國立臺南大學 103 學年度 **資訊工程學系碩士班** 招生考試　計算機概論　試題卷

1. Briefly describe the following terms (20%)
   (1) Cache　(2) HTTPS　(3) HTML 5
   (4) Ubiquitous computing　(5) NAS

2. Multiple choice (10%)
   (1) Which one is not the object-oriented programming language?
      (a)JAVA　(b)C#
      (c)C　(d)Smalltalk
   (2) Which one is NOT the format of a video file?
      (a)JPEG　(b)MP4
      (c)MKV　(d)3GP
   (3) Which is the main characteristic of data encapsulation?
      (a)Polymorphism　(b)Abstraction
      (c) Inheritance　(d)Information hiding
   (4) Which of the following data structure is the most proper approach to record the traversed steps in a "Mouse Maze" program?
      (a)Linked list　(b)Tree
      (c)Hashtable　(d)Stack
   (5) Suppose there is a series of arrays to be multiplied, which approach is the most efficient way to compute the result?
      (a)Greedy　(b)Backtracking
      (c)Dynamic programming　(d)Divide-and-Conquer

3. Write the following functions in *C* language.
   (1) Write a recursive function, ***int sumN(int n)***, to compute and return the result of 1+2+3+…..+*n*. (10%)
   (2) Write a recursive function, ***int count(char ch, const char *str)***, to count and return the number of times a particular character appears in a string of maximum 79 characters. (10%)

4. For each of the two expressions (12%)

   (*i*) $(x + a) * (y + b)$

(*ii*) $((((a * x + b) * x + c) * x + d) * x + e) * x + f$

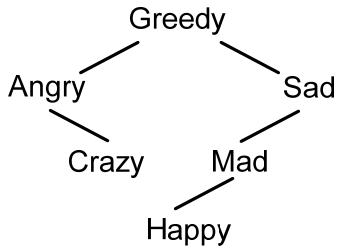
do the following:

(1) Construct the expression tree.

(2) Find the equivalent prefix expression.

(3) Find the equivalent postfix expression.

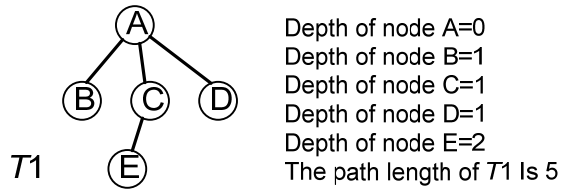
5. Given a binary search tree with six nodes labeled by strings shown in the following figure, please show what happens to the existing binary search tree if we insert the following keys in order: Bad, Boy, Inky, and Apple. Then show what happens when we delete in order: Bad, Sad, and Greedy. (14%)



6. Please write a recursive function (or method) parenthesize that accepts an int *n* as a parameter and prints out the numbers 1 through $n \geq 1$ inclusive in a particular pattern that looks like a set of mathematical multiplications wrapped in parentheses. The order of the numbers should begin with all of the evens in downward order, followed by all of the odds upward from 1. Each time a number is added to the pattern, a new set of parentheses and a * sign are added too. For examples, look at the pattern in the calls below to see the print format. (10%)

Call	**Output**
parenthesize(1);	1
parenthesize(2);	(2 * 1)
parenthesize(3);	((2 * 1) * 3)
parenthesize(4);	(4 * ((2 * 1) * 3))
parenthesize(5);	((4 * ((2 * 1) * 3)) * 5)
parenthesize(6);	(6 * ((4 * ((2 * 1) * 3)) * 5))

7. The path length of a tree *T* is the sum of the depths of all the nodes in *T*. Assume that the depth of any node in *T* is not known beforehand. For example as in the following figure, the path length of tree *T*1 is 5.



(1) Describe an algorithm in pseudo-code for computing the path length of a tree *T* (which is not necessarily binary). (10%)

(2) Compute the worst case running time of your algorithm as a function of the total number *n* of nodes in the tree and give the asymptotic (Big-Oh) characterization. You must explain how you compute it. (4%)