

系所組別： 工程科學系乙組

考試科目： 系統程式

考試日期： 0225，節次： 1

1. For what types of operations is DMA useful? Explain your answer. (10%)
2. Why is a just-in-time compiler useful for executing Java programs? (10%)
3. Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use nonpreemptive scheduling and base all decisions on the information you have at the time the decision must be made.

<u>Process</u>	<u>Arrival Time</u>	<u>Burst Time</u>
P1	0.0	8
P2	0.4	4
P3	1.0	1

- (a) What is the average turnaround time for these processes with the FCFS scheduling algorithm? (8%)
- (b) What is the average turnaround time for these processes with the SJF scheduling algorithm? (8%)
- (c) The SJF algorithm is supposed to improve performance, but notice that we chose to run process P1 at time 0 because we did not know that two shorter processes would arrive soon. Compute what the average turnaround time will be if the CPU is left idle for the first 1 unit and then SJF scheduling is used. Remember that processes P1 and P2 are waiting during this idle time, so their waiting time may increase. This algorithm could be known as future-knowledge scheduling. (10%)

(背面仍有題目,請繼續作答)

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4. It can be useful to pose a deadlock problem in human terms and ask why human systems never deadlock.
 - (a) Briefly explain the meaning of "deadlock" and "starvation" in a computer system. (10%)
 - (b) List two examples of deadlocks that are not related to a computer-system environment. (10%)

5. Consider a paging system with the page table stored in memory.
 - (a) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take? (6%)
 - (b) If we add associative registers, and 75 percent 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 zero time, if the entry is there.) (8%)

6. Assume we have a demand-paged memory. The page table is held in registers. It takes 8 milliseconds to service a page fault if an empty page is available or the replaced page is not modified, and 20 milliseconds if the replaced page is modified. Memory access time is 100 nanoseconds.

Assume that the page to be replaced is modified 70 percent of the time. What is the maximum acceptable page-fault rate for an effective access time of no more than 200 nanoseconds? (20%)