

國立高雄應用科技大學
101 學年度碩士班招生考試
電機工程系

准考證號碼 (考生必須填寫)

資料結構 (丙組)

試題 共 2 頁，第 1 頁

- 注意：a. 本試題共 4 題，每題 25 分，共 100 分。
 b. 作答時不必抄題。
 c. 考生作答前請詳閱答案卷之考生注意事項。

1. (a) Find the minimum cost spanning tree in the weighted undirected graph as shown in Figure 1 by Kruskal's algorithm, and number the edge selected in each step of the process of finding the minimum cost spanning tree. (5 points)
 (b) Find the shortest path from vertex A to each one of the other vertices in Figure 2 by Dijkstra's algorithm, and write out the process of applying Dijkstra's algorithm. (10 points)
 (c) For the graph in Figure 3, list every possible order in which depth-first search (DFS) can visit the vertices of the graph if starting from vertex A. (10 points)

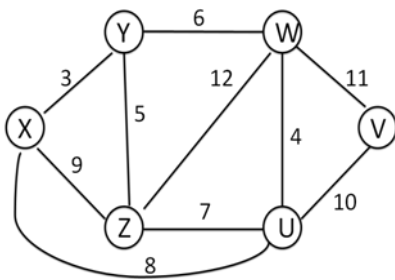


Figure 1.

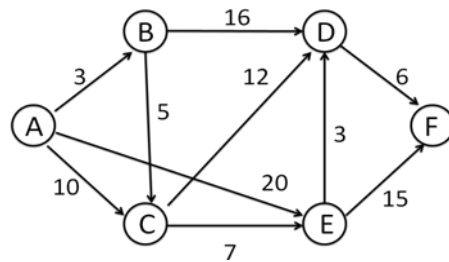


Figure 2.

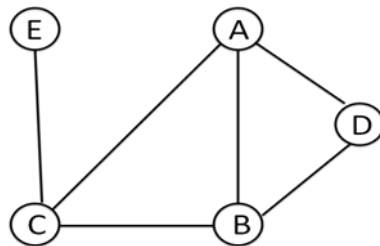


Figure 3.

背面尚有題目

2. (a) Write out the infix expression of the postfix expression: $12+3*456-/+$. (10 points)
 (b) Draw a binary tree to represent the infix expression in Question 2.(a). (5 points)
 (c) Write out the preorder traversal of the binary tree in Question 2.(b). (5 points)
 (d) Interpret the integer array $[23, 4, 17, 54, 9, 13, 36]$ as a binary tree, and adjust the binary tree to make it become a balanced search tree. (5 points)
3. (a) Sort the number list $(18, 4, 57, 21, 46, 32)$ in ascending order by using a max heap tree, and write out the status of the number list at the end of each iteration of the heap-sort process. (10 points)
 (b) Assume you are requested to move the four disks from the tower1 to the tower 3 in Figure 4. You must obey the following two rules: (1). Only one disk can be moved at any time; (2) No disk can be placed on top of a disk with smaller diameter. Write out the sequence of moves needed to accomplish this task. (15 points)

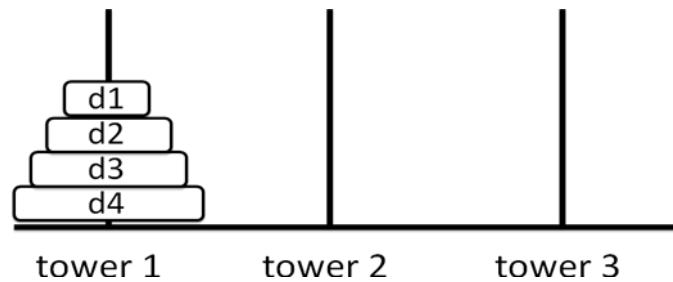


Figure 4.

4. (a) Let n be an integer parameter of a function named as *num*, and write this function by C language to compute and return the value of the n th number in the number sequence $(1, -2, 4, -7, 11, -16, 22, -29, 37, \dots)$. (15 points)
 (b) Let n be an integer parameter of a recursive function called *sum*, and write this recursive function by C language to compute and return the value of the expression: $\sum_{i=0}^n 2^i$. (10 points)