一、 In constructing a complex operating system, layered approach is now a popular way of interconnecting system components. Please answer the following related questions as detailed as possible: (total 15%)

1. What is an operating-system layer? (5%)

2. Briefly describe the advantages of using this layered approach? (5%)

3. How do you implement each layer to achieve the advantages you answered in 2.? (5 %)

二、 Please answer the following *process* related questions: (total 17%)

1. What is a ***lightweight*** process, and what are its basic components? (5 %)

2. (a). Describe the ***non-preemptive*** and the ***preemptive*** CPU scheduling schemes for processes in the ready queue? (3 %)

   (b). Suggest a method that will prevent a process from being preempted when it is executing a system call, and is in the middle of changing important kernel data (for example, I/O queues). (2 %)

3. (a). What is a ***critical section*** of a process? (2 %)

   (b). What requirements must be satisfied when designing a solution to the critical-section problem? (5 %)

三、 Please answer the following Storage-Management related questions: (total 18%)

1. (a). Briefly describe the ***paging scheme*** of memory management. (3 %)
   (b). What kind of problem does the paging scheme try to solve? (3 %)

2. (a). Briefly describe the difference between a demand-paging system and a paging system. (3%)

   (b). In measuring the performance of a demand-paging system, which three steps of the page-fault service are the major concerns? (3 %)

(背面仍有題目,請繼續作答)

3. In general, space in a disk is organized as **blocks**. Briefly describe the three major methods of allocating disk space to files: the ***contiguous***, the ***linked***, and the ***indexed*** methods. (6%)

四、 1. Describe the language denoted by the following Regular Expression:

a(a|b)* a (7 %)

2. Give a state diagram that can accept the language in 1.. (6 %)

3. What is the Deterministic Finite Automaton of 2.? (7 %)

五、 1. What are the meaning of syntax directed definition and translation scheme in defining the semantics of a grammar? (6 %)

2. The following is a syntax directed definition of grammar G with synthesized attribute.

A --> A_1 Y	{A.a := g(A_1.a, Y.y)}
A --> X	{A.a := f(X.x)}

(a). Please eliminate the left recursive of G, (4 %)

(b). and give its translation scheme. (10%)

六、 The followings are some issues about the code generation. Please give their meanings. (10%)

1. Input to the code generator
2. Target programs
3. Memory Management
4. Instruction Selection
5. Register Allocation