國立彰化師範大學105學年度碩士班招生考試試題

系所：電子工程學系(乙組選考己)、資訊工程學系(選考丙)、資訊工程學系機體電路設計碩士班(選考己)　　科目：作業系統

☆☆請在答案紙上作答☆☆　　

一、Multiple-choice questions(1% each, 90%)

1. A denial of service attack is ____.
   (A) aimed at gaining information (B) aimed at stealing resources
   (C) aimed at disrupting legitimate use of a system (D) generally not network based
2. ____ is a symmetric stream cipher.
   (A) DES (B) AES (C) RC4 (D) twofish
3. A ____ is a public key digitally signed by a trusted party.
   (A) key ring (B) digital certificate (C) message digest (D) digital key
4. ____ layer security generally has been standardized on IPSec.
   (A) Network (B) Transport (C) Data-link (D) Application
5. Which of the following is true of SSL?
   (A) It provides security at the data-link layer.
   (B) It is a simple protocol with limited options.
   (C) It is commonly used for secure communication on the Internet.
   (D) It was designed by Microsoft.
6. In an access matrix, the ____ right allows a process to change the entries in a row.
   (A) owner (B) copy (C) control (D) switch
7. In the reacquisition scheme for implementing the revocation of capabilities, ____.
   (A) a key is defined when the capability is created
   (B) the capabilities point indirectly, not directly, to the objects
   (C) a list of pointers is maintained with each object that point to all capabilities associated with that object
   (D) capabilities are periodically deleted from each domain
8. Which of the following is an advantage of compiler-based enforcement of access control?
   (A) Protection schemes are programmed as opposed to simply declared.
   (B) Protection requirements are dependant of the facilities provided by a particular operating system.
   (C) The means for enforcement needs to be provided by the designer of the subsystem.
   (D) Access privileges are closely related to the linguistic concept of a data type.
9. Which of the following is true of the Java programming language in relation to protection?
   (A) When a class is loaded, the JVM assigns the class to a protection domain that gives the permissions of that class.
   (B) It does not support the dynamic loading of untrusted classes over a network.
   (C) It does not support the execution of mutually distrusting classes within the same JVM.
   (D) Methods in the calling sequence are not responsible for requests to access a protected resource.
10. The ____ register of an I/O port can be written by the host to start a command or to change the mode of a device.
    (A) status (B) control (C) data-in (D) transfer
11. An interrupt priority scheme can be used to ____.
    (A) allow the most urgent work to be finished first
    (B) make it possible for high-priority interrupts to preempt the execution of a low priority interrupt
    (C) defer the handling of low-priority interrupt without masking off all interrupts
    (D) All of the above
12. A character-stream device ____.
    (A) transfers data in blocks of bytes (B) transfers data a byte at a time
    (C) is a device such as a disk drive (D) is similar to a random access device

13. Which of the following is true of a blocking system call?
    (A) The execution of the application is suspended when the call is issued.
    (B) The call returns immediately without waiting for the I/O to complete.
    (C) The application continues to execute its code when the call is issued.
    (D) Blocking application code is harder to understand than nonblocking application code.
14. A(n) ____ is a buffer that holds output for a device that cannot accept interleaved data streams.
    (A) escape (B) block device (C) cache (D) spool
15. Which of the following is a principle that can improve the efficiency of I/O?
    (A) Increase the number of context switches. (B) Use small data transfers.
    (C) Move processing primitives into hardware. (D) Decrease concurrency using DMA controllers.
16. On media that uses constant linear velocity, the ____.
    (A) disk's rotation speed increases as the head moves towards the middle of the disk from either side
    (B) disk's rotation speed remains constant
    (C) density of bits decreases from the inner tracks to the outer tracks
    (D) density of bits per track is uniform
17. Host-attached storage is ____.
    (A) a special purpose storage system that is accessed remotely over a data network
    (B) not suitable for hard disks
    (C) accessed via local I/O ports
    (D) not suitable for use in raid arrays
18. The location where Windows places its boot code is the _____.
    (A) boot block (B) master boot record(MBR)
    (C) boot partition (D) boot disk
19. What are the two components of positioning time?
    (A) seek time + rotational latency
    (B) transfer time + transfer rate
    (C) effective transfer rate - transfer rate
    (D) cylinder positioning time + disk arm positioning time
20. Which RAID level is best for storing large volumes of data?
    (A) RAID levels 0 + 1 and 1 + 0 (B) RAID level 3
    (C) RAID level 4 (D) RAID level 5
21. Which of the following statements regarding solid state disks (SSDs) is false?
    (A) They generally consume more power than traditional hard disks.
    (B) They have the same characteristics as magnetic hard disks, but can be more reliable.
    (C) They are generally more expensive per megabyte than traditional hard disks.
    (D) They have no seek time or latency.
22. Solid state disks (SSDs) commonly use the _____ disk scheduling policy.
    (A) SSTF (B) SCAN (C) FCFS (D) LOOK
23. In the Linux VFS architecture, a(n) ____ object represents an individual file.
    (A) inode (B) file (C) superblock (D) dentry

24. The free-space list can be implemented using a bit vector approach. Which of the following is a drawback of this technique?
    (A) To traverse the list, each block must be read on the disk.
    (B) It is not feasible to keep the entire list in main memory for large disks.
    (C) The technique is more complicated than most other techniques.
    (D) This technique is not feasible for small disks.
25. The NFS mount protocol ____.
    (A) does not allow a remote directory to be accessible in a transparent manner
    (B) exhibits a transitivity property in terms of client access to other file systems
    (C) establishes the initial logical connection between a server and a client
    (D) provides a set of RFCs for remote file operations
26. The file-allocation table (FAT) used in MS-DOS is an example of _____.
    (A) contiguous allocation　(B) indexed allocation
    (C) linked allocation　(D) multilevel index
27. How many disk accesses are necessary for direct access to byte 20680 using linked allocation and assuming each disk block is 4 KB in size?
    (A) 1　(B) 6　(C) 7　(D) 5
28. Which algorithm is considered reasonable for managing a buffer cache?
    (A) least-recently-used (LRU)　(B) first-in-first-out (FIFO)
    (C) most-recently-used　(D) least-frequently-used (LFU)
29. A(n) ____ file is a series of code sections that the loader can bring into memory and execute.
    (A) text　(B) source　(C) object　(D) executable
30. A shared lock ____.
    (A) behaves like a writer lock
    (B) ensures that a file can have only a single concurrent shared lock
    (C) behaves like a reader lock
    (D) will prevent all other processes from accessing the locked file
31. The simplest file access method is ____.
    (A) sequential access　(B) logical access　(C) relative access　(D) direct access
32. Which of the following is true of the tree-structured directory structure?
    (A) Users cannot create their own subdirectories.
    (B) Users cannot acquire permission to access the files of other users.
    (C) Directories can share subdirectories and files.
    (D) It is the most common directory structure.
33. Which of the following is not considered a classification of users in connection with each file?
    (A) owner　(B) current user　(C) group　(D) universe
34. **app.exe** is an example of a(n) _____.
    (A) batch file　(B) object file　(C) executable file　(D) text file
35. Which of the following is not considered a file attribute?
    (A) Name　(B) Size　(C) Resolution　(D) Protection

36. Which of the following is a benefit of allowing a program that is only partially in memory to execute?
    (A) Programs can be written to use more memory than is available in physical memory.
    (B) CPU utilization and throughput is increased.
    (C) Less I/O is needed to load or swap each user program into memory.
    (D) All of the above
37. Suppose we have the following page accesses: 1 2 3 4 2 3 4 1 2 1 1 3 1 4 and that there are three frames within our system. Using the LRU replacement algorithm, what is the number of page faults for the given reference string?
    (A) 14　(B) 13　(C) 8　(D) 10
38. Belady's anomaly states that ____.
    (A) giving more memory to a process will improve its performance
    (B) as the number of allocated frames increases, the page-fault rate may decrease for all page replacement algorithms
    (C) for some page replacement algorithms, the page-fault rate may decrease as the number of allocated frames increases
    (D) for some page replacement algorithms, the page-fault rate may increase as the number of allocated frames increases
39. In the enhanced second chance algorithm, which of the following ordered pairs represents a page that would be the best choice for replacement?
    (A) (0,0)　(B) (0,1)　(C) (1,0)　(D) (1,1)
40. The ____ is the number of entries in the TLB multiplied by the page size.
    (A) TLB cache　(B) page resolution　(C) TLB reach　(D) hit ratio
41. _____ occurs when a process spends more time paging than executing.
    (A) Thrashing　(B) Memory-mapping　(C) Demand paging　(D) Swapping
42. Which of the following statements is false with regard to allocating kernel memory?
    (A) Slab allocation does not suffer from fragmentation.
    (B) Adjacent segments can be combined into one larger segment with the buddy system.
    (C) Because the kernel requests memory of varying sizes, some of which may be quite small, the system does not have to be concerned about wasting memory.
    (D) The slab allocator allows memory requests to be satisfied very quickly.
43. Which of the following is considered a benefit when using the slab allocator?
    (A) Memory is allocated using a simple power-of-2 allocator.
    (B) It allows kernel code and data to be efficiently paged.
    (C) It allows larger segments to be combined using coalescing.
    (D) There is no memory fragmentation.
44. An address generated by a CPU is referred to as a ____.
    (A) physical address
    (B) logical address
    (C) post relocation register address
    (D) Memory-Management Unit (MMU) generated address
45. The mapping of a logical address to a physical address is done in hardware by the _____.
    (A) memory-management-unit (MMU)　(B) memory address register
    (C) relocation register　(D) dynamic loading register
46. _____ is the dynamic storage-allocation algorithm which results in the smallest leftover hole in memory.
    (A) First fit　(B) Best fit　(C) Worst fit　(D) None of the above

47. Which of the following is true of compaction?
(A) It can be done at assembly, load, or execution time.
(B) It is used to solve the problem of internal fragmentation.
(C) It cannot shuffle memory contents.
(D) It is possible only if relocation is dynamic and done at execution time.

48. Consider a logical address with a page size of 8 KB. How many bits must be used to represent the page offset in the logical address?
(A) 10 (B) 8 (C) 13 (D) 12

49. Given the logical address 0xAEF9 (in hexadecimal) with a page size of 256 bytes, what is the page number?
(A) 0xAE (B) 0xF9 (C) 0xA (D) 0x00F9

50. Assume the value of the base and limit registers are 1200 and 350 respectively. Which of the following addresses is legal?
(A) 355 (B) 1200 (C) 1551 (D) all of the above

51. A deadlocked state occurs whenever ____.
(A) a process is waiting for I/O to a device that does not exist
(B) the system has no available free resources
(C) every process in a set is waiting for an event that can only be caused by another process in the set
(D) a process is unable to release its request for a resource after use

52. Which of the following data structures in the banker's algorithm is a vector of length *m*, where *m* is the number of resource types?
(A) Need (B) Allocation (C) Max (D) Available

53. A ___ could be preempted from a process.
(A) mutex lock (B) CPU (C) semaphore (D) file lock

54. A cycle in a resource-allocation graph is ____.
(A) a necessary and sufficient condition for deadlock in the case that each resource has more than one instance
(B) a necessary and sufficient condition for a deadlock in the case that each resource has exactly one instance
(C) a sufficient condition for a deadlock in the case that each resource has more than once instance
(D) is neither necessary nor sufficient for indicating deadlock in the case that each resource has exactly one instance

55. Suppose that there are ten resources available to three processes. At time 0, the following data is collected. The table indicates the process, the maximum number of resources needed by the process, and the number of resources currently owned by each process. Which of the following correctly characterizes this state?

Process	Maximum Needs	Currently Owned
P_0	10	4
P_1	3	1
P_2	6	4

(A) It is safe.
(B) It is not safe.
(C) The state cannot be determined.
(D) It is an impossible state.

56. Consider a disk queue holding requests to the following cylinders in the listed order: 116, 22, 3, 11, 75, 185, 100, 87. Using the SCAN scheduling algorithm, what is the order that the requests are serviced, assuming the disk head is at cylinder 88 and moving upward through the cylinders?
    (A) 116 - 22 - 3 - 11 - 75 - 185 - 100 – 87　(B) 100 - 116 - 185 - 87 - 75 - 22 - 11 - 3
    (C) 87 - 75 - 100 - 116 - 185 - 22 - 11 – 3　(D) 100 - 116 - 185 - 3 - 11 - 22 - 75 - 87
57. A RAID structure ____.
    (A) is primarily used for security reasons
    (B) is primarily used to ensure higher data reliability
    (C) stands for redundant arrays of ineffective disks
    (D) is primarily used to decrease the dependence on disk drives
58. Which of the following disk head scheduling algorithms does not take into account the current position of the disk head?
    (A) FCFS　(B) SSTF　(C) SCAN　(D) LOOK
59. Consider a disk queue holding requests to the following cylinders in the listed order: 116, 22, 3, 11, 75, 185, 100, 87. Using the C-SCAN scheduling algorithm, what is the order that the requests are serviced, assuming the disk head is at cylinder 88 and moving upward through the cylinders?
    (A) 116 - 22 - 3 - 11 - 75 - 185 - 100 – 87　(B) 100 - 116 - 185 - 87 - 75 - 22 - 11 - 3
    (C) 87 - 75 - 100 - 116 - 185 - 22 - 11 – 3　(D) 100 - 116 - 185 - 3 - 11 - 22 - 75 - 87
60. _____ uses checksums to maintain the integrity of data.
    (A) VFS　(B) NFS　(C) ZFS　(D) CIFS4
61. A race condition ____.
    (A) results when several threads try to access the same data concurrently
    (B) results when several threads try to access and modify the same data concurrently
    (C) will result only if the outcome of execution does not depend on the order in which instructions are executed
    (D) None of the above
62. A counting semaphore ____.
    (A) is essentially an integer variable
    (B) is accessed through only one standard operation
    (C) can be modified simultaneously by multiple threads
    (D) cannot be used to control access to a thread's critical sections
63. A ___ type presents a set of programmer-defined operations that are provided mutual exclusion within it.
    (A) transaction　(B) signal　(C) binary　(D) monitor
64. A solution to the critical section problem does not have to satisfy which of the following requirements?
    (A) mutual exclusion　(B) progress　(C) atomicity　(D) bounded waiting
65. How many philosophers may eat simultaneously in the Dining Philosophers problem with 5 philosophers?
    (A) 1　(B) 2　(C) 3　(D) 5
66. When using semaphores, a process invokes the **wait**( ) operation before accessing its critical section, followed by the **signal**( ) operation upon completion of its critical section. Consider reversing the order of these two operations—first calling **signal**( ), then calling **wait**( ). What would be a possible outcome of this?
    (A) Starvation is possible.
    (B) Deadlock is possible.
    (C) Mutual exclusion is still assured.
    (D) Several processes could be active in their critical sections at the same time.

67. Another problem related to deadlocks is _____.
(A) race conditions (B) critical sections (C) spinlocks (D) indefinite blocking

68. ____ scheduling is approximated by predicting the next CPU burst with an exponential average of the measured lengths of previous CPU bursts.
(A) Multilevel queue (B) RR (C) FCFS (D) SJF

69. Which of the following scheduling algorithms must be nonpreemptive?
(A) SJF (B) RR (C) FCFS (D) priority algorithms

70. _____ allows a thread to run on only one processor.
(A) Processor affinity (B) Processor set (C) NUMA (D) Load balancing

71. A significant problem with priority scheduling algorithms is _____.
(A) complexity (B) starvation
(C) determining the length of the next CPU burst (D) determining the length of the time quantum

72. The rate of a periodic task in a hard real-time system is ____, where p is a period and t is the processing time.
(A) $1/p$ (B) p/t (C) $1/t$ (D) pt

73. Which of the following is true of the rate-monotonic scheduling algorithm?
(A) The task with the shortest period will have the lowest priority.
(B) It uses a dynamic priority policy.
(C) It is non-preemptive.
(D) CPU utilization is bounded when using this algorithm.

74. The ____ multithreading model multiplexes many user-level threads to a smaller or equal number of kernel threads.
(A) many-to-one model (B) one-to-one model
(C) many-to-many model (D) many-to-some model

75. Which of the following would be an acceptable signal handling scheme for a multithreaded program?
(A) Deliver the signal to the thread to which the signal applies.
(B) Deliver the signal to every thread in the process.
(C) Deliver the signal to only certain threads in the process.
(D) All of the above.

76. LWP is ____.
(A) short for lightweight processor
(B) placed between system and kernel threads
(C) placed between user and kernel threads
(D) common in systems implementing one-to-one multithreading models

77. A ____ provides an API for creating and managing threads.
(A) set of system calls (B) multicore system
(C) thread library (D) multithreading model

78. A _____ uses an existing thread — rather than creating a new one — to complete a task.
(A) lightweight process (B) thread pool
(C) scheduler activation (D) asynchronous procedure call

79. When OpenMP encounters the **#pragma omp parallel** directive, it
(A) constructs a parallel region
(B) creates a new thread
(C) parallelizes for loops
(D) creates as many threads as there are processing cores

80. The ____ of a process contains temporary data such as function parameters, return addresses, and local variables.
(A) text section (B) data section (C) program counter (D) stack

81. The _____ refers to the number of processes in memory.
(A) process count (B) long-term scheduler
(C) degree of multiprogramming (D) CPU scheduler

82. A process may transition to the Ready state by which of the following actions?
(A) Completion of an I/O event (B) Awaiting its turn on the CPU
(C) Newly-admitted process (D) All of the above

83. A blocking **send**( ) and blocking **receive**( ) is known as a(n) _____
(A) synchronized message (B) rendezvous
(C) blocked message (D) asynchronous message

84. Imagine that a host with IP address 150.55.66.77 wishes to download a file from the web server at IP address 202.28.15.123. Select a valid socket pair for a connection between this pair of hosts.
(A) 150.55.66.77:80 and 202.28.15.123:80 (B) 150.55.66.77:150 and 202.28.15.123:80
(C) 150.55.66.77:2000 and 202.28.15.123:80 (D) 150.55.66.77:80 and 202.28.15.123:3500

85. The _____ application is the application appearing on the display screen of a mobile device.
(A) main (B) background (C) display (D) foreground

86. Policy ____.
(A) determines how to do something (B) determines what will be done
(C) is not likely to change across places (D) is not likely to change over time

87. _____ is a mobile operating system designed for the iPhone and iPad.
(A) Mac OS X (B) Android (C) UNIX (D)iOS

88. Which of the following statements is incorrect?
(A) An operating system provides an environment for the execution of programs.
(B) An operating system manages system resources.
(C) Operating systems provide both command line as well as graphical user interfaces.
(D) Operating systems must provide both protection and security.

89. Embedded computers typically run on a ____ operating system.
(A) real-time (B) Windows XP (C) network (D) clustered

90. Which of the following statements concerning open source operating systems is true?
(A) Solaris is open source.
(B) Source code is freely available.
(C) They are always more secure than commercial, closed systems.
(D) All open source operating systems share the same set of goals.

二、Explain what has to happen for a set of processes to achieve a deadlocked state. (10%)

GOOD LUCK