

八十五學年度國立台灣工業技術學院研究所碩士班招生考試

所 別：管理技術研究所

學程別：資訊管理學程

組別：

科目：資料結構

1. (1) There are three disjoint sets which are represented by the trees as shown in Fig.1. Show the array which represents the sets. (10%)
- (2) Explain how to apply the two operations "find" and "union" of disjoint set structure to Kruskal's algorithm, which finds a minimum cost spanning tree in a graph. (6%)

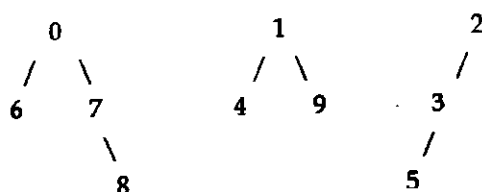


Fig. 1

2. Consider an AOE network which has 9 vertices and 11 edges. The edge set consists of $a_0 = (0,1,5)$, $a_1 = (0,2,4)$, $a_2 = (0,3,4)$, $a_3 = (1,4,2)$, $a_4 = (2,4,1)$, $a_5 = (3,5,1)$, $a_6 = (4,6,8)$, $a_7 = (4,7,6)$, $a_8 = (5,7,5)$, $a_9 = (6,8,3)$, $a_{10} = (7,8,3)$, where the triple (V_1, V_2, W) represents that there is a directed edge with weight W pointed out from vertex V_1 to vertex V_2 .
 - (1) Compute the earliest (Early) and the latest (Late) activity times as well as Slack (Late - Early) times of the 11 activities. (11%)
 - (2) Show its critical path. (4%)
 - (3) How do you apply adjacent list and inverted adjacency list to computing the earliest times and the latest times? (4%)
3. Consider chained matrix multiplication $M_1 \times M_2 \times M_3 \times M_4$, where matrix M_1 is with dimension 6×3 , M_2 is with dimension 3×10 , M_3 is with dimension 10×2 , and M_4 is with dimension 2×5 . Use dynamic programming approach and a 2-dimensional array to find the optimal matrix multiplication sequence, which has the minimum number of multiplications. Show the procedure of computing the optimal solution and add parenthesis adequately in order to show the multiplication sequence such as $((M_1 \times M_2) \times M_3) \times M_4$. (15%)
4. (a) Is quicksort stable? Give an example of input list to confirm your answer. (7%)
 (b) Is heapsort stable? Give an example of input list to confirm your answer. (8%)
5. Consider the regular precedence relationships among the operators $+$, $-$, $*$, $/$. Given the postfix form of expression: $a b / c - d e * + a c * -$, what is its prefix form? (15%)
6. Hashing is one of the known fast searching schemes. Describe at least three methods for handling the collision problem when applying hashing technique? (20%)

