浙江大学 2004 —2005 学年 秋 学期期终考试

《操作系统》课程试卷

考试时间：__120__分钟　开课学院:_____专业:_____

姓名:_____ 学号:_____ 任课教师:_____

题序	一	二	三（1）	三（2）	三（3）	三（4）	总分
评分							
评阅人							

一、Choose True(T) or False(F) for each of following statements and fill the answer in the corresponding blank. **（40 marks）**

1. (　　) 2. (　　) 3. (　　) 4. (　　) 5. (　　)

6. (　　) 7. (　　) 8. (　　) 9. (　　) 10. (　　)

11. (　　) 12. (　　) 13. (　　) 14. (　　) 15. (　　)

16. (　　) 17. (　　) 18. (　　) 19. (　　) 20. (　　)

1. The sequential file is good for sequential storage devices, however not fit for disks.
2. For the same file, different physical organization structures are OK to be defined for different storage media with different file names.
3. Directories are usually kept in memory.
4. If the user intends to operate a file of a file system, sometimes he needs to specify its physical address that the file is located.
5. In the tree-like directory organization, files are accessed by means of paths which consist of directories followed by the file name.
6. When a process is interrupted, the operating system gains the control of CPU and executes an interrupt service program. By completion, the control will be directly returned to the interrupted process resuming its execution at the interrupted point.
7. Most of devices with lower speed are of shared devices.
8. One of the objectives of SSTF (Shortest Seek Time First) is the minimum movement of the disk arm. The algorithm sometimes causes starvation.
9. The cache technology takes a portion of external storage as the cache pool.
10. As to a multiprogramming environment, the more processes in residence, the higher the system performance.
11. In terms of response time, the requirements to time-sharing system are the same as that to real-time system.

12. User-level threads are scheduled by the operating system. However the operating system can not designate an user-level thread to be executed by a specified CPU.
13. Threads that belong to the same process share one set of registers and the same stack.
14. The running process can only be changed into ready state or waiting state.
15. The critical resource must be accessed exclusively. Therefore it is impossible to share the critical resource.
16. A system consists of 4 resources with the same type. Suppose that at most 3 processes simultaneously apply the resource and every process applies at most two, so the system is deadlock free.
17. As to the demand paging memory management, if double the page size, then the page faults will reduce the half.
18. For the virtual memory system, the size of virtual address space is equal to the size of secondary storage plus the size of memory.
19. In the paging system, the addresses of a program that has been loaded into memory are physical addresses.
20. Considering the algorithms of partition allocation, the partition allocated by the First-Fit algorithm has the size closest to that the process requires.

二、Choose the CORRECT and BEST answer for each of following questions and fill the answer in the corresponding blank. (32 marks)

1. ( ) 2. ( ) 3. ( ) 4. ( ) 5. ( ) 6. ( )

7. ( ) 8. ( ) 9. ( ) 10. ( ) 11. ( ) 12. ( )

13. ( ) 14. ( ) 15. ( ) 16. ( )

1. A computer has only one CPU, however with multiprogramming operating system. At a snapshot, it is running in user mode and has 5 user processes loaded. Therefore, at most _____ user processes that are in ready status.

A. 4 B. 0 C. 5 D. 1

2. Here are the description of the Producer and the Consumer in the producer-consumer problem

Producer process:

```
item nextProduced;
while (1) {
    while (counter == BUFFER_SIZE)
        ; /* do nothing */
    buffer[in] = nextProduced;
    in = (in + 1) % BUFFER_SIZE;
    counter++;
}
```

Consumer process:

```
item nextConsumed;
```

```
while (1) {
    while (counter == 0)
        ; /* do nothing */
    nextConsumed = buffer[out];
    out = (out + 1) % BUFFER_SIZE;
    counter--;
}
```

The critical section of the Producer is_____

A. the statement "counter--" B. the statement "counter++"

C. the variable "counter" D. not exist

3. To the deadlock problem, generally we have four levels of solutions, that are deadlock prevention, deadlock avoidance, deadlock detection and deadlock recovery. The banker's algorithm is one of solutions that of ____

A. deadlock prevention B. deadlock detection

C. deadlock avoidance D. deadlock recovery

4. For functionality, it is not necessary in the segmentation system that____

A. the size of logical segment is equal to the physical segment

B. both segment number and the offset are required for address mapping

C. the logical address space is independent of the physical address space

D. there must have TLB(Translation Lookaside Buffer)

5. The memory management method that has better solution to the fragmentation is_____

A. paging B. segmentation

C. fixed-sized partition D. variable sized partition

6. There is a file with 100 data blocks. Suppose that the file control block, and the index block if necessary, stays in memory. For the operation inserting after the 45th block, _____takes the longest.

A. contiguous allocation B. linked allocation

C. single level index allocation D. multi-level index allocation

7. The cache technology _____

A. is to solve the speed mismatch between CPU and I/O devices, but is not dedicated for that

B. is dedicated to solve the speed mismatch between CPU and I/O devices

C. employs a portion of memory to served as buffering area

D. defines buffer pool consists of buffer units, each unit consists of a header and a body

8. Within the following functional components of an operating system, _____does not require hardware support.

A. timer service B. process scheduling

C. address mapping D. interrupt service

9. Suppose there is a segmentation memory management system with logical addresses in 24 bits, 8 bits of them devote to the segment number. Then, the maximum size of a segment is _____

A. 2^{24} B. 2^{8} C. 2^{16} D. 2^{32}

10. It is realized that, in a paging system, the program has contiguous logical address space, which in turn mapped into frame based physical address space. The operation cutting the logical address space into pages is done by_____

A. programmer B. compiler C. user D. MMU

11.The file system is _____

A. a set of file B. consolidation of files, software and data structure managing files

C. software managing files D. directories of files

12. File access is protected by _____

A. both user access rights and user priority B. both user access rights and file attributes

C. both user priority and file attributes D. both file attributes and user password

13. If you finish using a file, you should_____ it.

A. close B. discard C. un-mount D. backup

14. The algorithm that schedules the disk arm is _____

A. Round robin B. Shortest Seek Time First

C. LRU D. High priority first

15. The CPU gets rid of involving in the data exchange between the I/O device and the storage device by means of _____

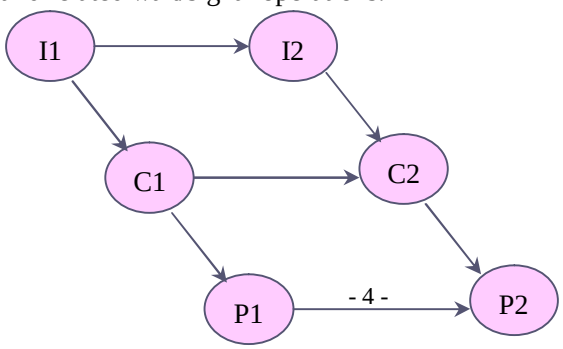
A. polling B. interrupt C. DMA D. unconditional access methods

16. Disk access time does not include _____

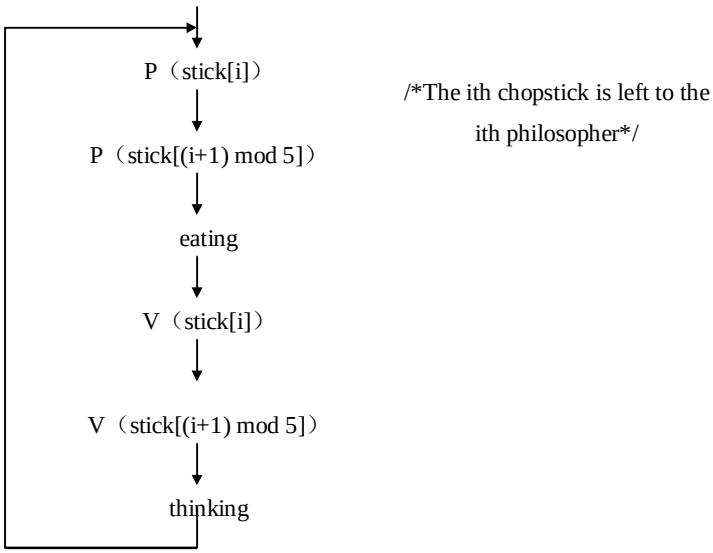
A. seek time B. rotational latency C. read/write time D. CPU scheduling time

三、Please answer the following subsections（28 marks， 7 marks for each subsection）

1. Two concurrent processes have input, computing and printing actions, respectively. That is said I1, C1, P1 for the 1st process, and I2, C2, P2 for the 2nd process. Their precedential relationship is shown in the figure, i.e. I2 must happen after I1, C2 must happen after C1 and I2, etc. Please describe the synchronization relationship of two processes by means of semaphores and related wait/signal operations.



2. The figure shows a solution to the dining-philosophers problem. Is it deadlock free? Please present your solution implemented by semaphores that is deadlock free.



Figure, Activities of the ith philosopher

3. Could you define a single level directory structure without limiting the length of file names. The structure should have one to one corresponding to a tree-like directory structure. If can, please give a brief description. If not, please give the reasons.

4. A process is allocated 3 frames by the demand paging system. The process accesses the following pages in sequence: 1, 4, 3, 1, 2, 5, 1, 4, 2, 1, 4, 5. Initially, suppose the 3 frames are empty. What are the page fault rates if the page replacement algorithms FIFO and LRU are used, respectively.