

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

「作業系統」

共五題，請在答案卷畫一個表格(如下所示)，並在每個空格內清楚地填入五個題目的答案(共 17 格需要填)，以利評分。謝謝!

題目							
一	[1]	[2]	[3]				
二	[4]	[5]	[6]	[7]			
三	[8]	[9]	[10]	[11]	[12]	[13]	
四	[14]				[15]		
五	[16]				[17]		

- 一. A solution to the critical-section problem must satisfy three requirements. Write down three requirements in English. (此題以英文作答，分別填入第一題的[1], [2], [3]格中, 9%)
- 二. Suppose that the head of a moving-head disk with 150 tracks, numbered 0 to 149, is currently serving a request at track 120 and has just finished a request at track 115. The queue of requests is kept in the FIFO order:
89, 110, 20, 45, 139
Write down the total number of head movements for (4) FCFS (5) SCAN (6) LOOK (7) SSTF scheduling, respectively. (答案需分別填入第二題的[4], [5], [6], [7]格中, 12%)

(背面仍有題目,請繼續作答)

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

- 三. There are four processes that arrived at a computer at different time. The arrival time, burst time, and the priority of each process is as the following table: (the time unit is millisecond and a lower priority number means higher priority) (18%)

Process	Arrival time	Burst time	Priority
A	2	6	4
B	0	9	3
C	3	10	2
D	5	5	1

Determine the average turnaround time of **process B** for (8) Preemptive priority scheduling (9) Preemptive shortest-job-first scheduling (10) Nonpreemptive priority scheduling (答案分別填入第三題[8], [9], [10]格中)。 Determine the average turnaround time of **process C** for (11) First-come, first-served scheduling (12) Preemptive priority scheduling (13) Nonpreemptive priority scheduling (答案分別填入第三題[11], [12], [13]格中)
(Ignore process switching overhead and assume that only a process runs at a time)

- 四. (a) The objective of multiprogramming is to maximize _____. (此題以英文作答，答案填入第四題的[14]格中, 3%)
(b) Switching the CPU to another process requires performing a state save of the current process and a state restore of a different process. This task is known as a _____. (此題以英文作答，答案填入第四題的[15]格中, 3%)
- 五. (a) In paging scheme, the access of page table causes the decrease in system performance. A standard solution is to use a special, small, fast-lookup hardware cache, called a _____. (此題以英文作答，答案填入第五題的[16]格中, 3%)
(b) In a multiprocessor system, if all processors are peers (no master-slave relationship exists between processors), we call it _____ multiprocessing. (此題以英文作答，答案填入第五題的[17]格中, 2%)

本試題是否可以使用計算機： 可使用， 不可使用（請命題老師勾選）

「計算機組織」

共四題，請在答案卷畫一表格如下，並清楚地填入這四個題目的答案（共需填入 5 格）。

題號	答案	
六	子題(1)：	子題(2)：
七		
八		
九		

六. Consider a MIPS processor with an additional floating point unit. Assume functional unit delays in the processor are as follows: memory (2 ns), ALU and adders (2 ns), FPU add (8 ns), FPU multiply (16 ns), register file access (1 ns), and the remaining units (0 ns). Also assume instruction mix as follows: loads (31%), stores (21%), R-format instructions (27%), branches (5%), jumps (2%), FP adds and subtracts (7%), and FP multiplies and divides (7%).

- (1) What is the delay in nanosecond to execute a load, store, R-format, branch, jump, FP add/subtract, and FP multiply/divide instruction in a single-cycle MIPS design? **[10%]**
- (2) What is the averaged delay in nanosecond to execute a load, store, R-format, branch, jump, FP add/subtract, and FP multiply/divide instruction in a multicycle MIPS design? **[10%]**

七. Consider a cache with 4 memory blocks. Assume that the cache contains no memory block initially. How many cache misses will be introduced by the *directed mapped, 2-way set associative* and *fully associative* caches if the memory blocks with addresses 0, 8, 0, 6 and 8 are fetched sequentially? **[10%]**

八. Which of the following techniques can resolve *control hazards*? **[10%]**

- (1) Branch prediction
- (2) Stall
- (3) Delayed branch

九. Write a C program which exhibits the *temporal* and *spatial localities*. The C program cannot exceed 5 lines. **[10%]**