國立成功大學

113學年度碩士班招生考試試題

編　號：221

系　所：會計學系

科　目：資料結構

日　期：0202

節　次：第 3 節

備　註：不可使用計算機

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※ 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、選擇題(40 分，每題 4 分)

1. A tree with *n* vertices has ____ edges.

   A. n　　B. n-1　　C. n-2　　D. None of the above

2. The time complexity for inserting *n* numbers using bubble sort algorithm is _____.

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

3. If the postfix expression of a sequence of operations is 45+67*+, then its prefix expression is _____.

   A. ++45*67　　B. 45++67*　　C. **67+45　　D. +*+4567

4. Which of the following sequence of keys in a heap?
   A. 13, 14, 16, 24, 21, 19, 68, 65, 26, 32, 31
   B. 13, 16, 14, 24, 21, 19, 68, 65, 26, 32, 31
   C. 13, 14, 16, 21, 24, 19, 68, 65, 26, 32, 31
   D. 13, 14, 16, 24, 21, 68, 19, 65, 26, 32, 31

5. _____ data structure can be used to keep track of function calls.

   A Queue　　B. Hash　　C. Stack　　D. List

6. _____ always selects the best choice at each step, instead of considering all sequences of steps that may lead to an optimal solution.
   A Divide-conquer algorithm　　B. Random algorithm
   C. Greedy algorithm　　D. Brute-force algorithm

7. In computer science, _____ provides an intermediate step between a nature language description of the algorithm and an implementation of this algorithm in a programming language.

A. Huffman code　　B. Inheritance　　C. Hamming code　　D. Pseudo code

8. When Huffman code is used to encode the following symbols with the frequencies listed: A: 0.08, B:0.10, C:0.12, D:0.15, E: 0.20, and F:0.35, A is encoded as ____.

A. 001　　B. 000　　C. 110　　D. 111

9. AVL trees work only when all nodes' right and left subtrees differ in heights by at most _____.

A. 2,　　B. 1　　C. 0　　D. None of the above

10. When two keys hash to the same cell, we call the situation a _____.

A, distribution　　B. union　　C. collision　　D. composition

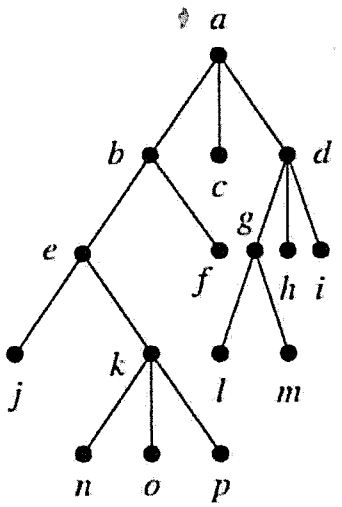
二. 問答題(60 分)

1. Explain each of the following terms: (20 分)

(1). Binary search algorithm
(2). Complete graph
(3). Splay tree
(4). Divide and conquer algorithm
(5).*d*-Heap

2. Suppose there is an initially empty AVL tree, please show (1) the result of inserting the keys 3, 2, 1, 4, 5, 6 and 7 in sequential order, (2) the result of Breath-first search of the AVL tree, and (3) the internal nodes of the tree. (10 分)

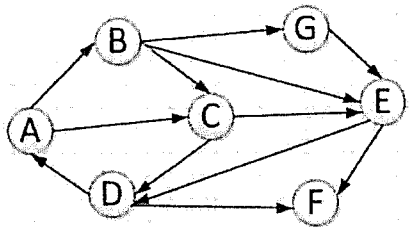
3. Answer the following 3 questions based on this graph. (9 分)



(1) Which nodes are leaves?
(2) What is the depth of the tree?
(3) What is the result of *post-order traversal*?

4. Show the result of running Shellsort on the input 9, 8, 7, 6, 5, 4, 3, 2, 1 using the increments {1, 3, 7}. (12 分)

5. Consider the figure and answer the following 3 questions. (9 分)



(1) . Whether this graph is a simple graph?
(2) . What is the in-degree of node B?
(3) . Draw the *depth-first spanning tree* of the graph.