

國立中正大學

115 學年度碩士班招生考試

試題

[第 4 節]

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| 科目名稱 | 資料結構 |
| 系所組別 | 資訊管理學系-乙組 |

—作答注意事項—

※作答前請先核對「試題」、「試卷」與「准考證」之系所組別、科目名稱是否相符。

1. 預備鈴響時即可入場，但至考試開始鈴響前，不得翻閱試題，並不得書寫、畫記、作答。
2. 考試開始鈴響時，即可開始作答；考試結束鈴響畢，應即停止作答。
3. 入場後於考試開始 40 分鐘內不得離場。
4. 全部答題均須在試卷（答案卷）作答區內完成。
5. 試卷作答限用藍色或黑色筆（含鉛筆）書寫。
6. 試題須隨試卷繳還。

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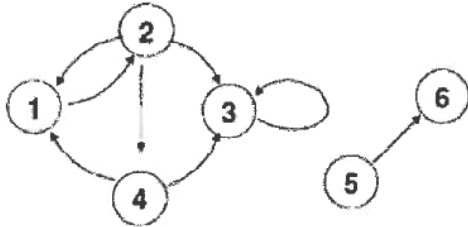
科目名稱：資料結構

本科目共 1 頁 第 1 頁

系所組別：資訊管理學系-乙組

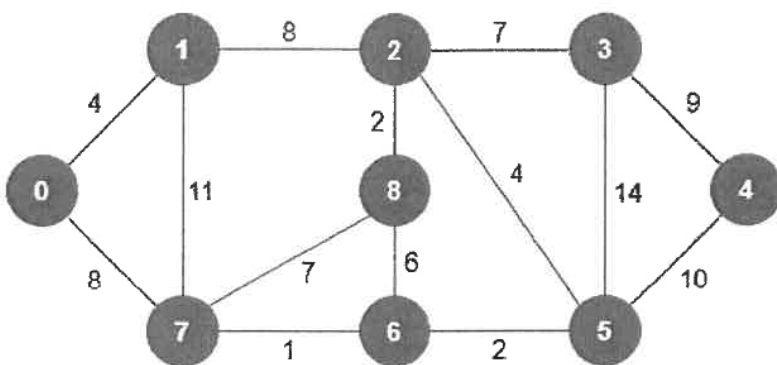
Briefly answer the following questions.

- For the list, (A (B (E (Z, L, K), F), D (H (M), P, C (W), O (X)))), please (a) draw the corresponding tree for the list; (5%) (b) Please transform the tree to a binary tree and draw this binary tree (5%).
- For the following graph, (a) please write its corresponding adjacent matrix and adjacent list. (5%) (b) please write an algorithm or pseudo code to reply how many isolated parts in a graph. In this example, the answer of the algorithm will be 2. (5%)



- Please draw AVL tree, from empty AVL tree and then read the input one by one for the following six keys, w, y, a, m, t, l. The rotation of the tree may be needed. (10%)
- Please draw the expression (binary) tree for the following expression,

$$A * b - c / (d - e) * f + g + h * (-j)$$
 Then write the pre-order algorithm for the pre-order traversing. (10%)
- Recursion a type of divide-and-conquer technique in algorithmic perspective, which is composed by boundary condition(s) and formula for problem-size reduction. (a) Please write a recursive function to calculate the function, $f(n) = 3^n$, n is positive integer, and indicate the boundary condition. (10%); (b) Please write the recursive program for the function $f(n)$. (10%).
- (a) Please write the shortest path algorithm (or pseudo codes) to find the shortest path from given starting node to all other nodes in a graph (i.e., a minimal spanning tree by *Dijkstra's algorithm*) (10%). (b) Please draw the spanning tree with the least cost from node 0 for the tree in the following graph where the number between two nodes are the cost of the path. (10%)



- Continue for the above graph, (a) please write the algorithm (or pseudo codes) to find the shortest path given the starting node and end node. (10%) (hint: you can use the dynamic programming technique like Bellman-Ford algorithm); (b) Please use the find the shortest path from node 0 to node 3 (10%)