系所：　資訊工程學系(選考丙)、　　　　　　　　科目：　作業系統

　　　　電子工程學系(乙組選考己)、

　　　　資訊工程學系積體電路設計碩士班(選考己)

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I. Multiple-choice questions (1% each, 20%)

1. The most common method used by attackers to breach security is ____.
   (A) masquerading　　　　　　　　　　　(B) message modification
   (C) session hijacking　　　　　　　　　　(D) phishing

2. A ____ virus changes each time it is installed to avoid detection by antivirus software.
   (A) multipartite　　　　　　　　　　　　(B) tunneling
   (C) polymorphic　　　　　　　　　　　　(D) stealth

3. Worms ____.
   (A) use the spawn mechanism to ravage system performance
   (B) can shut down an entire network
   (C) continue to grow as the Internet expands
   (D) All of the above

4. In the UNIX operating system, a domain is associated with the ____.
   (A) user　　　　　　(B) process　　　　　　(C) procedure　　　　　(D) task

5. Which of the following is a true statement regarding the relative merits between access rights enforcement based solely on a kernel as opposed to enforcement provided largely by a compiler？
   (A) Enforcement by the compiler provides a greater degree of security.
   (B) Enforcement by the kernel is less flexible than enforcement by the programming language for user-defined policy.
   (C) Kernel-based enforcement has the advantage that static access enforcement can be verified off-line at compile time.
   (D) The fixed overhead of kernel calls cannot often be avoided in a compiler-based enforcement.

6. In capability lists, each object has a ____ to denote its type.
   (A) gate　　　　　　(B) tag　　　　　　　(C) key　　　　　　　(D) lock

7. DMA controllers ____.
   (A) do not utilize an additional, special purpose, processor
   (B) are a nonstandard component in PCs of today
   (C) can steal memory access cycles from the main CPU
   (D) can access main memory at the same time as the main CPU

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8. _____ I/O accesses a block device as a simple array of blocks.
   (A) Raw
   (B) Stream
   (C) Indirect
   (D) Cooked.

9. A(n) _____ is a front-end processor that multiplexes the traffic from hundreds of remote terminals into one port on a large computer.
   (A) terminal concentrator
   (B) network daemon
   (C) I/O channel
   (D) context switch coordinator.

10. The surface of a magnetic disk platter is divided into _____.
    (A) sectors
    (B) arms
    (C) tracks
    (D) cylinders

11. The shortest seek time first scheduling algorithm _____.
    (A) services the request with the maximum seek time
    (B) services the request with the minimum seek time
    (C) chooses to service the request furthest from the current head position
    (D) None of the above

12. Swap space management _____.
    (A) is a high-level operating system task
    (B) tries to provide the best throughput for the virtual memory system
    (C) is primarily used to increase the reliability of data in a system
    (D) None of the above

13. _____ is a technique for managing bad blocks that maps a bad sector to a spare sector.
    (A) Sector slipping
    (B) Sector sparing
    (C) Bad block mapping
    (D) Hard error management

14. A _____ is a private network connecting servers and storage units.
    (A) host-attached storage
    (B) network-attached storage
    (C) storage-area network
    (D) private-area network

15. Which of the following statements is false？
    (A) Swapping works in conjunction with virtual memory techniques.
    (B) Some systems allow for multiple swap spaces (disks).
    (C) Solaris only swaps pages of anonymous memory.
    (D) Typically, entire processes are swapped into memory

16. Transfers between memory and disk are performed a ____.
    (A) byte at a time   (B) file at a time
    (C) block at a time   (D) sector at a time

17. Order the following file system layers in order of lowest level to highest level.
    [1] I/O control   [2] logical file system   [3] basic file system
    [4] file-organization module   [5] devices

    (A) 1, 3, 5, 4, 2   (B) 5, 1, 3, 2, 4
    (C) 1, 5, 3, 4, 2   (D) 5, 1, 3, 4, 2

18. A volume control block ____.
    (A) can contain information needed by the system to boot an operating system from that partition
    (B) is a directory structure used to organize the files
    (C) contains many of the file's details, including file permissions, ownership, size, and location of the data blocks
    (D) contains information such as the number of blocks in a partition, size of the blocks, and free-block and FCB count and pointers

19. Which of the following is the simplest method for implementing a directory？
    (A) tree data structure   (B) linear list
    (C) hash table   (D) nonlinear list

20. Which of the following allocation methods ensures that only one access is needed to get a disk block using direct access？
    (A) linked allocation   (B) indexed allocation
    (C) hashed allocation   (D) contiguous allocation

II. Distinguish between an absolute path name and a relative path name. (10%)

III. Consider a demand-paging system with the following time-measured utilizations: CPU utilization 20% , Paging disk 97.7%, Other I/O devices 5%.　For each of the following, say whether it will (or is likely to) improve CPU utilization. Explain your answers.

(a) Install a faster CPU. (2%)

(b) Install a bigger paging disk. (2%)

(c) Increase the degree of multiprogramming. (2%)

(d) Decrease the degree of multiprogramming. (2%)

(e) Install more main memory. (2%)

(f) Install a faster hard disk or multiple controllers with multiple hard disks. (2%)

IV. Consider the following segment table:

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses？ (10%)

a. 0, 430　　　b. 1, 10　　c. 3, 400　　d. 2, 500　　e. 5, 0

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V. Consider the following snapshot of a system:

	Allocation	Max	Available
	A B C D	A B C D	A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

(a) What is the content of the matrix *Need*? (3%)

(b) Is the system in a safe state? Why? (3%)

(c) If a request from process P_1 arrives for (0,4,2,0), can the request be granted immediately? Why? (4%)

VI. Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock-free. (10%)

VII. Explain the process of starvation and how aging can be used to prevent it. (10%)

VIII. What is a thread pool and why is it used？ (8%)

IX. Name and describe the different states that a process can exist in at any given time. (10%)