國立暨南國際大學 106 學年度碩士班入學考試試題　第 1 節

科目：資料結構與演算法　　　適用：資工系

編號：341

考生注意：
1.依次序作答，只要標明題號，不必抄題。
2.答案必須寫在答案卷上，否則不予計分。
3.限用藍、黑色筆作答；試題須隨卷繳回。

本試題共 1 頁
第 1 頁

1. Compare the properties of Insertion Sort and Shell Sort. (20%)

2. a. How many different binary trees can be made from 5 nodes?
   Explain your answer. (20%)
   b. Suppose a binary tree is used to store N nodes, show the possibly minimum tree height. Explain your answer. (10%)

3. The sequence $F(n)$ of Fibonacci numbers is defined by the recurrence relation
   $$F(n) = F(n - 1) + F(n - 2),$$
   with seed values
   $$F(0) = 1, \text{ and } F(1) = 1.$$
   a. If using the recursion method to calculate the value of $F(12)$, how many times of additive operations will be performed?
   Explain your answer briefly. (15%)
   b. If using the dynamic programming method to calculate the value of $F(12)$, how many times of additive operations will be performed?
   Explain your answer briefly. (15%)

4. For an AVL tree, write a C or java-like pseudo-codes to determine which one of the R-R, L-L, R-L, L-R rotations should be perform. Explain your answer briefly. (20%)