

1. (1-1) Describe an ADT (Abstract Data Type) of the queue data structure.(4%)  
(1-2) Implement the queue ADT which you described in (1-1) using two stacks.  
(Either a pseudo algorithm language or a programming language may be used.)(10%)  
(1-3) What is the time complexity of your implementation in (1-2)? (3%)  
What is its space complexity? (3%)
2. Suppose the inorder traversal of a complete binary tree shows the result below  
**A B C D E F G H I J K L**  
where each letter stands for a node of the tree.  
(2-1) What is the height of this tree? (3%)  
(2-2) To make a threaded tree of this tree, which nodes will have threads linked to the root node ? (3%)  
(2-3) Is this tree a height-balanced tree? (3%)  
(2-4) Show the balance factor of node **D** i.e.  $BF(D)$ ? (3%)
3. In high level programming languages, there are combinations of characters treated as *reserved words*. For example, the *int* in statement "*int i, j, k;*" of programming languages C and C++ is a reserved word. From the viewpoint of a compiler, does it make difference whether or not character combinations such as *int* and all others are treated as reserved words in the definition of a programming language? Please give your explanation. (6%)
4. The process of compiling a program can be divided into several phases. Describe briefly the phases of a typical compiler. (6%)
5. Describe how the C language statements below are translated into machine codes by a typical compiler. (6%) :  

```
#define FALSE 0  
int err_flag = FALSE;
```
6. Consider memory protection/sharing in a multi-user demand paging virtual memory system with proper memory protection.  
(1) In such a system, a process of one user can not maliciously (惡意) alter the contents of the address space in a process of another user. Explain how this can be achieved, (5%)  
(2) Is it possible for two processes to exchange data via a shared memory ? If yes, please explain how, if no, please explain why. (5%)
7. What is a system call ? What are the differences between a system call and a subroutine call ? (4%)  
'Creating a process' is a system call in a typical operating system.  
Please show one example that would need to use this system call. (4%)

(背面仍有題目,請繼續作答)

8. Java is an object-oriented language.  
Java supports multithreading.

(1) What is a Java applet ?

(2) Please give more detailed explanation about 'object-oriented' and multithreading.

(12%)

9. Explain the concept of DLLs (Dynamic Link Libraries) in Microsoft Windows Systems.

What are the advantages using DLLs ? (8%)

10. Please describe the functions of the following operating system components.

You need to draw a diagram to illustrate the system architecture that containing the following components. (12%)

- \* file system
- \* cache manager
- \* disk driver