國立高雄第一科技大學 97 學年度 碩士班 招生考試 試題紙

系 所 別：系統資訊與控制研究所　　組　別：資訊組

考科代碼：1413　　考　科：資料結構

注意事項：

1、本科目可使用本校提供之電子計算器。

2、請於答案卷上規定之範圍作答，違者該題不予計分。

Notice:

i) In the following questions 1-3, data set $A = \{35, 3, 43, 12, 7, 55, 81\}$ is used.

ii) remainder: (x mod y) = x – y * integer(x/y)

1. (15%) To store data into storage, hashing is popularly adapted.
   (a) Please show the open addressing hash result of set *A* by quadratic probing method with a hash function h(x) = x mod 8. (8%)
   (b) What are the benefits of hashing? Try to describe others for comparison. (7%)

2. (28 %) To search for content of data set *A*, tree is used to add values of *A* in orders from left to right of its tree.
   (a) Show the binary search tree of *A*. (7 %)
   (b) Construct the AVL tree of *A*. (8 %)
   (c) If the root of *A* is deleted, show the resulting binary search tree. (8 %)
   (d) What is the complexity of the binary search tree in the Big-O notation. (5 %)

3. (30 %) Design a program in C code or pseudo-code which has the following functions.
   (a) Read set *A* from consol and store it into a tree structure. (10 %)
   (b) Find the two boundaries: maximum and minimum of the stored array. (10 %)
   (c) Rearrange the array into a heap. (10 %)

4. (12 %) Consider a given function as follows,

$$f(x)=\begin{cases} f(x/2)+1, \text{ if } (x \bmod 2) \text{ equals to } 0; \\ 2*f(x-1), \text{ if } (x \bmod 2) \text{ equals to } 1; \\ 0, \text{ otherwise} \end{cases}$$

where $x \in \mathbb{N}^+$.

Find the value of f(8).

5. (15 %) Given an expression (a*b-c)/d+e^f . Show the stack output when converting the expression to postfix form. (^ means an exponent)