

國立勤益科技大學 102 學年度研究所碩士班招生筆試試題卷

所別：資訊工程系碩士班

組別：

科目：作業系統

准考證號碼：□□□□□□□□ (考生自填)

考生注意事項：

- 一、考試時間 80 分鐘，滿分為 200 分。
- 二、本考科不可使用電子計算機。
- 三、本試題紙空白處或背面，可做草稿使用

一、選擇題(單選題，每題 4 分)〈80 分〉

1. 下列四個說明敘述，請問那些敘述是錯誤的？
 - (1) 一個分時系統 (Time sharing system) 一定是一個多元程式 (Multiprogramming) 規劃的系統
 - (2) 一個多元程式規劃的系統一定是一個分時系統
 - (3) 一個多元程式規劃的系統一定是一個多重處理 (Multiprocessing) 的系統
 - (4) 一個多元程式規劃的系統一定是一個多使用者 (Multiuser) 系統。(A) (1) (2) (3) (B) (2) (3) (4) (C) (1) (3) (4) (D) (1) (2) (3) (4)。
2. 下列敘述何者為錯誤？
 - (A) 雙模式運作 (Dual Mode Operation) 為使用者模式 (User mode) 和監督模式 (Supervisor mode)
 - (B) 監督模式又稱系統模式或特權模式
 - (C) 在系統啟動時硬體必須由使用者模式開始
 - (D) 硬體設定只允許特權指令在監督模式時執行。
3. 下列何者不是一個在設計容錯系統 (Fault tolerance system) 上必要的結構方法？
 - (A) 採用管線式處理 (Pipeline processing system)
 - (B) 將程式在不同的 Memory modules 各放一份
 - (C) 使用多處理系統 (Multiprocessing system)
 - (D) 處理機 (Processor) 可以偵測硬體上的錯誤並予以記錄。
4. 在作業系統的概念中，下列何者與「讓多個程式可同時在主記憶體中執行」無關？
 - (A) 虛擬記憶體 (Virtual Memory)
 - (B) 批次處理 (Batch Processing)
 - (C) CPU 排程 (CPU Scheduling)
 - (D) 多元程式 (Multi-programming)。

5. 下列有關作業系統之死結(Deadlock)的敘述何者為不正確?
- (A)所謂Deadlock就是行程(Process)執行時，對資源的取得互不相讓而作業系統亦無法決斷，造成的結果
- (B)一旦發生Deadlock系統一定有所損失
- (C)所謂Critical region就是行程執行時，可能造成危機的區域，一進入此區域就必須將此區域鎖定不得讓其它行程進入，也就是此一區域為獨佔區
- (D)所謂Critical region就是行程執行時，可能造成Deadlock的區域，一旦進入此一區域就必須一氣喝成將事情做完，不可以被中斷(Interrupt)。
6. 在啟動一個可執行檔後，會產生一個新的程序(process)。下列何者最不可能為程序控制區塊(Process Control Block; PCB)儲存的內容?
- (A)程序的狀態(status) (B)程式計數器(program counter)
- (C)暫存器(register) 的內容 (D)可執行檔儲存在硬碟的位置。
7. 下列何者為即時處理系統(Real-time processing system)經常採用的排班演算法(Scheduling algorithm)?
- (1) Deadline scheduling (2) Multi-level feedback queue
- (3) Shortest-Job First (4) Preemptive priority
- (5) Multi-level queue (6) Round-Robin
- (A) (1), (3), (5) (B) (1), (4) (C) (2), (3), (4), (6) (D) (3), (5), (6)。
8. 下列有關線程(Thread)與行程(Process)的敘述，那一些為正確?
- (1) 行程有Stack、Program counter(PC)，而線程沒有獨立的Stack與PC
- (2) 線程的工作環境交換(Context-switching)負擔較行程為輕
- (3) 線程支援平行化(Parallelism)程序較行程為佳
- (4) 同一工作(Task)內的線程可共享程式區與資料區。
- (A) (1), (2), (3) (B) (1), (3), (4) (C) (2), (3), (4) (D) (1), (2), (3), (4)。
9. 分散式系統(Distributed system)中如果以多處理器系統當成伺服器，則該伺服器中處理器之間的通信方式通常是採取：
- (A)信息傳遞(Message passing) (B)群組通信(Group Communication)
- (C)共享記憶體(Share memory) (D)TCP/IP通訊協定。
10. When talking about an operating system, the "kernel" is :
- (A) the part which deals with the user interface
- (B) the central part, which offers the basic functionality of the operating system
- (C) the part which deals with peripheral devices
- (D) the central processing unit of the computer.

11. Which technique was introduced because a single job could not keep both the CPU and the I/O devices busy?
- (A) Multiprogramming (B) Spooling
(C) Preemptive scheduling (D) Time-sharing.
12. In the readers-writers problem, processes p and q are allowed to simultaneously access the shared resource if and only if :
- (A) p and q are both reading. (B) p and q are both writing.
(C) Either p or q or both is reading. (D) Either p or q or both is writing.
13. Switching the CPU from one process to another requires saving the state of the old process and loading the saved state for the new process. This operation is known as :
- (A) Dispatching (B) context switching
(C) swapping (D) deadlock avoidance.
14. Suppose we are building and supporting a real-time operating system for embedded system. Which of the following is *not* considered essential in our design?
- (A) To choose hard real-time and soft real-time scheduling policies for applications.
(B) To develop real-time O.S. Kernels.
(C) To estimate the overall system throughput to see if it matches the system requirements.
(D) To implement a parallel file system for applications.
15. There are generally three methods used to pass parameters to the operating system through system call, which of the following methods is not correct ?
- (A) the simplest approach is to pass the parameters in register
(B) In some case, the parameters are stored in a block or table in memory, and the address of the block is passed as a parameter in a register
(C) Parameters can be pushed onto or popped off the stack by the operating system
(D) Parameters can be passed by messaging passing in a modern operating system.

16. Which of the following statement is true ?
- (A) Multi-threading causes higher CPU utilization.
 - (B) A non-preemptive process cannot be interrupted.
 - (C) Higher context switch frequency causes higher system performance.
 - (D) A long term scheduler should choose a mix of CPU-bound and I/O bound processes.
17. Suppose that the operating system is running a non-preemptive scheduler and that process p is currently running. A context switch can occur :
- (A) When p terminates or blocks
 - (B) When another process unblocks
 - (C) When the time quantum is exhausted
 - (D) When the priority of some other process exceeds the priority of p .
18. In each of the following, you will be given a hypothetical sequence of states that a process enters during its lifetime. Which one is possible in a system with preemptive scheduling but not possible with non-preemptive scheduling?
- (A) New \rightarrow Ready \rightarrow Running \rightarrow Waiting \rightarrow Ready \rightarrow Running \rightarrow Terminated
 - (B) New \rightarrow Ready \rightarrow Running \rightarrow Terminated
 - (C) New \rightarrow Ready \rightarrow Running \rightarrow Ready \rightarrow Running \rightarrow Terminated
 - (D) New \rightarrow Ready \rightarrow Running \rightarrow Waiting \rightarrow Running \rightarrow Terminated.
19. Which of the following statements on threading issues is NOT true?
- (A) `fork()` with the inherited address space duplicates only the calling thread of the process
 - (B) Assigning a specific thread to receive all signals for the process is one of the options for signal handling
 - (C) Asynchronous cancellation terminates the target thread immediately
 - (D) By thread pools serving a request with an existing thread is usually slightly faster than creating a new thread.
20. The producer-consumer problem refers to:
- (A) Mutual-exclusion when n jobs sharing a resource
 - (B) Multiple clients and servers accomplishing a computation
 - (C) The need for synchronization in systems where many processes share a resource
 - (D) None of the above

二、問答題

1. Explain *interrupts* and *traps*, and provide a detailed account of the procedure that an operating system handles an interrupt. 〈10分〉
2. What are **preemptive** and **non-preemptive** scheduling policies? Elaborate your answer. 〈10分〉
3. Define **external and internal fragments**. Which memory management scheme does not have external fragment? Why? 〈10分〉
4. According to the hard disk structure, define the **Seek Time**, **Rotational Latency**, **Access Time** and **Service Time**? 〈10分〉
5. In OS systems : 〈10分〉
 - (a) what is *context switching*? Provide a detailed description of all activities of a context switch.
 - (b) Context switching is slow. Can you explain what techniques are used by modern OS systems to **avoid or speed-up** context switching ?
6. 在一部電腦上，同時有三個Processes A, B, C正在執行(如下列所示)：

Process A	Process B	Process C
{	{	{
S1;	S3;	S6;
S2;	S4;	S7;
}	S5;	}
	}	

請說明如何利用Synchronization機制以確保 S1 的執行是在 S4 之後，而 S1 的執行是在 S7 之前。(假設有兩個同步控制變數：sem1 and sem2 其初始值均設為0) 〈10分〉
7. Operating systems frequently exploit **locality** to improve performance. Briefly describe **two** examples where operating systems do so, and state how locality is exploited. 〈10分〉
8. Define the meaning of *race condition*? 〈10分〉

9. Five processes A, B, C, D and E arrive in this order at the same time with the following CPU burst and priority values. A smaller value means a higher priority.

	CPU Burst	Priority
A	7	3
B	2	5
C	3	1
D	6	4
E	4	2

Fill the entries of the following table with waiting time and average waiting time for each indicated scheduling policy and each process. Ignore context switching overhead. (20分)

Scheduling Policy	Waiting Time					Average Waiting Time
	A	B	C	D	E	
First-Come First Served						
Non-Preemptive Shortest-Job-First						
Priority						
Round-Robin (Time quantum=2)						

10. Given memory holes (i.e., unused memory blocks) of **100K**, **500K**, **200K**, **300K** and **600K** (in address order) as shown below, how would each of the **first-fit**, **next-fit**, **best-fit** and **worst-fit** algorithms allocate memory requests of 290K, 420K, 110K and 350K (in this order)? The shaded areas are used/allocated regions that are not available. Write your answer into the following figures. Use shaded areas to indicate unused memory blocks. You should write down the size of each allocated and unused memory block. (20分)

