

一、单项选择题（本大题共 11 小题，每小题 2 分，共 22 分）

提示：在每小题列出的四个备选项中只有一个是符合题目要求的，请将其代码填写在下表中。错选、多选或未选均无分。

1. About operating system, which one of the following is not true:
 - (A) An operating system controls the execution of applications and acts as an interface between applications and the computer hardware.
 - (B) The operating system maintains information that can be used for billing purposes on multi-user systems.
 - (C) The operating system typically runs in parallel with application programs, on its own special O/S processor.
 - (D) One of the driving forces in operating system evolution is advancement in the underlying hardware technology.
2. Operating system provides many types of services to end-users, programmers and system designers, including:
 - (A) Built-in user applications
 - (B) Error detection and response
 - (C) Relational database capabilities with the internal file system
 - (D) None of the above
3. The one that is not the typical reason for process termination is:
 - (A) Time limit exceeded
 - (B) Operator or OS intervention
 - (C) Page fault
 - (D) Memory unavailable
4. Which of the following is true regarding multithreading:
 - (A) Multithreading refers to the ability of an OS to support multiple, concurrent paths of execution within a single process
 - (B) In a multithreaded environment, a process is defined as the unit of resource allocation and a unit of protection.
 - (C) The concept of thread synchronization is required in multithreaded systems because threads of a single process share the process's process control block (PCB).
 - (D) None of the above
5. A data type that is used to block a process or thread until a particular condition is true is:
 - (A) Semaphore
 - (B) Event Flag
 - (C) Spinlock
 - (D) Condition Variable
6. In the Resource Allocation Denial approach to Deadlock Avoidance, a safe state is defined as one in which:

- (A) No circular wait exists
 - (B) All potential process sequences do not result in a deadlock
 - (C) Several potential process sequences do not result in a deadlock
 - (D) None of the above
7. The practice in which a program and data are organized in such a way that various modules can be assigned the same region of memory is called:
- (A) Overlaying
 - (B) Sharing
 - (C) Segmentation
 - (D) partitioning
8. Which one of the following is true regarding virtual memory
- (A) The condition known as thrashing occurs when the majority of the processes in main memory require repetitive blocking on a single shared I/O device in the system.
 - (B) The modify (M) bit is a control bit in a page table entry that indicates whether the contents of the corresponding page have been altered since the page was last loaded into memory.
 - (C) A Page Fault occurs when the desired page table entry is not found in the Translation Lookaside Buffer (TLB).
 - (D) In a combined paging/segmentation system, a user's address space is broken up into a number of fixed-size pages, which in turn are broken up into a number of segments.
9. A typical way to overcome starvation of lower-priority processes in a priority-based scheduling system is to:
- (A) Change a process priority randomly
 - (B) Change a process priority with its age
 - (C) Use a preemptive scheduling policy
 - (D) All of the above
10. The I/O technique where interrupt mechanism is not employed is:
- (A) Programmed I/O
 - (B) Interrupt-driven I/O
 - (C) Direct memory access (DMA)
 - (D) None of the above
11. Any file in the system can be located by following a path from the root or master directory down various branches until the file is reached. The series of directory names, culminating in the file name itself, constitutes a:
- (A) Working directory
 - (B) Current directory
 - (C) Parent directory
 - (D) Pathname

二、名词解释题（本大题共 5 小题，每小题 3 分，共 15 分）。

提示：解释每小题所给名词的含义，若解释正确则给分，若解释错误则无分，若解释不准确或不全面，则酌情扣分。

1. Predictability
2. Compaction
3. Consumable resource
4. Strong semaphore
5. Process image

三、简答题（本大题共 5 小题，每小题 5 分，共 25 分）。

1. Describe the similarities and differences between Simple Paging and Virtual Memory Paging.
2. Draw a figure to show address translation in a Combined Paging/Segmentation System. Then briefly describe the process of address translation in a Combined Paging/Segmentation System.
3. List advantages of ULTs over KLTs and disadvantages of ULTs compared to KLTs.
4. Describe the process of a DMA operation.
5. What is user mode? What is system mode? What is the reason for using the two modes?

四、问答题（本大题共 3 小题，共 38 分）。

1. For the following sequence of disk track requests: 70, 93, 930, 60, 990, 420, 900, 20, 300. Assume that a disk with 1000 tracks (0~999), the disk head is initially positioned over track 80 and is moving in the direction of decreasing track number. Compute the averages seek length and detail step of each. (12 分)

FIFO		C_SCAN		SCAN		SSTF	
Next track	Number of tracks	Next track	Number of tracks	Next track	Number of tracks	Next track	Number of tracks
Average seek length:		Average seek length:		Average seek length:		Average seek length:	

2. Suppose that the following processes arrive for execution at the times indicated, each process will run the listed amount of time. (13 分)

Process	Arrival Time	Service Time
P1	0	5
P2	3	6
P3	5	7
P4	8	4

- (A) Draw Gantt charts that illustrate the execution of these processes using first-come-first served (FCFS), shortest process next (SPN), Shortest remaining time (SRT).

(B) Calculate Turnaround time (T_r) and T_r/T_s of each process for each of the scheduling algorithm.

3. There is a bridge on the river, we assumed that:

(1) Only one person is allowed to pass the bridge at a time

(2) If someone has been walking on the bridge, for example from A to B, other persons followed him on the same direction can get through the bridge one by one, meanwhile the persons on the B side must wait until all the persons on the A side have passed the bridge, and vice versa.

Please fill in the following blanks to complete the program managing the bridge and persons using semaphore.

Semaphore s0 = _____;(1) Semaphore s1 = _____;(2) Semaphore s2 = _____;(3) Semaphore s3 = _____;(4) Int c1 = _____;(5) Int c2 = _____;(6)	
Persons from A to B	Persons from B to A
<pre> void atob(void) { while(TRUE) { semWait (s0); c1 ++; if (c1 == _____) (7) semWait(s1); semSignal(s0); semWait(s2); Passes the bridge from A to B semSignal(s2); semWait(s0); c1 --; if (c1 == _____) (8) semSignal(_____); (9) semSignal (s0) } } </pre>	<pre> void btoa(void) { while(TRUE) { semWait (s3); c2 ++; if (c2 == _____) (10) semWait(_____); (11) semSignal(s3); semWait(s2); Passes the bridge from B to A semSignal(s2); semWait(s3); c2 --; if (c2 == _____) (12) semSignal(_____); (13) semSignal (s3) } } </pre>
Main	
<pre> void main() { parbegin(atob, btoa); } </pre>	