

國立高雄應用科技大學  
107 學年度研究所碩士班招生考試  
電機工程系碩士班  
資料結構(丙組)

試題 共 2 頁，第 1 頁

注意：a. 本試題共 5 題，每題 20 分，共 100 分

b. 作答時不必抄題

c. 考生作答前請詳閱答案卷之考生注意事項

d. 第 2、3 題作答時，必須書寫解題過程。若過程不正確，則該題不予計分。

1. Multiple Choice Questions. (4 points each). (20%)

Q1. 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

Q2. The complexity of binary search on a sorted list of  $n$  items is \_\_\_\_.

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

Q3. Which of the following sorting algorithm is of divide-and-conquer type?

- A. Bubble sort    B. Insertion sort    C. Quick sort    D. All of above

Q4. The in-order traversal of tree will yield a sorted list of elements of tree in \_\_\_\_.

- A. Binary trees    B. Binary search trees    C. Heaps    D. None of above

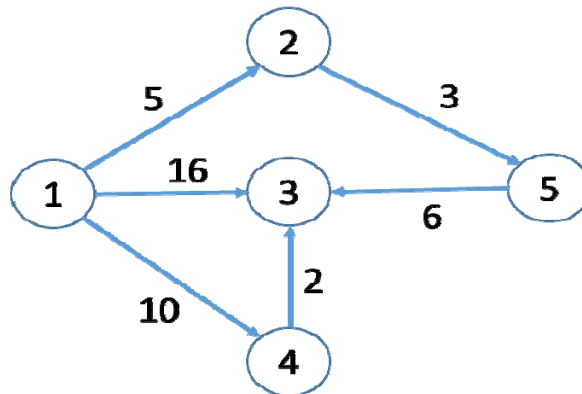
Q5. The number of swapping needed to sort the numbers 8, 22, 7, 9, 31, 19, 5, 13 in ascending order by using bubble sort is \_\_\_\_.

- A. 11                      B. 12                      C. 13                      D. 14.

2. Assume a hash table has eleven slots. Map a number sequence of 14, 11, 33, 27, 18, 67, 46, 32, 54, 39 to the hash table in that order by the following hash function, and using linear probing to resolve the problem of collisions.

Key =  $x \% 11$ , where  $x$  is an element in the number sequence and Key is the address of mapping  $x$  to the hash table. (20%)

3. Use the following graph for this problem.



a. Represent this graph by means of length-adjacency matrix. (10%)

b. Use Dijkstra's Algorithm to calculate the shortest path from vertex 1 to every other vertex. (10%)

4. a. Draw an arithmetic expression tree for the expression:  $A * B / C + D * (E + F)$ . (10%)

b. List the sequence of nodes visited by preorder traversal of the arithmetic expression tree drawn in 4.a. (10%)

5. a. Use C language to write a recursive function, i.e., `int strcmp(char *s1, char* s2)` to compare string `s1` with string `s2`, and return an integer value based on the following conditions. If `s1` is larger than `s2`, it will return 1. If `s1` is equal to `s2`, it will return 0. If `s1` is less than `s2`, it will return -1. (10%)

b. What is the return value of the following `fun()` when `a` is 5 and `b` is 3 ?, and what does this function do in general ? (5 points each) (10%)

```

int fun(int a, int b)
{
    if (b == 0)
        return 0;

    if (b % 2 == 0)
        return fun(a+a, b/2);

    return fun(a+a, b/2) + a;
}
  
```