國立成功大學

112學年度碩士班招生考試試題

編　號：226

系　所：會計學系

科　目：資料結構

日　期：0207

節　次：第 3 節

備　註：不可使用計算機

※ 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. _____ can be used to support *first-come first-served* operations.

　　A.　Stack　　B. Queue　　　C. Tree　　　D. Hash

2. An input to a linked list is 3, 4, 12, 52, and 62. If we want to insert a new element 16

　　between elements 12 and 52, then this operation will take _____ time.

　　A. O(n)　　　　B. O(1)　　　　C. O(n^2)　　　D. log (n)

3. Which of the following is the postfix of the expression a+b*c+(d*e+f}*g?

　A.　abc*de+*f+g*+　　　　　　　　B. a+b*cde*gf++

　C.　abc*+de*fg+*++　　　　　　　　D. abc*+de*f+g*+

4. In a tree, nodes with the same parents are called _____.

　　A. Ancestors　　　　B. Grandchildren　　　　C. Siblings　　　　D. Grandparents

5. Merge sort takes _____ worst-case running time.

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

6. Which of the following can be used to represent single-variable polynomials?

　A. Queue　　B. List　　C. Hash　　D. Heap

7. Which of the following strategies needs to allocate new cells in solving hashing

　collision?

A. Liner probing　　B. separate chaining　　C. quadratic probing　　D double hashing

8. If a stack contains four entities, *w, x, y,* and *z* (from top to bottom), which of the following would be the contents after three entities are popped and two entities *a* and *b* are pushed (from top to bottom)?

A. b, a , z　　　　B. z, a, b　　　C. z, b, a　　　D. a, b, z

9. Huffman codes are the application of _____.

A. divide-and-conquer algorithm　　　B. randomized algorithm

C. backtracking algorithm　　　　　　D. greedy algorithm

10. Which of the following sequences of keys is a max-heap?

A. 97, 53, 59, 26, 41, 58, 31　　B. 97, 53, 26, 59, 41, 58, 31

C. 97, 53, 59, 26, 58, 41, 31　　D. 97, 53, 26, 41, 58, 59,31

二、問答題（60 分）

1. Give the best Big-O characteristics for each the following running time estimates. (15 分)

(1). $x^2 + 2x+1$

(2). $x!$

(3). $1 + 2 +3 + ... + n.$

(4). $2 \log(n) + 500$

(5). $300^{20} + 1000^{50}$

2. Consider a binary search tree shown in Fig. 1 and answer the following questions: (15 分)

(1). Draw the binary search tree after inserting a node 5.

(2). Draw the binary search tree after deleting a node 2 and inserting a node 5 in (1).

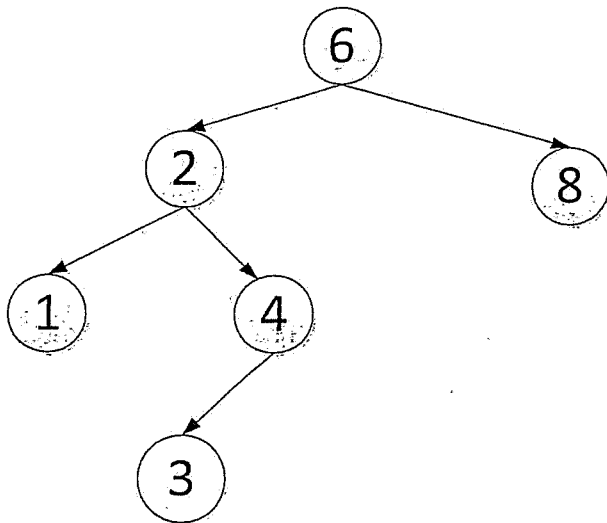(3). What is the result of *preorder* traversal of the tree in (2)?

Fig. 1

3. Consider Fig.2, and use Prim's algorithm to solve the following questions: (15 分)

(1). Draw the minimum spanning tree of Fig. 2.

(2). What is the result of breath-frist-search?

(3). Which is the worst-case running time of the Prim's algorithm?
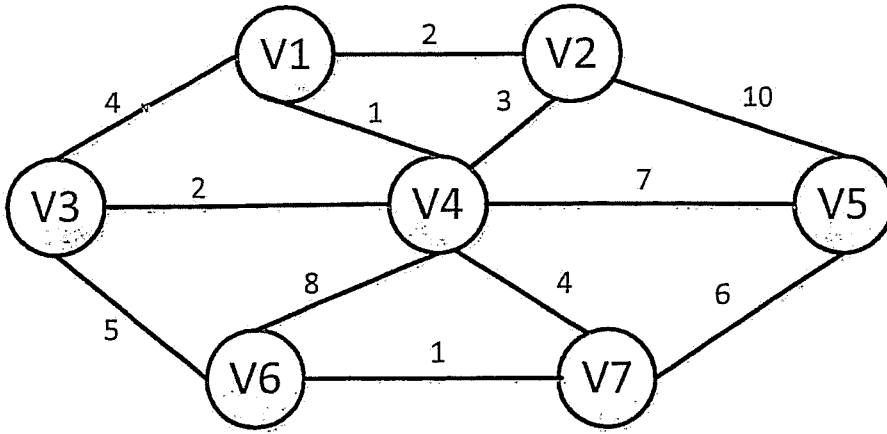

Fig. 2

4. Consider a min-heap shown in Fig.3 and answer the following questions: (15 分)

   (1) Draw the heap after inserting a node 14.

   (2) Draw the heap after deleting 13.

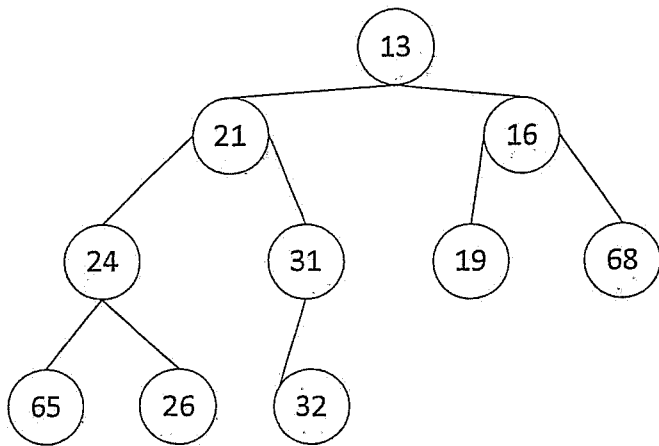   (3) What is the worst-case running time for the above two operations?

Fig. 3