

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：資訊管理系

組別：技術組

考科代碼：3212

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。

(一) A matrix consists of 4 rows and 5 columns of numbers as follows.

0	50	0	0	0
0	0	40	0	0
0	0	0	30	0
0	20	0	0	10

- (1) (3%) A sparse matrix can be represented by using an array of triples <row, col, value>. Write down the sparse matrix representation of the above matrix using an array of triples <row, col, value>.
- (2) (3%) Write down the transpose of the above matrix using sparse matrix representation.
- (3) (10%) Write an algorithm (using pseudo code) to transpose a sparse matrix which is represented by an array of triples <row, col, value>.
- (4) (2%) What is the time complexity of your algorithm?

(二)

- (1) (8%) Show the status of the input list $L = (4, 6, 5, 2, 7, 3, 9, 1, 8)$ at the end of each phase of Quick Sort.
- (2) (10%) Write an algorithm for Quick Sort by using pseudo code.

(三) (5%) Write a recursive algorithm including main program for Hanoi Tower using pseudo code, java, C++ , or C.

(四)

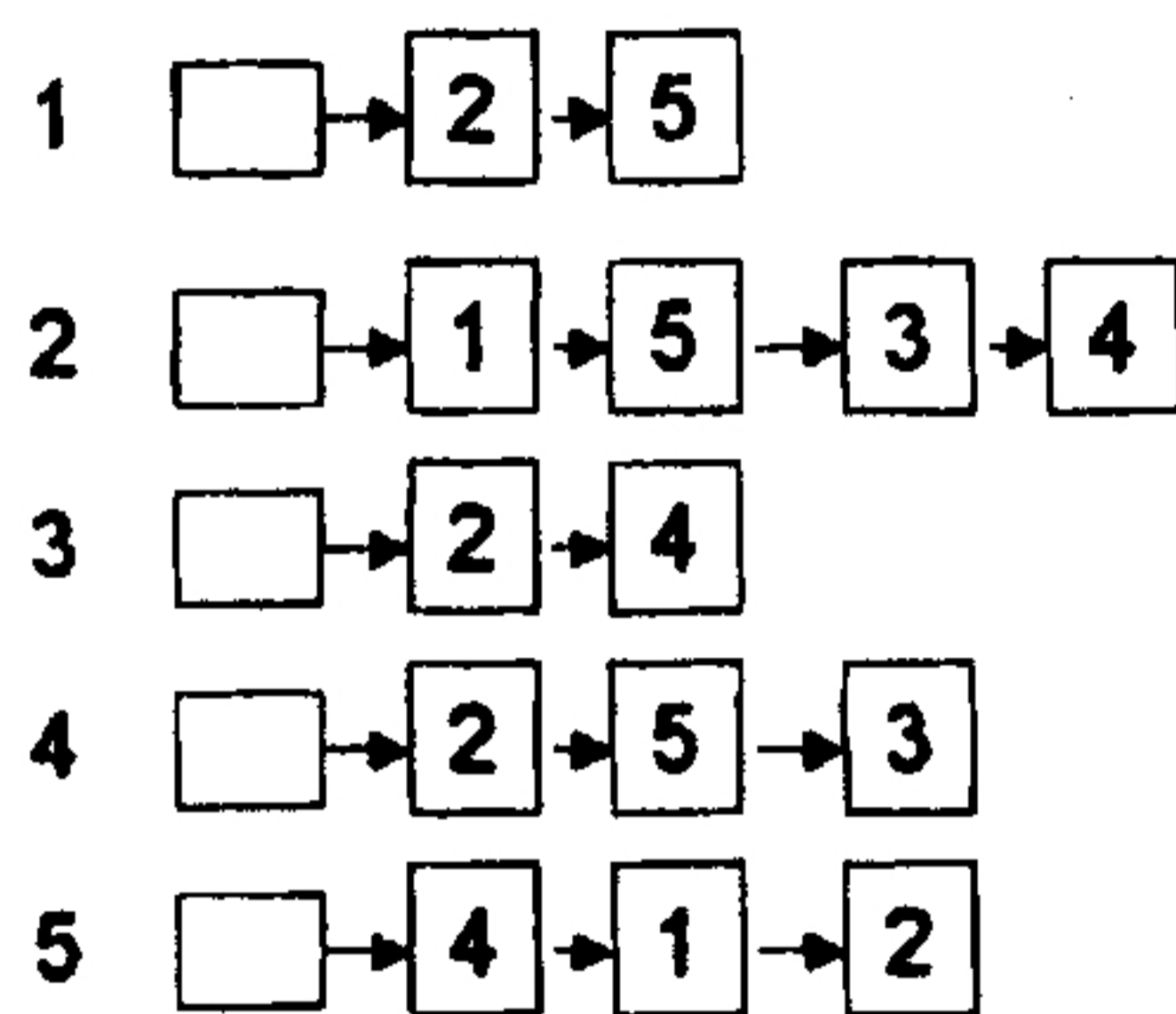
- (1) (2%) An infix expression can be converted to its postfix expression. Given an infix expression, $A/B-C*D+E*F+G$, what is its postfix expression?
- (2) (7%) Write an algorithm to convert from infix to postfix expression using pseudo code.

(五) (10%) Determine whether the following statements are correct:

(1) $n^3 + n \log n = \Theta(n^3)$ (2) $n! = O(n^n)$.

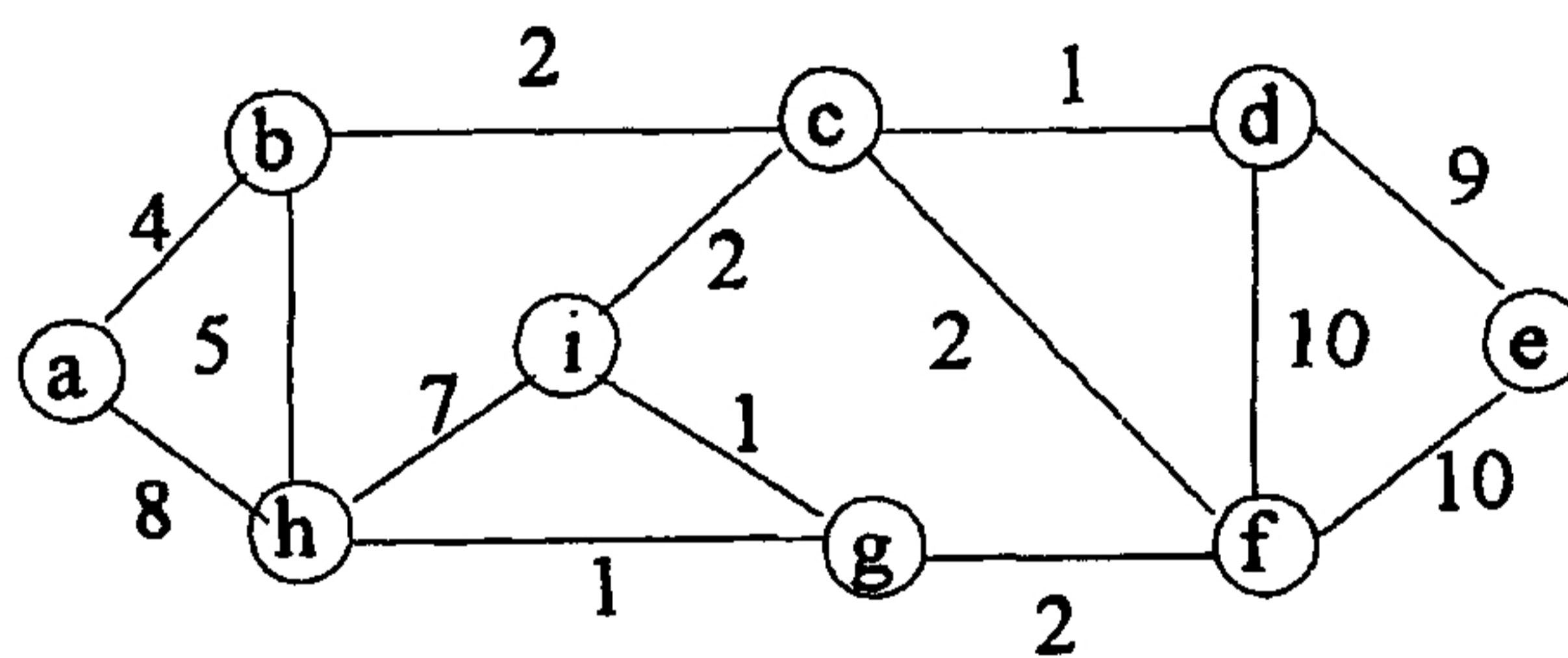
(六) (10%) (1) Build a **max heap** by the following value: 179, 208, 306, 859, 984, 55, 9, 271, 33. (2) Rebuild the heap after 984 is deleted.

(七) (10%) Given an **adjacency list** representation of a graph in the following figure, please draw this graph. Further, show the **adjacency matrix** representation of this graph.



Adjacency list

(八) (10%) Show a **minimum cost spanning tree** of the following figure by (1) Kruskal's Algorithm (2) Prim's Algorithm.



(九) (10%) What is **hashing**? Describe the differences between **static hashing** and **dynamic hashing**.