四川大学期末考试试题（闭卷）

（2018~2019 学年第 1 学期） B 卷

课程号：<u>311076040</u> 课程名称：<u>数据结构与算法</u> 任课教师：__________

适用专业年级：<u>软件工程 2017 级</u> 学号：____________ 姓名：____________

考生承诺

我已认真阅读并知晓《四川大学考场规则》和《四川大学本科学生考试违纪作弊处分规定（修订）》，郑重承诺：

1、 已按要求将考试禁止携带的文具用品或与考试有关的物品放置在指定地点；

2、 不带手机进入考场；

3、 考试期间遵守以上两项规定，若有违规行为，同意按照有关条款接受处理。

考生签名：

题　号	一(30%)	二(34%)	三(20%)	四(16%)
得　分				
卷面总分		阅卷时间		

注意事项： 1. 请务必将本人所在学院、姓名、学号、任课教师姓名等信息准确填写在试题纸和添卷纸上；

2. **请将答案全部填写在<u>答题纸</u>上；本试题纸上的答案一律不计分；**

3. 考试结束，请将试题纸、答题纸和草稿纸一并交给监考老师。

评阅教师	得分

一、单项选择题（本大题共 15 小题，每小题 2 分，共 30 分）

提示： 在每小题列出的四个备选项中只有一个是符合题目要求的，请将其代码写在答题纸上。错选、多选或未选均无分。

1. Suppose that a client performs an intermixed sequence of (stack) push and pop operations. The push operations push the integers 0 through 9 in order on to the stack; the pop operations print out the return value. Which sequence could not occur? (　　)

   A. 4 3 2 1 0 9 8 7 6 5

   B. 2 1 4 3 6 5 8 7 9 0

   C. 0 4 6 5 3 8 1 7 2 9

   D. 4 6 8 7 5 3 2 9 1 0

2. If a node is at position r in the array implementation for a complete binary tree, then its parent is at (　　).

   A. (r - 1)/2 if r > 0

   B. 2r + 1 if (2r + 1) < n

   C. r - 1 if r is even

   D. r + 1 if r is odd.

3. An undirected complete graph with 5 vertices has the following edges (　　).

注： 1、印制试卷时同时提交《四川大学期末试卷审批表》。

2、本试卷审批表同试卷一并归档保存。

A. 4

B. 5

C. 20

D. 10

4. What is the best definition of a collision in a hash table? (　　)

A. Two entries are identical except for their keys.

B. Two entries with different data have the exact same key.

C. Two entries with different keys have the same exact hash value.

D. Two entries with the exact same key have different hash values.

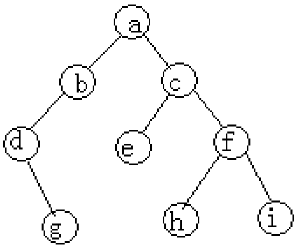
5. For the following binary tree, the result of traversing under preorder is (　　).

A. dgbechfia

B. abdgcefhi

C. dgbaechfi

D. gdbehifca



6. Asymptotic analysis refers to (　　).

A. The cost of an algorithm in its best, worst, or average case.

B. The growth in cost of an algorithm as the input size grows towards infinity.

C. The size of a data structure.

D. The cost of an algorithm for small input sizes

7. Dijkstra's algorithm requires that vertices be visited in (　　).

A. Depth-first order.

B. Breadth-first order.

C. Order of shortest distance from the source vertex.

D. No particular order.

8. The two main factors of algorithm analysis are (　　).

A. space complexity and time complexity

B. correctness and simplicity

C. data complexity and program complexity

D. none of the above

9. Assume the in-order of a binary tree T is ABCDEFG, the post-order is BDCAFGE, then the number of leafs in the left subtree will be (　　).

A. 3

B. 2

C. 4

D. 5

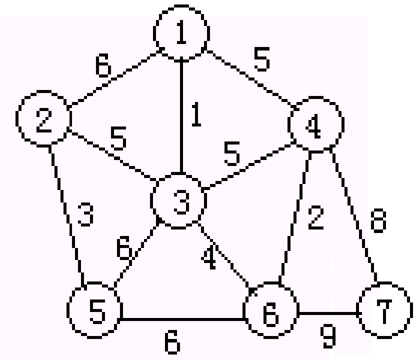
10. The Huffman tree is a binary tree with minimum external path weight. The external path weight of a Huffman tree is ( ).
    - A. the sum of the weights of all nodes except root.
    - B. the sum of the weights of all nodes.
    - C. the sum of the weighted path lengths of all leaves.
    - D. the value of root.
11. A collection of key values is (41, 79, 56, 38, 40, 84). If we choose the first element to be the pivot, then the result of the first pass of quicksort is ( ).
    - A. 40, 38, 41, 56, 79, 84
    - B. 40,38, 41, 84, 56, 79
    - C. 38, 40, 41, 56, 79, 84
    - D. 40, 38, 41, 79, 84, 56
12. If we know nothing about the distribution of key values, then the binary search is the best algorithm for ( ).
    - A. an array-based list.
    - B. a linked list
    - C. a sorted array-based list
    - D. a sorted linked list
13. Using closed hashing, with linear probing to resolve collisions, insert n keys into a hash table successively. If these n keys hash to the same home position, then searching the last inserted key requires ( ) comparisons.
    - A. n-1
    - B. n
    - C. n+1
    - D. n+2
14. If the size of memory available for an array is M records, replacement selection creates runs of ( ) records in length on average.
    - A. M
    - B. 2M
    - C. M*M
    - D. MlogM
15. We use the parent pointer representation for general trees to solve which problem? ( )
    - A. Shortest paths
    - B. General tree traversal
    - C. Equivalence classes
    - D. Exact-match query

评阅教师	得分

二、应用题（本大题共 4 小题, 1-2 每小题 8 分, 3-4 每小题 9 分，共 34 分）

提示：有求解过程的要尽量给出解题步骤，只有最终答案会酌情扣分。

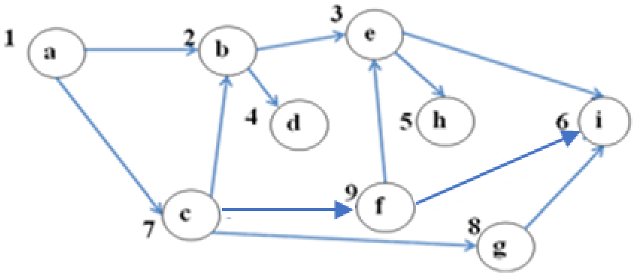
1. Consider the following undirected graph. In what order are edges added to the minimum spanning tree by Kruskal’s algorithm? List the edges by giving their endpoints, and compute the cost of the minimum spanning tree.



2. Starting from an empty binary tree, sequentially insert the following elements one by one according to the insertion algorithm of BST: 86, 100, 66, 302, 450, 75, 20,69, 14, 20, 260, 72.
   a) Draw the binary search tree after inserting all the above elements.
   b) Show the pre-order traversal and In-order traversal results of the BST in(a)
   c) Draw the binary search tree after deleting the element with value 66.

3. Given an array containing the elements {107, 3, 27, 84, 21, 47, 90, 15, 25, 68, 35}. Show the partition step and result during the first pass of quicksort (choosing the middle position element of the array to be the pivot). Show the array before each swap and after each swap.

4. Given the following DAG,



   a) Represent the graph using Adjacency Matrix.
   b) Represent the graph using Adjacency List.
   c) Give out the Queue-Based(**BFS-based**) Topsort result of the graph.

评阅教师	得分

三、编程、设计及分析题（本大题共2小题，1小题8分，2小题12分，共20分）。

提示：每小题给出了一个程序设计要求，请按照要求写出源程序代码，如果源程序代码中出现语法错误或逻辑错误，则酌情扣分。

1. Implement EnQueue() and DeQueue() function of the queue below

```
#include <stdlib.h>
#include <stdio.h>
#define MAXSIZE 100
typedef int ElemType ;
typedef struct
{
    ElemType *base;
    int front;
    int rear;
}circularQueue;

InitQueue(circularQueue *q)
{
    q->base = (ElemType *)malloc((MAXSIZE) * sizeof(ElemType));
    if (!q->base) exit(0);
    q->front = q->rear = 0;
}

EnQueue(circularQueue *q, ElemType e)
{
     ……
}

DeQueue(circularQueue *q, ElemType *e)
{
     ……
}
```

2. Implement one pass of quicksort algorithm.

评阅教师	得分

四、分析题（本大题共1小题，共16分）。

Give your opinions about the sentence: It is hardly ever true that one data structure is better than another for use in all situations. You can explain your opinions by examples.