

浙江大学 2005 - 2006 学年秋季学期

《数据结构基础》课程期末考试试卷

开课学院: 计算机学院和软件学院

考试形式: 闭卷

考试时间: 2005 年 11 月 9 日 所需时间: 120 分钟 任课教师: _____

考生姓名: _____ 学号: _____ 专业: _____

题序	一	二	三	四	五	六	七	八	九	十	总分
得分											
评卷人											

(第三、第四、第五、第十题请做在后面的白纸上, 其余做在试题上)

一、 Please fill in the table with your best choices: (20 points , 2 points ×10)

1	2	3	4	5	6	7	8	9	10

- (1) An undirected graph with n vertices has at most ____ edges.
 ① n ② $n(n-1)$ ③ $n(n-1)/2$ ④ $2n$
- (2) Given a queue that is implemented by a single linked list, which status is 1->2->3, after operations “delete” and “insert(4)”, the status of this list is:
 ① 4->1->2 ② 2->3->4 ③ is ① OR ② ④ neither ① nor ②
- (3) To find the shortest path between a pair of given vertices, ____ method can be used.
 ① Kruskal ② Dijkstra ③ Hashing ④ Critical Path
- (4) In the disjoint set problem, if Unions are performed by height, then the depth of any tree with n nodes is ____.
 ① $O(n)$ ② $O(1)$ ③ $O(\log n)$ ④ $n/2$
- (5) Given a single linked list, we would delete the node follow the node implied by P pointer. which operation is correct?
 ① $p \rightarrow next = p \rightarrow next \rightarrow next$ ② $p = p \rightarrow next$
 ③ $p \rightarrow next \rightarrow next = p \rightarrow next$ ④ $p = p \rightarrow next \rightarrow next$
- (6) If the input is a presorted integer sequence, which algorithm is the best to complete sorting.
 ① Mergesort ② Quicksort ③ Heapsort ④ Insertion Sort
- (7) The maximum number of nodes in a binary tree of height k is
 ① $2^{k+1} - 1$ ② $2^k - 1$ ③ $2^{k-1} - 1$ ④ 2^{k+1}
- (8) Given a ternary tree(三叉树) with 5 nodes of degree 1, 3 nodes of degree 2, 2 nodes of degree 3. The number of leaf nodes in this tree is
 ① 10 ② 12 ③ 13 ④ 8
- (9) Given a weighted and connected undirected graph G, there is/are ____ minimum spanning tree(s) of G.
 ① only one ② one or more ③ more than one ④ zero or more
- (10) Which method that the average search length is independent of the number of elements..
 ① serial search ② binary search ③ binary search tree ④ hashing

二、 Given an integer sequence 25、 84、 21、 47、 15、 27、 68、 35、 20, after the Heapsort's initial heap building, this interger sequence is _____ (**7 points**)

三、 For the graph given by the adjacency matrix
$$\begin{bmatrix} 0 & 7 & 0 & 0 & 0 & 0 \\ 7 & 0 & 5 & 1 & 0 & 0 \\ 0 & 5 & 0 & 4 & 0 & 2 \\ 0 & 1 & 4 & 0 & 3 & 6 \\ 0 & 0 & 0 & 3 & 0 & 0 \\ 0 & 0 & 2 & 6 & 0 & 0 \end{bmatrix}$$
, please give: (**15 points**)

- (1) its adjacency list representation (**3 points**)
- (2) its biconnected components (**6 points**)
- (3) the minimum cost spanning tree. (**6 points**)

四、 Write pseudocode for the deletion of any node i in a min-heap H . The resulting heap must satisfy the min heap definition. (**8 points**)

Deletion (PriorityQueue H , i) /* delete element $H \rightarrow \text{Elements}[i]$ */

五、 Please according to the following travel results, draw the corresponding forest F: (7 points)
the preorder binary travel of F is A B C D E F G H I J K L;
the inorder binary travel of F is C B E F D G A J I K L H

六、 Given an integer sequence 25、 84、 21、 47、 15、 27、 68、 35、 20, after the first run of the shell sorting by an increment 3, the integer sequence is (7 points) :

七、 Please complete the following program, according to the corresponding function descriptions.

(7 points)

The function is “union-by-size” in the disjoint set problem.

void SetUnion(DisjSet S, SetType Root1, SetType Root2)

{ /* Root1 and Root2 must be roots */

if (_____)

S[Root2] += S[Root1];

_____;

}

else {

_____;

S[Root2] = Root1;

}

}

八、 A queue can be simulated by two stacks, assuming that the queue and two stacks are empty.

The operations ‘push’ and ‘pop’ on stack1 are expressed as P1(x) and O1.

The operations ‘push’ and ‘pop’ on stack2 are expressed as P2(x) and O2.

The operations ‘enqueue’ and ‘dequeue’ are expressed as I(x) and D .

For example, the operation sequence of queue is I(x)、 D can be simulated by the operation sequence of P1(x)、 P2(O1) and O2. Please give the stack operation sequence that simulates the queue operation sequence I(x)、 I(y) and D. (7points)

九、The following program is a Delete operation in a binary search tree. Please fill in the blank lines of code. (10 points) .

```
SearchTree Delete( ElementType X, SearchTree T )
```

```
{   Position TmpCell;
```

```
    if ( T == NULL )
```

```
        Error("Element not found");
```

```
    else if ( X < T->Element )
```

```
        T->Left = Delete( X, T->Left );
```

```
    else if ( X > T->Element )
```

```
        T->Right = Delete( X, T->Right );
```

```
    else
```

```
        if ( T->Left && T->Right ) {
```

```
            _____
```

```
            _____
```

```
            _____
```

```
        }
```

```
    else {
```

```
        TmpCell = T;
```

```
        if ( T->Left == NULL )
```

```
            _____
```

```
        else if ( T->Right == NULL )
```

```
            _____
```

```
        free( TmpCell );
```

```
    }
```

```
    return T;
```

```
}
```

十、please write a C program that counts the number of simple paths with length L between two vertices in a given unweighted directed graph G . The input is an adjacency matrix for G , the total number of vertices n in G , the two vertices i and j , and the path length L . The output is the number of paths specified. (Please give this algorithm specification) (12 points)