1. Write down the four necessary conditions for the deadlock and explain if we can prevent the occurrence for each condition. (10%)

2. For memory management, explain in which condition the internal and external fragmentations occur? (10%)

3. For memory allocation algorithm, the "best fit" is always better than "worst fit", Yes or No ? Explain it. (10%)

4. Consider a paging system with the page table stored in memory. (10%)
   (a) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?
   (b) If we add associate register, and 75% of all page-table reference are found in the associative registers (search time: 20 nanoseconds), what is the effective memory reference time ?

5. Consider a demand-paging system with the following time-measured utilizations (利用率) (10%):

CPU utilization	20%
Paging disk	97.7%
Other I/O devices	5%

   Which (if any) of the following will (probably) improve CPU utilization? Explain it shortly.
   (a) Install a slower CPU.
   (b) Install a smaller paging disk.
   (c) Decrease the degree of multiprogramming.
   (d) Install more memory.
   (e) Decrease the paging size
   (f) Add prepaging to the page fetch algorithms.

6. How many page faults occur for LRU and optimal algorithms for the following reference string, with four page frames? (10%)
   1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2

(背面仍有題目,請繼續作答)

7.

(a) Give an example for *trap, hardware interrupt,* and *software interrupt* respectively. (5%)

(b) What kind of the information is needed for a disk controller to finish DMA (Direct Memory Access) operation. (5%)

8. Which of the following statements are wrong with respective to the comparison between a compilation and an interpretation? (10%)

(a) The space required by the application program is smaller for compilation.

(b) Compilation may provide more sophistic language control structure then interpretation does.

(c) The syntax error recovery handling is necessary for compiler but is not for interpreter.

(d) Interpreter requires less-basic hardware then compiler does.

9. In basic compiler functions, there are two parsing schemes for syntactic analysis: operator-precedence and recursive-descent parsings. Please identify which one is top-down and which one is bottom-up technique, and explain it briefly. (10%)

10. Why the assembler is usually implemented by two pass assembler?
State and explain briefly 2 different techniques how to be implemented by 1-pass assembler. (10%)