

國立交通大學九十學年度碩士班入學考試試題

科目名稱：系統程式(076)

考試日期：90年4月22日 第1節

系所班別：資訊科學系

第1頁, 共7頁

*作答前, 請先核對試題、答案卷(試卷)與准考證上之所組別與考試科目是否相符!!

共有 25 題, 全部為單選, 每題 4 分, 答錯每題倒扣 1 分

1. To increase program portability, the POSIX standard is defined for OS providers and application programmers to follow. Which of the following things is not defined in POSIX?
 - a. system calls
 - b. library functions
 - c. console commands
 - d. device drivers
 - e. all of the above are included
2. Two processes on the same machine can communicate through message passing or shared memory services provided by the operating system. The numbers of data copying required through message passing and shared memory for process A to write a message to process B are X and Y, respectively. What is (X, Y)?
 - a. (1, 1)
 - b. (1, 2)
 - c. (2, 1)
 - d. (2, 2)
 - e. none of the above
3. Some classes of CPU scheduling algorithms are subsets of the others if they are properly parameterized. What relationship of the following is incorrect? (SJF: shortest job first, FCFS: first come first serve, RR: round robin, MFQ: multilevel feedback queues)
 - a. $SJF \subset \text{priority}$
 - b. $FCFS \subset \text{priority}$
 - c. $FCFS \subset RR$
 - d. $RR \subset MFQ$
 - e. $SJF \subset RR$
4. If we want to give I/O-bound and interactive processes higher priority for CPU access, what scheduling scheme should we use?
 - a. priority scheduling
 - b. multilevel queue scheduling with each queue running RR and priority scheduling between queues

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- c. multilevel queue scheduling with each queue running FCFS and priority scheduling between queues
 - d. multilevel feedback queue scheduling with each queue running RR and priority scheduling between queues
 - e. multilevel feedback queue scheduling with each queue running FCFS and priority scheduling between queues
5. A computer has 11 tape drives, with n processes competing for them. Each process may need at most 3 drives at the same time. What is the maximum value of n that keeps the system deadlock free?
- a. 3
 - b. 4
 - c. 5
 - d. 6
 - e. 7
6. The Banker's algorithm is used for deadlock-avoidance. For a system with n processes and m types of resources, what is the order of complexity of this algorithm?
- a. m
 - b. n
 - c. $m \times n$
 - d. $m^2 \times n$
 - e. $m \times n^2$
7. In a paging system with R bit and M bit to record the page access, R bit is set by X and cleared by Y. What is (X, Y)?
- a. (OS, OS)
 - b. (OS, MMU)
 - c. (MMU, OS)
 - d. (MMU, MMU)
 - e. none of the above.
8. A computer has four page frames. The time of loading, time of last access, and the R and M bits for each page are as shown below (the times are in clock ticks):

Page	Loaded	Last reference	R	M
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0	126	279	0	0
1	230	260	1	0
2	120	272	1	1
3	160	280	1	1

What page will LRU replace?

- a. 0
- b. 1
- c. 2
- d. 3
- e. none

9. Consider a pure 2-level paging system where virtual addresses are 32-bit and pages are 4K-byte. The 20-bit virtual page number is divided into two parts, each with 10-bit as an index to the top-level and second-level page tables. Suppose that each page table entry is 4-byte. What is the *minimum* page table size for a process with size 2M-byte?

- a. below 10K
- b. between 10K and 50K
- c. between 50K and 100K
- d. between 100K. and 150K
- e. above 150K

10. A clock driver simulates multiple virtual clocks with a single physical clock by maintaining a chained linked list of all pending clock requests, along with two clock tick counters: Current Time and Next Signal. Each entry on the list tells how many clock ticks following the previous one to wait before causing a signal. On each clock tick, Current Time is incremented while Next Signal is decremented. Suppose now Current Time is 4200 and Next Signal is 2. The entries in the linked list are: 3, 4, 6, 2, 1. If the last signal in the current list happens at time X, what is $X \bmod 5$?

- a. 0
- b. 1
- c. 2
- d. 3
- e. 4

11. Among the following things, what does a device driver associated with a hard disk need

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to know?

- (1) the buffer size of disk controller
 - (2) how many sectors per track
 - (3) the location (cylinder, track, sector) of the desired block
 - (4) the current position of the disk head
 - (5) (major device number, minor device number) of the hard disk
- a. all of them
 - b. 1, 2, 3, 4
 - c. 2, 3, 4, 5
 - d. 2, 3, 4.
 - e. 1, 3, 4, 5

12. Disk requests come in to the disk driver for cylinders 10, 22, 20, 2, 40, 6, and 38, in that order. A seek takes 6 msec per cylinder moved. The arm is initially at cylinder 20 moving upwards. The seek time needed if Elevator algorithm is used is X ms. What is X mod 5?

- a. 0
- b. 1
- c. 2
- d. 3
- e. 4

13. Consider the following operations when an interrupt occurs: (Note that the entity which performs the operation is omitted intentionally.)

- (1) registers saved and new stack set up
- (2) service process marked as ready
- (3) service process executed
- (4) program counter saved
- (5) new program counter loaded from interrupt vector

Which sequence of operations is correct?

- a. 4 1 5 3
- b. 4 1 5 2 3
- c. 1 4 5 2
- d. 4 5 1 2.
- e. 1 4 5 3

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14. Which of the following instructions should not be privileged?
- a. Set value of timer
 - b. Read the clock
 - c. Clear memory
 - d. Turn off interrupts
 - e. Switch from user to monitor mode
15. The following is a list of instructions that are normally protected. What is the minimal set of instructions that must be protected?
- A. Change to user mode
 - B. Change to monitor mode
 - C. Read from monitor memory
 - D. Write into monitor memory
 - E. Fetch an instruction from monitor memory
 - F. Turn on timer interrupt
 - G. Turn off timer interrupt
- a. ABDEFG
 - b. ADEFG
 - c. BDEFG
 - d. ADEG
 - e. BDEG
16. Which of the following information is normally not included in the Process Control Block (PCB)?
- a. Process Number
 - b. CPU registers
 - c. I/O device queues
 - d. CPU-scheduling information
 - e. Memory-management information
17. Consider a computer system where mailboxes with blocking and nonblocking primitives are used as the inter-process communication scheme. What sequence of send and receive should a process P execute if P wants to wait for one message from mailbox A or mailbox B?
- a. Blocking receive(A), blocking receive(B)

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- b. Blocking receive(A), nonblocking receive(B)
 - c. Nonblocking receive(A), if null then blocking receive(B)
 - d. Nonblocking receive(A), if null then Nonblocking receive(B)
 - e. None of above
18. Consider a byte oriented logical address space of eight pages of 1024 bytes each, mapped onto a physical memory of 32 frames. How many bits are there in the logical address?
- a. 10
 - b. 11
 - c. 12
 - d. 13
 - e. 14
19. Continued from problem 18. How many bits are there in the physical address?
- a. 12
 - b. 13
 - c. 14
 - d. 15
 - e. 16
20. Consider a paging system with the page table stored in memory. If a memory reference takes 200 ns, how long does a paged memory reference take?
- a. 200ns
 - b. 300ns
 - c. 400ns
 - d. 500ns
 - e. 600ns
21. Continued from problem 20. If associative registers are used, and 75% of all page-table references are found in the associative registers, what is the effective memory reference time? (Assume that finding a page-table entry in the associative registers takes 40 ns, if the entry is there)
- a. 270ns
 - b. 280ns
 - c. 290ns

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- d. 300ns
 - e. 310ns
22. Given memory holes of 100K, 500K, 200K, 300K, and 600K (in order), which of the first-fit, best-fit, and worst-fit algorithms makes the most efficient use of memory by placing processes of 212K, 417K, 112K, and 426K (in order)?
- a. First-fit
 - b. Best-fit
 - c. Worst-fit
 - d. First-fit and best-fit
 - e. First-fit and Worst-fit
23. Consider a Unix file currently consisting of 100 blocks. Assume that the inode is already in memory and each block contains 256 disk addresses. How many disk I/O operations are required for appending a new block into the file? (Assume that the information of added block and the free-space list are in memory)
- a. 2
 - b. 3
 - c. 4
 - d. 5
 - e. 6
24. Continued from problem 23. If the file currently consisting of 1000 blocks, how many disk I/Os are required?
- a. 2
 - b. 3
 - c. 4
 - d. 5
 - e. 6
25. Continued from problem 23. If the file system is using linked allocation with FAT(file allocation table) where the file control block and the FAT are in memory, how many disk I/Os are required?
- a. 1
 - b. 2
 - c. 3
 - d. 4
 - e. 5