編號： 238

國立成功大學 108 學年度碩士班招生考試試題

系　　所：會計學系

考試科目：資料結構

考試日期：0224，節次：3

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、（40%）

1. In a circular doubly linked list with N nodes, if we want to search a node from the list, the time complexity should be __.

A. O(1)　B. O(N)　C. O(n log N)　D. O(log N)

2. In computer science, _____ is an informal high-level description of the operation principle of a computer program or other algorithm.

A. pseudo code　B. Huffman code　C. Hamming code　D. none of the above

3. If a stack contained the entries *x, y, z* (from top to bottom), which of the following would be the content after the entries *a* and *b* were inserted and three entries were removed?

A. a, b　B. x, y　C. y, z　D. none of the above

4. The time complexity for sorting *n* numbers using the quick sort algorithm is __

A. $O(n^2)$　B. O(n)　C. O (n log n)　D. O(log n)

5. Which of the following techniques can be used in detecting memory leaks?

A. runtime interpretation　B. runtime execution　C. runtime exception　D. runtime checking

6. Address of operator "&" is known as __ operator.

A. reference　B. dereference　C. disengage　D. disembarking

7. Self-balancing binary search tree is often implemented by the following data structures except _____.

A. AVL tree　B. red-black tree　C. R+ tree　D. B- tree

8. Dictionary is in important data structure that is designed to maintain a set of data during 'search', 'delete', and 'insert' operations. Which of the following data structure is used to solve the problem of the dictionary?

A. hash table　B. stack　C. set　D. array

9. Sorting algorithm can be divided into internal sorting and external sorting. Which of the following technique is suitable for external sorting?

A. heap sort　B. bubble sort　C. bucket sort　D. shell sort

10. Queue follows a __ rule.

A. FIFO　B. FILO　C. LILO　D. LIFO

二、(60%)

1. Consider the following message: CAST CAST SAT AT A TASA. Please compute the Huffman code of each letter and draw the Huffman tree. (12%)

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2. Consider the following code fragment, and answer the following questions. (12%)

A. What is the Mystery function for?

B. Assume Fig. 2 inputs, what does the Mystery function return?

```
typedef struct _BitNode
{
    int data;
    struct _BitNode *lchild,*rchild;
}BitNode,*BiTree;

bool Mystery (BiTree T, int key, BiTree pre, BiTree &n)
 {
    if(!T)
    {
        n=pre;
        return false;
    }
    else if(key==T->data)
    {
        n=T;
        return true;
    }
    if(key<T->data)
        Mystery(T->lchild, key, T, n) ;
    else
    {
        Mystery(T->rchild, key, T, n);
    }
 }
```

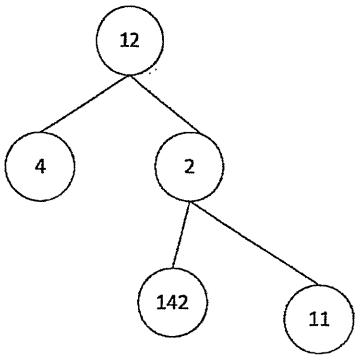

Fig. 2

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3. Given the best Big-O characterization for each of the following running time estimates (where n is the size of the input problem). (24%)

A. $3n^2 + 3n + 1$

B. $1 + 2 + 3 + \ldots + 100$

C.
$$T(n) = \begin{cases} 1 & n = 1 \\ 2T(n-1) + 1 & n > 1 \end{cases}$$

D. $100^4 + 2^9$

E:
```
int result=1;
  while(result<n){
      result=result*2;
 }
```

F. $2n + 3n \log_2{}^n + 19$

4. Consider Fig. 3, and answer the following questions： (12%)

A. Is Fig.3 a binary tree?

B. What's the result of "In-order Traversal"?

C. What's the result of "Post-order Traversal"?

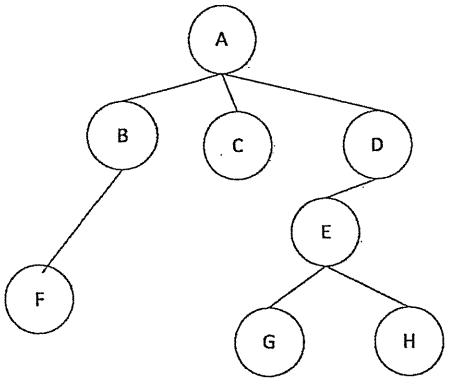

Fig. 3