

國立臺北科技大學

九十四學年度電機工程系博士班入學考試

計算機理論試題

填准考證號碼

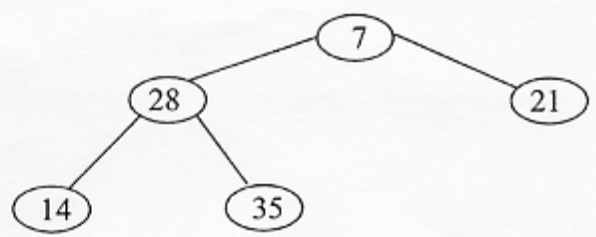
第一頁 共一頁

--	--	--	--	--	--	--	--

注意事項：

1. 本試題共 10 題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. (A) What is a max heap? (4%)
 (B) Given a binary tree as shown below, you are required to rebuild it into a max heap. Show how you obtain the resultant max heap. (6%)



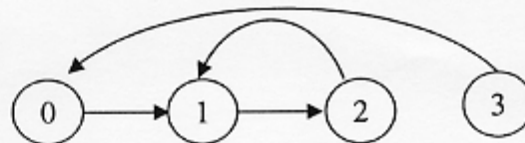
2. Given an input list of n elements,
 - (A) What are the average computation time and worst computation time using quick sort and bubble sort, respectively? (6%)
 - (B) At what condition does bubble sort rather than quick sort be adopted for sorting? (4%)
3. Both Divide-and-Conquer (D&C) algorithm and Dynamic Programming (DP) algorithm solve problems by combining the solutions to subproblems, what are the features of problems that we would apply DP rather than D&C? (10%)

4. If $T(n)$ is the number of operations, and the recurrence relation is

$$T(n) = \begin{cases} b, & n = 1, b \text{ a constant} \\ 2T(n/2) + c, & n > 1, c \text{ a constant} \end{cases}$$

What is the Big- O of $T(n)$? (10%)

5. Given n inputs $A(1:n)$, a function SELECT selects an input from A , removes it and assigns its value to x , FEASIBLE is a Boolean-valued function that determines if x can be included into the *solution* vector. UNION is a function which combines x with *solution* and updates the objective function. Write a procedure that uses Greedy method to obtain a feasible solution. (10%)
6. For a graph G as shown below,
 (A) Express this graph using adjacency matrix, transitive closure matrix, reflexive closure matrix of G , respectively. (6%)
 (B) What is the output if we perform topological sort on this graph? (4%)



7. Let p = the probability of a page fault, t = the time for memory access, and f = the page-fault time,
 (A) What is the effective access time for a demand-page system? (4%)
 (B) What factors determine f , the page-fault time? (6%)
8. In terms of CPU scheduling,
 (A) What is a CPU burst and what is an I/O burst? (6%)
 (B) What kind of CPU burst would an I/O bound program typically have? (4%)
9. Given memory partitions of 100K, 500K, 300K, 250K, and 600K (in order), how would each of the First-fit and Best-fit algorithms place processes of 222K, 414K, 108K, and 426K (in order)? Which algorithm makes the more efficient use of memory? (10%)
10. For an operating system,
 (A) What resources are used when a thread is created? (5%)
 (B) How do they differ from those used when a process is created? (5%)