國立中央大學104學年度碩士班考試入學試題

所別：資訊管理學系碩士班 丁組(一般生)　科目：資料結構　共 1 頁 第 1 頁

本科考試禁用計算器　　＊請在答案卷（卡）內作答

參考用

Problem 1: (17%)

You are given a prefix expression of −A/B * C^DE.

(a) Transform it to the corresponding infix expression. Explain your answer. (7%)

(b) Give the detail process in stack for the complete transformation procedure above. Explain your answer. (8%)

(c) If A=35, B=4, C=1, D=2, and E=3, what is the numerical result for the infix expression obtained above? Explain your answer. (2%)

Problem 2: (16%)

(a) Represent the polynomial below in a sparse matrix. Explain your answer. (8%)

$$7x^5y^3 + 12x^4 - 6x^3y + y^3 - 23.$$

(b) Express the sparse matrix obtained above in a two-dimensional matrix with smaller size. Explain your answer. (8%)

Problem 3: (33%)

Please describe the differences between four sorting algorithms based on the following data: 3, 2, 6, 4, 1, 5

(a) Bubble sort (7%)

(b) Selection sort (7%)

(c) Merge sort (9%)

(d) Quick sort (10%)

Problem 4: (19%)

A binary tree is stored in an array as follows: 《63、48、36、5、71、3、75、86》

(a) Give the definition of a heap. (5%)

(b) Adjust the binary tree into a heap. You should draw the heaps for each step during the adjustment. (5%)

(c) Is heap sort a stable sorting? (4%)

(d) Give an example to demonstrate your answer to (c). (5%)

Problem 5: (15%)

An extended binary tree has N internal nodes. The external path length is E and the internal path length is I. Prove or disprove the equation: E=I+2N. (15%)