※ 考生請注意：本試題不可使用計算機　　　　**請勿在本試題紙上作答，否則不予計分**

一 選擇題 (30%)

1.　Which form of access is used to add and remove nodes from a queue?

a. LIFO, Last In First Out　　b. FIFO, First In First Out　　c. Both 1 and 2　　d. None of these

2. Two main measures for the efficiency of an algorithm are

a. Processor and memory

b. Complexity and capacity

c. Time and space

d. Data and space

3. Heap is a useful data structure. Which of the following sequence of keys is a heap?

a. 16,31,23,04,53,72　　　　b. 94,53,31,72,16,23

c. 16,53,23,94,31,72　　　　d. 94,31,53,23,16,72

4. The depth of a tree is the _____ of a tree.

a. number of nodes on the tree

b. number of levels of a tree

c. number of branches

5. For a stack, the input sequence is ABC, if the output sequence is CBA, the stack operations are :

a. push, pop, push, pop, push, pop　　　b. push, push, pop, pop, push. pop

c. push, push, push, pop, pop, pop　　　d. push, pop, push, push, pop, pop

6. A connected graph which has n nodes has at least _____ edges.

a. n-1　　b. n　　c. n(n-1)/2　　d. 2n

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7. How do you assign an address to an element of a pointer array ?　（　　　）

   a. by using the address operator, which is the ampersand (&), in an assignment statement

   b. by using the address operator, which is the asterisks (*), in an assignment statement

   c. by using the address operator, which is the Double-asterisks (**), in an assignment statement

   d. None of the above

8. A string t = `a good student`, then Substr(t,b,6)=(　　　).

   a. student　　　b. a good s　　c. good　　d a good

9. Allocating memory at runtime is also called

   a. Statically allocating memory　　　　b. Sequentially allocating memory
   c. Dynamically allocating memory　　d. All of the above

10. _____ is the way you groups things together by placing one thing on top of another and then removing things one at a time from the top.

   a. Array

   b. Stack

   c. Pointer

   d. All of the above

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二、For each of the terms in the left-hand column below, select the term in the right-hand column that best matches it. (30%)

1. _____ prototype

2. _____ program maintenance

3. _____ traversal

4. _____ topological order

5. _____ software engineering

6. _____ B-tree

A. A process for visiting the nodes in some order.

B. A (sequential) listing of all the vertices of the directed graph such that there is a (directed) edge from vertex v to vertex w, then v comes before w in the listing.

C. The branch of computer science concerned with techniques of production and maintenance of large software system.

D. A multiway tree in which the branching at each level is determined by the appropriate character of the key, but it differs from an arbitrary multiway tree in that it is pruned to remove all branches and nodes that do not lead to any entry.

E. Wasted space within sector if record size does not match sector size; wasted space within cluster if file size is not a multiple of cluster size.

F. A rough model of a program that can be used in experiments with alternates specifications for the final design.

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7. ＿＿＿＿ trie

G. A multiway search structure which is balanced in that all the leaves are on the same level and non-leaves except possibly the root are at least half full of entries.

8. ＿＿＿＿internal fragment

H. An organization for data on disk.

9. ＿＿＿＿ palindrome
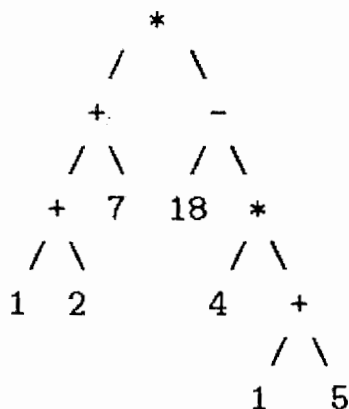
I. Reviewing and revising a program according to the changing needs and demands of the user.

10. ＿＿＿＿ file structure

J. A string that reads the same forwards as backwards.

三、問答題

1. Consider the following expression tree　(6%)

```
            *
          /   \
        +       -
       / \     / \
      +   7   18   *
     / \         / \
    1   2       4   +
                   / \
                  1   5
```

(1) What is the formula represented by the tree?

(2) What is the sequence of symbols that would result from a postorder traversal?

系所組別：會計學系乙組

考試科目：資料結構　　　　　　　　　　　　　　　　　考試日期：0224，節次：3

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2. What disadvantage of insertion sort does Shell sort overcome? (5%)

3. What is the relationship between a queue and its underlying array?(5%)

4. Suppose that a hash table contains hash_size=13 entries indexed from 0 through 12 and that the following keys are to be mapped into the table: (14%)

　　10　100　32　45　58　126　3　29　200　400　0

(a) Determine the hash addresses and find how many collisions occur when these keys are reduced by applying the operation % hash_size.

(b) Find a hash function that will produce no collisions for these keys.(A hash function that has no collisions for a fixed set of keys is called *perfect*.)

5. Insert the keys *c, o, r, n, f, l, a, k, e, s* into an initially empty red-black tree (10%)