

※ 考生請注意：本試題不可使用計算機

I. Multiple choice and Short answer questions.

1. What are the major data structures used in RDBMS area?(5%)
(a) Array (b) Linked list (c) Tree (d) Graph (e) None of the above
2. What kind of data structures is the most suitable to implement sparse matrix?(5%)
(a) Array (b) Stack (c) Queue (d) Multilinked list (d) Tree (e) Graph
3. What is the minimum number of queues needed to implement the priority queue? Please explain your answer.(5%)
4. How many different trees are possible with 8 nodes? Why?(5%)
5. If you are using C language to implement the heterogeneous linked list, what pointer type will you use? Why?(5%)
6. Show that in a binary tree with N nodes, there are $N+1$ NULL links representing children.(5%)
7. Convert the expression $((A + B) * C - (D - E) ^ (F + G))$ to equivalent Prefix and Postfix notations.
(10%)
8. Show the result of inserting 2, 1, 4, 5, 9, 3, 6, 7 into an initially empty AVL tree. (10%)

(背面仍有題目,請繼續作答)

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II.

9. iPhone 5 is a new announced product and the customer needs to put a preorder request for getting the chance to buy it. Those preorder data should be kept for first come first serve. You are a programmer and have been asked to write a program to keep customers' requests in computer memory. Which data structure should be used to keep the order requests and why? (4%)
10. Please explain what a hight-baised leftist tree is and give an example leftist tree whose tree height equals to 3 ? (6%)
11. What are the differences between the internal sort and the external sort? (4%) When doing the external sort, how many passes will a 4-way merge on 16 runs process be completed in? (4%)
12. Please describe in detail how to build the winner tree of {4,3,6,8,9,4,5,2,11,15,2,6,5,8} in increasing order. (9%)
13. If these data {4,3,6,8,9,4,5,2,11,15,2,6,5,8} need to be used to construct a hash table with density < 0.5, please explain what the **minimum bucket size** will be when liner probing is used together with positive integer hash function, and there are 2 slots in each bucket. (5%)
14. Please describe the sorting process of {4,15,3,6,8,5,2,11} in decreasing order step by step:
 A. Insertion sort (5%)
 B. Quick sort (5%) (pivot based on median-of-three rule)
15. Please explain how to find the shortest path for node A by Dijkstra's algorithm step by step. (8%)

