

國立臺北科技大學 103 學年度碩士班招生考試

系所組別：2151、2152 電機工程系碩士班戊組

第二節 資料結構 試題

第一頁 共一頁

注意事項：

1. 本試題共五大題十三子題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. (20%) Consider an arithmetic expression as follows:

$$a/b - c + d * (e - a) * c$$

- (a) What is the postfix notation of the expression? (5%)
 - (b) Describe an algorithm for producing a postfix expression from an infix one. (5%)
 - (c) Demonstrate your algorithm with a stack for the expression. (10%)
2. (25%) (a) Construct a binary tree whose in-order traversal equals to the expression shown in Problem 1. (10%)
- (b) What is the pre-order and post-order transversal of the binary tree constructed in Problem 2 (a)? (10%)
 - (c) Write a recursive function in C/C++ language for the post-order transversal. (5%)

3. (20%) Assume there is a sparse matrix shown as follows:

$$\begin{bmatrix} 15 & 0 & 0 & 22 \\ 0 & 11 & 3 & 0 \\ 0 & 0 & 0 & -6 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

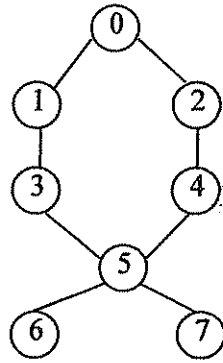
- (a) Use arrays to represent this matrix with minimum memory space required. Explain your data structure in detail and define a structure in C/C++ language. (10%)
- (b) Repeat the previous problem with linked lists. (10%)

4. (20%) Suppose a list of 10 records with keys

5, 26, 1, 37, 61, 11, 15, 59, 19, 48

- (a) Show the sorting process of this list if quick sort is exploited. (5%)
- (b) Describe the algorithm of quick sort. (10%)
- (c) What is the worst and average complexity of quick sort? (5%)

5. (15%) Consider a graph G as follows.



- (a) Define and draw its adjacency list. (10%)
(b) What is the result of depth first search of the graph G . (5%)