: 163|164

25. An algorithm designed to detect starvation by tracking how long each job has been waiting for resources is the same concept as \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | deadlock | c. | preemption |
| b. | aging | d. | round robin |

ANS: B PTS: 1 REF: 165

**Chapter 6: Concurrent Processes**

**TRUE/FALSE**

1. Parallel processing is a situation in which two or more processors operate in unison.

ANS: T PTS: 1 REF: 174

2. In multiprocessing systems, the Processor Manager has to coordinate the activity of each processor, as well as synchronize cooperative interaction among the CPUs.

ANS: T PTS: 1 REF: 174

3. The only reason for multiprocessing is to increase computer power.

ANS: F PTS: 1 REF: 174

4. Multiprocessors were developed for high-end models of midrange and mainframe computers, where the operating system treated each additional CPU as an additional resource, so that each could be scheduled for work.

ANS: T PTS: 1 REF: 176

5. The master/slaveconfiguration is an symmetric multiprocessing system.

ANS: F PTS: 1 REF: 177

6. In a master/slave system, the master processor is responsible for managing the entire system—all files, devices, memory, and processors.

ANS: T PTS: 1 REF: 177

7. The loosely coupled configuration features several complete computer systems, each with its own memory, I/O devices, CPU, and operating system.

ANS: T PTS: 1 REF: 178

8. In a loosely coupled system, a job may move from one processor to another during execution.

ANS: F PTS: 1 REF: 179

9. The symmetric configuration is best implemented if the processors are all of the same type.

ANS: T PTS: 1 REF: 179

10. In a symmetric configuration, processor scheduling is centralized.

ANS: F PTS: 1 REF: 179

11. The success of process synchronization hinges on the capability of the operating system to make a resource available to other processes while it is being used by one of them.

ANS: F PTS: 1 REF: 180

12. The common element in all synchronization schemes is to allow a process to finish work on a critical region of the program before other processes have access to it.

ANS: T PTS: 1 REF: 181

13. Test-and-set is a single indivisible machine instruction known simply as TS and was introduced by IBM for its multiprocessing System 360/370 computers.

ANS: T PTS: 1 REF: 181

14. The WAIT and SIGNAL operations must be issued at the same time.

ANS: F PTS: 1 REF: 182

15. A semaphore is a negative integer variable that is used as a binary signal.

ANS: F PTS: 1 REF: 182

16. In parallel computations, mutual exclusion is achieved automatically because each operation is handled in order, one at a time.

ANS: F PTS: 1 REF: 185

17. The classic problem of producers and consumersis one in which one process produces some data that another process consumes later.

ANS: T PTS: 1 REF: 185

18. The problem of masters and slaves arises when two types of processes need to access a shared resource such as a file or database.

ANS: F PTS: 1 REF: 187

19. Multiprocessing can refer to one job using several processors to execute sets of instructions in parallel.

ANS: T PTS: 1 REF: 189

20. For many computational purposes, serial processing is sufficient; it’s easy to implement and fast enough for most users.

ANS: T PTS: 1 REF: 189

21. Implied parallelism includes automatic detection by the compilerof instructions that can be performed in parallel.

ANS: F PTS: 1 REF: 190

22. Multiplying two 3x3 matrices requires 45 operations when performed in parallel using three processors.

ANS: F PTS: 1 REF: 191|192

23. Threads share the same resources as the process that created them.

ANS: T PTS: 1 REF: 192

24. Thread Information Blocks contain basic information about a thread such as its ID, state, and a pointer to the process that created it.

ANS: F PTS: 1 REF: 195

25. Java was developed by Sun Microsystems, Inc., and released in 1995 as the first software platform that promised to allow programmers to code an application with the capability to run on any computer.

ANS: T PTS: 1 REF: 196

**MULTIPLE CHOICE**

1. Parallel processing is also called \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | uniprocessing | c. | shared processing |
| b. | multiprocessing | d. | divided processing |

ANS: B PTS: 1 REF: 174

2. When the costs of CPU hardware began to decline in the mid-\_\_\_\_s, multiprocessor systems with dozens of CPUs found their way into business environments.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1960 | c. | 1980 |
| b. | 1970 | d. | 1990 |

ANS: C PTS: 1 REF: 176

3. The **\_\_\_\_** configuration is an asymmetric multiprocessing system.

|  |  |
| --- | --- |
| a. | loosely coupled |
| b. | master processors |
| c. | start/end |
| d. | master/slave |

ANS: D PTS: 1 REF: 177

4. The \_\_\_\_ configurationfeatures several complete computer systems, each with its own memory, I/O devices, CPU, and operating system.

|  |  |
| --- | --- |
| a. | loosely coupled |
| b. | master processor |
| c. | start/end |
| d. | master/slave |

ANS: A PTS: 1 REF: 178

5. The \_\_\_\_ configuration is the most difficult to implement.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | master/slave | c. | symmetric |
| b. | loosely coupled | d. | shared load |

ANS: C PTS: 1 REF: 179

6. In a symmetric configuration, processor scheduling is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | centralized | c. | multifaceted |
| b. | decentralized | d. | balanced |

ANS: B PTS: 1 REF: 179

7. The need for algorithms to resolve conflicts between processors is called process \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | communication | c. | processing |
| b. | synchronization | d. | math |

ANS: B PTS: 1 REF: 180

8. A \_\_\_\_ of processing must be handled as a unit.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | line | c. | critical region |
| b. | segment | d. | semaphore |

ANS: C PTS: 1 REF: 181

9. Lock and key synchronization must take place within a single \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | instruction | c. | processor |
| b. | computer | d. | machine cycle |

ANS: D PTS: 1 REF: 181

10. A problem with test-and-set is that when many processes are waiting to enter a critical region, \_\_\_\_ could occur because the processes gain access in an arbitrary fashion.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | starvation | c. | deadlock |
| b. | synchronization | d. | an error |

ANS: A PTS: 1 REF: 182

11. \_\_\_\_ sets the process’s process control block (PCB) to the blocked state and links it to the queue of processes waiting to enter this particular critical region.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | TS | c. | WAIT |
| b. | SIGNAL | d. | STOP |

ANS: C PTS: 1 REF: 182

12. The two operations identified by Dijkstra to be performed on a semaphore are \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | P and V | c. | test and set |
| b. | WAIT and SIGNAL | d. | check and update |

ANS: A PTS: 1 REF: 183

13. When using a semaphore, a value of \_\_\_\_ indicates that a critical region is in use.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | -100 | c. | 100 |
| b. | 0 | d. | 9999 |

ANS: B PTS: 1 REF: 183|184

14. Operations on semaphore *s* enforce the concept of \_\_\_\_, which is necessary to avoid having two operations attempt to execute at the same time.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | mutual execution | c. | signal exclusion |
| b. | mutex execution | d. | mutual exclusion |

ANS: D PTS: 1 REF: 184

15. \_\_\_\_ semaphores are used in the producer and consumer problem.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | One | c. | Three |
| b. | Two | d. | Four |

ANS: C PTS: 1 REF: 186

16. \_\_\_\_ proposed a solution to the readers and writers problem that did not result in starvation for readers or writers.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Hoare | c. | Heymans |
| b. | Courtois | d. | Parnas |

ANS: A PTS: 1 REF: 188

17. \_\_\_\_ semaphores are used in the solution to the readers and writers problem that does not involve starvation.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Zero | c. | Two |
| b. | One | d. | Three |

ANS: C PTS: 1 REF: 188

18. When a computer evaluates the expression A = 3 \* B \* C + 4 / (D + E) \*\* (F – G), in a sequential manner, \_\_\_\_ is evaluated as a first step.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | F – G | c. | C + 4 |
| b. | 3 \* B | d. | B \* C |

ANS: A PTS: 1 REF: 189

19. Automatic detection by the compiler of instructions that can be performed in parallel is called \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | automatic parallelism | c. | explicit parallelism |
| b. | array parallelism | d. | implicit parallelism |

ANS: D PTS: 1 REF: 190

20. Most current operating systems support the implementation of threads, or \_\_\_\_, which have become part of numerous application packages.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | parallel processes | c. | heavyweight processes |
| b. | lightweight processes | d. | semaphores |

ANS: B PTS: 1 REF: 192

21. Each active thread in a process shares the \_\_\_\_ and the resources allocated to its process.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | processor registers | c. | data area |
| b. | program counter | d. | status |

ANS: C PTS: 1 REF: 193

22. Once a thread is in the ready state, the state it can enter next is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | BLOCKED | c. | WAITING |
| b. | FINISHED | d. | RUNNING |

ANS: D PTS: 1 REF: 193

23. A thread transitions from RUNNING to \_\_\_\_ when it has to wait for an event outside its control to occur.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | LOOPING | c. | WAITING |
| b. | BLOCKED | d. | PENDING |

ANS: C PTS: 1 REF: 193

24. The source code of a Java program is first compiled into an intermediate language called Java \_\_\_\_, which are platform-independent.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | beans | c. | bits |
| b. | nibs | d. | bytecodes |

ANS: D PTS: 1 REF: 196

25. With its sophisticated synchronization capabilities, Java supports multithreading at the \_\_\_\_ level.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | language | c. | operating |
| b. | machine | d. | operating system |

ANS: A PTS: 1 REF: 198

**Chapter 7: Device Management**

**TRUE/FALSE**

1. The universal serial bus (USB) controller acts as an interface between the operating system, device drivers, and applications and the devices that are attached via the USB host.

ANS: T PTS: 1 REF: 207

2. On a magnetic tape, the inter-record gap (IRG) is about two inches long regardless of the sizes of the records it separates.

ANS: F PTS: 1 REF: 208

3. Direct access storage devices (DASDs) are devices that can directly read or write to a specific place on a disk.

ANS: T PTS: 1 REF: 210

4. A fixed-head disk is lower in cost than a movable head disk.

ANS: F PTS: 1 REF: 211

5. Among the many differences between an optical disc and a magnetic disk is the design of the disc track and sectors.

ANS: T PTS: 1 REF: 213

6. Two of the most important measures of optical disc drive performance are sustained data-transfer rate and longest access time.

ANS: F PTS: 1 REF: 214

7. A magneto-optical (MO) disk drive combines the technology of magnetic disks with that of optical discs.

ANS: T PTS: 1 REF: 217

8. An MO disk is covered with a silicone-based glass alloy that needs something more powerful than the magnetic field generated by the read/write head to change states.

ANS: F PTS: 1 REF: 217

9. DASDs are good for files with low activity (the percent of records accessed) or for users who access records in a random fashion.

ANS: T PTS: 1 REF: 219

10. The job of the I/O control unit is to keep up with the I/O requests from the CPU and pass them down the line to the appropriate control unit.

ANS: F PTS: 1 REF: 222

11. Each unit in the I/O subsystem can finish its operation independently from the others.

ANS: T PTS: 1 REF: 225

12. When using DMA, the CPU is involved in transferring data to and from memory for the entire transfer.

ANS: F PTS: 1 REF: 226

13. Buffers are used extensively to better synchronize the movement of data between the relatively slow I/O devices and the very fast CPU.

ANS: T PTS: 1 REF: 226

14. The traffic controller maintains a spreadsheet file containing the status and connections for each unit in the I/O subsystem, grouped into Channel Control Blocks, Control Unit Control Blocks, and Device Control Blocks.

ANS: F PTS: 1 REF: 228

15. A find strategy determines the order in which the processes get the I/O handler device, and the goal is to keep seek time to a minimum.

ANS: F PTS: 1 REF: 229

16. First-come, first-served (FCFS) is the simplest device-scheduling algorithm.

ANS: T PTS: 1 REF: 229

17. The SCAN algorithm moves the arm methodically from the inner to the outer track, servicing every request in its path.

ANS: F PTS: 1 REF: 231

18. N-Step SCANholds all new requests until the arm starts on its way back.

ANS: T PTS: 1 REF: 232

19. RAIDis a set of logical disk drives that is viewed as a single physical unit by the operating system.

ANS: F PTS: 1 REF: 234

20. Most RAID configurations require fewer disk drives, which decreases hardware costs.

ANS: F PTS: 1 REF: 235

21. RAID Level 0 is the only one that does not provide error correction, or redundancy, and so it is not considered a true form of RAID because it cannot recover from hardware failure.

ANS: T PTS: 1 REF: 236

22. RAID-0 is ideal for data-critical real-time systems.

ANS: F PTS: 1 REF: 236

23. The advantage of RAID Level 3 is that if any one drive fails, data can be restored using the bits in the parity disk.

ANS: F PTS: 1 REF: 239

24. RAID Level 6 was introduced by the Berkeley research team in a paper that followed its original outline of RAID levels.

ANS: T PTS: 1 REF: 240

25. Additional complex configurations of RAID can be created by combining multiple levels.

ANS: T PTS: 1 REF: 240

**MULTIPLE CHOICE**

1. \_\_\_\_ devicesare assigned to only one job at a time.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Dedicated | c. | Virtual |
| b. | Shared | d. | Static |

ANS: A PTS: 1 REF: 206

2. The USB controller assigns bandwidth to each device depending on its priority, and the \_\_\_\_ priority is assigned to real-time exchanges where no interruption in the data flow is allowed, such as video or sound data.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | highest | c. | lowest |
| b. | medium | d. | standard |

ANS: A PTS: 1 REF: 207

3. The number of characters that can be recorded per inch on a magnetic tape is determined by the \_\_\_\_ of the tape.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | width | c. | density |
| b. | length | d. | parity |

ANS: C PTS: 1 REF: 208

4. If the transport speed for a magnetic tape is 200 inches per second and the density is 1600 bpi, a total of \_\_\_\_ bytes can be transferred in one second.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 3,200 | c. | 320,000 |
| b. | 32,000 | d. | 3,200,000 |

ANS: C PTS: 1 REF: 209

5. It takes 2.5 minutes to reach the last record on a tape, \_\_\_\_ is the average access time.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | .5 minutes | c. | 1.25 minutes |
| b. | 1 minute | d. | 2 minutes |

ANS: C PTS: 1 REF: 210

6. In a fixed-head magnetic disk, each circle is called a \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | sector | c. | track |
| b. | block | d. | platter |

ANS: C PTS: 1 REF: 210

7. Movable-head magnetic disks, such as the computer hard drive, have \_\_\_\_ read/write head(s).

|  |  |  |  |
| --- | --- | --- | --- |
| a. | zero | c. | two |
| b. | one | d. | four |

ANS: B PTS: 1 REF: 211

8. The advent of optical discs was made possible by developments in \_\_\_\_ technology.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | magnetic | c. | storage |
| b. | laser | d. | silicone |

ANS: B PTS: 1 REF: 213

9. On an optical disc, all sectors are \_\_\_\_.

|  |  |
| --- | --- |
| a. | of varying sizes depending upon where you are on the disc |
| b. | larger as you move to the edge |
| c. | smaller as you move to the edge |
| d. | of the same size throughout the disc |

ANS: D PTS: 1 REF: 214

10. The data-transfer rate for an optical disc is measured in \_\_\_\_ and refers to the speed at which massive amounts of data can be read from the disc.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | kilobytes | c. | gigabytes |
| b. | megabytes | d. | terabytes |

ANS: B PTS: 1 REF: 214

11. When making CDs for sale, such as music or software CDs, data is recorded on a master disc by means of a high-intensity laser beam, which burns indentations, called pits, and flat areas, called \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | lands | c. | hills |
| b. | valleys | d. | lakes |

ANS: A PTS: 1 REF: 215

12. The software used to create a CD-R uses a standard format, such as \_\_\_\_, which automatically checks for errors and creates a table of contents, used to keep track of each file’s location.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | CD 1000 | c. | AMC 22 |
| b. | ISA 9102 | d. | ISO 9096 |

ANS: D PTS: 1 REF: 216

13. A dual-layer, single-sided DVD can hold the equivalent of \_\_\_\_ CDs.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 3 | c. | 13 |
| b. | 8 | d. | 19 |

ANS: C PTS: 1 REF: 216

14. To write data to flash memory, an electric charge is sent through one transistor, called the \_\_\_\_, then through a metal oxide layer, and into a second transistor called the control gate where the charge is stored in a cell until it’s erased.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | parallel port | c. | pit |
| b. | floating gate | d. | crystalline port |

ANS: B PTS: 1 REF: 218

15. Data recorded on DASDs may or may not be blocked at the discretion of the \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | end user | c. | operator |
| b. | application programmer | d. | database programmer |

ANS: B PTS: 1 REF: 219

16. Of the three components of access time in a movable-head DASDs, \_\_\_\_ is the longest.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | seek time | c. | transfer time |
| b. | search time | d. | delay time |

ANS: A PTS: 1 REF: 220

17. \_\_\_\_ control the transfer of information between the disk drives and the rest of the computer system.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | System controllers | c. | System interfaces |
| b. | Disk drive controllers | d. | Disk drive interfaces |

ANS: D PTS: 1 REF: 223

18. \_\_\_\_ bits make up the Channel Status Word (CSW) flag.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Two | c. | Four |
| b. | Three | d. | Five |

ANS: B PTS: 1 REF: 225

19. Without DMA, the \_\_\_\_ is responsible for the physical movement of data between main memory and the device.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | CPU | c. | memory controller |
| b. | bus | d. | disk |

ANS: A PTS: 1 REF: 226

20. The I/O \_\_\_\_ allocates the devices, control units, and channels.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | scheduler | c. | device handler |
| b. | traffic controller | d. | director |

ANS: A PTS: 1 REF: 228

21. \_\_\_\_ uses the same underlying philosophy as shortest job next, where the shortest jobs are processed first and longer jobs are made to wait.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | LOOK | c. | SSTF |
| b. | FCFS | d. | SCAN |

ANS: C PTS: 1 REF: 230

22. \_\_\_\_ is a way to optimize search times by ordering the requests once the read/write heads have been positioned.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Rotational ordering | c. | C-SCAN |
| b. | SSTF | d. | LOOK and SCAN |

ANS: A PTS: 1 REF: 232

23. The RAID level \_\_\_\_ uses word parity for error correction.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1 | c. | 5 |
| b. | 3 | d. | 6 |

ANS: B PTS: 1 REF: 236

24. The RAID level \_\_\_\_ requires two different parity calculations.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2 | c. | 5 |
| b. | 3 | d. | 6 |

ANS: D PTS: 1 REF: 240

25. A RAID Level \_\_\_\_ system consists of a Level 1 system mirrored to a second Level 1 system, both controlled by a single Level 0 system.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 01 | c. | 10 |
| b. | 03 | d. | 30 |

ANS: C PTS: 1 REF: 240

**Chapter 8: File Management**

**TRUE/FALSE**

1. The File Manager is in charge of the system’s physical components, its information resources, and the policies used to store and distribute the files.

ANS: T PTS: 1 REF: 252

2. The computer system definesa file by activating the appropriate secondary storage device and loading the file into memory while updating its records of who is using what file.

ANS: F PTS: 1 REF: 253

3. A recordis a group of related bytes that can be identified by the user with a name, type, and size.

ANS: F PTS: 1 REF: 254

4. Directoriesare special files with listings of filenames and their attributes.

ANS: T PTS: 1 REF: 254

5. Examples of batch commands are CREATE, DELETE, RENAME, and COPY.

ANS: F PTS: 1 REF: 254

6. Without the File Manager, every program would need to include instructions to operate all of the different types of devices, and all of the different models within each type.

ANS: T PTS: 1 REF: 255

7. Each volume can only contain a single file.

ANS: F PTS: 1 REF: 256

8. In newer operating systems, a subdirectory is created when a user opens an account to access the computer system.

ANS: T PTS: 1 REF: 257

9. Tree structures are inefficient for searching because there are fewer entries in each directory.

ANS: F PTS: 1 REF: 257

10. A file descriptor usually contains only a file name and the directory name in which the file is located.

ANS: F PTS: 1 REF: 258

11. The relative filename is the name that is selected by the File Manager when the file is created.

ANS: F PTS: 1 REF: 259

12. An extension is usually two or three characters long and is separated from the relative name by a period.

ANS: T PTS: 1 REF: 259

13. When someone creates a folder, the system creates a subdirectory in the current directory or folder.

ANS: T PTS: 1 REF: 260

14. When a user gives a command to modify the contents of a file, it’s actually a command to access folders within the file.

ANS: F PTS: 1 REF: 261

15. It is easy to calculate the location of a variable-length record.

ANS: F PTS: 1 REF: 262

16. Sequential record organization is by far the easiest to implement because records are stored and retrieved serially, one after the other.

ANS: T PTS: 1 REF: 262

17. An indexed sequential file does not have overflow areas.

ANS: F PTS: 1 REF: 265

18. The File Manager keeps track of the empty storage areas by treating them as files.

ANS: T PTS: 1 REF: 267

19. Although noncontiguous allocation schemes eliminate external storage fragmentation and the need for compaction, they don’t support direct access because there’s no easy way to determine the exact location of a specific record.

ANS: T PTS: 1 REF: 268

20. Files cannot be converted from sequential to direct or vice versa.

ANS: F PTS: 1 REF: 269

21. Access methods are dictated by a file’s organization; the most flexibility is allowed with indexed sequential files and the least with sequential.

ANS: T PTS: 1 REF: 270

22. Many systems force users to have their files organized for fixed-length records if the records are to be accessed directly.

ANS: T PTS: 1 REF: 271

23. In a file management system, information is passed from the Device Manager at the top of the hierarchy to the File Manager at the bottom.

ANS: F PTS: 1 REF: 272

24. Data in a fixed-length field might include a short name followed by many blank characters; it can be replaced with a variable-length field and a special code to indicate how many blanks were truncated.

ANS: T PTS: 1 REF: 278

25. To achieve its goals, the File Manager must be able to accommodate a variety of file organizations, physical storage allocation schemes, record types, and access methods.

ANS: T PTS: 1 REF: 280

**MULTIPLE CHOICE**

1. The File Manager is in charge of the system’s \_\_\_\_ components.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | data | c. | electronic |
| b. | software | d. | physical |

ANS: D PTS: 1 REF: 252

2. A \_\_\_\_is a group of related records that contains information to be used by specific application programs to generate reports.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | field | c. | file |
| b. | record group | d. | directory |

ANS: C PTS: 1 REF: 254

3. \_\_\_\_are special files with listings of filenames and their attributes.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Databases | c. | Programs |
| b. | Directories | d. | Data files |

ANS: B PTS: 1 REF: 254

4. \_\_\_\_ is a specialized WRITE command for existing data files that allows for appending records or for rewriting selected records in their original place in the file.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | APPEND | c. | REWRITE |
| b. | UPDATE | d. | MODIFY |

ANS: D PTS: 1 REF: 254

5. The File Manager writes the volume name and other descriptive information on an easy-to-access place on each unit: \_\_\_\_ of the CD or DVD.

|  |  |
| --- | --- |
| a. | the outermost part |
| b. | the innermost part |
| c. | immediately following the master file directory |
| d. | stored at the beginning of the volume |

ANS: B PTS: 1 REF: 256

6. Many computer users and some operating systems call subdirectories \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | folders | c. | volumes |
| b. | files | d. | databases |

ANS: A PTS: 1 REF: 257

7. A \_\_\_\_ is created when a user opens an account to access the computer system.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | directory | c. | subdirectory |
| b. | volume | d. | MFD |

ANS: C PTS: 1 REF: 257

8. For every file request, the \_\_\_\_ is the point of entry.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | file location | c. | subdirectory |
| b. | volume location | d. | MFD |

ANS: D PTS: 1 REF: 257

9. The purpose of an extension is to \_\_\_\_.

|  |  |
| --- | --- |
| a. | identify the directory in which the file is stored |
| b. | identify the type of file |
| c. | identify the file size |
| d. | identify the file owner |

ANS: B PTS: 1 REF: 259

10. In a networked environment using the OpenVMS Alpha operating system, a file might be named VAX2::USR3:[IMFST.FLYNN]INVENTORY\_COST.DOC;7. \_\_\_\_ is the volume where the file is stored?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | VAX2 | c. | IMFST |
| b. | USR3 | d. | FLYNN |

ANS: B PTS: 1 REF: 260

11. A UNIX or Linux system might identify a file as: /usr/imfst/flynn/inventory.doc. What represents the root directory is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | / | c. | imfst |
| b. | usr | d. | flynn |

ANS: A PTS: 1 REF: 260

12. As long as users refer to files in the \_\_\_\_ directory, they can access their files without entering the complete name from the highest level to the lowest.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | root | c. | home |
| b. | working | d. | default |

ANS: B PTS: 1 REF: 261

13. When data is stored in fixed length fields, data that extends beyond the fixed size \_\_\_\_.

|  |  |
| --- | --- |
| a. | generates an operating system error |
| b. | is truncated |
| c. | is broken up and stored in more than one field |
| d. | combines multiple fields to accommodate the data |

ANS: B PTS: 1 REF: 261

14. On magnetic disks, files can be organized in one of three ways; \_\_\_\_.

|  |  |
| --- | --- |
| a. | indexed direct, indexed indirect, or random |
| b. | sequential, indirect, or direct |
| c. | sequential, random, or indirect |
| d. | sequential, direct, or indexed sequential |

ANS: D PTS: 1 REF: 262

15. When using random access files, the program used to store the data follows a set of instructions, called a \_\_\_\_ algorithm, that transforms each key into a number, the record’s logical address.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | hashing | c. | translation |
| b. | grouping | d. | lookup |

ANS: A PTS: 1 REF: 263

16. When using indexed sequential record organization, each entry in the index file contains the \_\_\_\_ and the physical location of the data block where this record, and the records with smaller keys, are stored.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | last record name | c. | lowest record key |
| b. | highest record key | d. | first record name |

ANS: B PTS: 1 REF: 264

17. The primary disadvantage of contiguous storage is that \_\_\_\_.

|  |  |
| --- | --- |
| a. | it is hard to implement and manage |
| b. | it is difficult to find information in files |
| c. | file can’t be expanded unless there is empty space available immediately following it |
| d. | it is an inefficient use of space |

ANS: C PTS: 1 REF: 266

18. \_\_\_\_allocation allows files to use any storage space available on the disk.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Contiguous storage | c. | Fragmented storage |
| b. | Noncontiguous storage | d. | Add-on storage |

ANS: B PTS: 1 REF: 267

19. In noncontiguous storage, linking can take place at the \_\_\_\_ level where each part of the file points to the next one in the sequence.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | subdirectory | c. | directory |
| b. | file | d. | storage |

ANS: D PTS: 1 REF: 267

20. In indexed storage, when a file is created, the pointers in the index block are all set to \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | the end of the volume | c. | null |
| b. | the beginning of the volume | d. | zero |

ANS: C PTS: 1 REF: 270

21. The File Manager uses the address of the \_\_\_\_ to access the next sequential record.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | first byte read | c. | first byte in the file |
| b. | last byte read | d. | index record |

ANS: B PTS: 1 REF: 270

22. \_\_\_\_ formula computes the byte address for a direct access file with fixed record length.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | CBA = (RN – 1) \* RL | c. | CBA = RN / RL |
| b. | CBA = RN \* RL | d. | CBA = (RN + 1) \* RL |

ANS: A PTS: 1 REF: 271

23. The most commonly used access control scheme is the \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | access control matrix | c. | capability list |
| b. | access control list | d. | capability matrix |

ANS: B PTS: 1 REF: 277

24. \_\_\_\_ compressionis a technique used to save space in files.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Text | c. | Data |
| b. | Space | d. | Character |

ANS: C PTS: 1 REF: 278

25. \_\_\_\_ might be an encoded version of ADAMSbbbbbbbbbb?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | ADAMSx10 | c. | AD2MSb10 |
| b. | ASbb | d. | ADAMSb10 |

ANS: D PTS: 1 REF: 278