

招生學年度	102	招生類別	碩士班
系所班別	資訊工程學系碩士班(甲組)		
科目	作業系統與計算機組織		
注意事項	本考科禁止使用掌上型計算機		

1. [10%] Consider a demand-paging system with a paging disk that has an average access and transfer time of 20 milliseconds. Addresses are translated through a page table in main memory, with an access time of 1 microsecond per memory access. Thus, each memory reference through the page table takes two accesses. To improve this time, we have added an associative memory that reduces access time to one memory reference, if the page-table entry is in the associative memory.  
 Assume that 80 percent of the accesses are in the associative memory and that, of those remaining, 10 percent (or 2 percent of the total) cause page faults. What is the effective memory access time?
2. [15%] Explain the differences in the degree to which the following scheduling algorithms discriminate in favor of short processes: (a) FCFS; (b) RR; (c) Multilevel feedback queues.
3. [10%] Please explain briefly what deadlock prevention is.
4. [10%] 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?  
 (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.)
5. [5%] Which of the following components of program state are shared across threads in a multithreaded process? (a) register values; (b) heap memory; (c) global variables; (d) stack memory.
6. [14%] Suppose a program runs on a machine, with multiply operations responsible for 50% of the execution time, and memory access operations responsible for 30% of the execution time. If you want your program to run two times faster and you can improve the memory access operations to run three times faster, how much do you have to improve the speed of multiplication?
7. [20%] Show the IEEE 754 binary representation of the decimal number -33.8 in (a) single precision. (b) double precision.
8. [16%] Consider a loop branch that branches eight times in a row, then is not taken twice. What is the prediction accuracy assuming (a) 1-bit prediction scheme. (b) 2-bit prediction scheme.