

國立臺北科技大學

九十二學年度電機工程系博士班入學考試

計算機理論（電機乙組）試題

填准考證號碼

第一頁 共一頁

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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. What is the NP-complete problem?(5%) How to prove that a problem A is NP-complete? (5%)
2. Give an $O(\log(n))$ algorithm to compute the value of an exponential term x^n . (10%)
3. Solve the recurrence equation:
$$T(n) = T(n-1) + n \cdot \log(n) \text{ for } n > 1 \text{ and } T(1) = 2.$$
What is $T(n)$ in terms of big O notation? (10%)
4. What is the critical-section problem? (5%)
5. Describe the differences among short-term, medium-term, and long-term scheduling in operation system. (10%)
6. What are the four necessary conditions needed before deadlock can occur in operation system? (5%)
7. Suppose that the head of a moving-head disk with 201 tracks, numbered 0 to 200, is currently serving a request at track 110 and has just finished a request at track 100. The queue of requests is kept in the FIFO order: 75, 120, 95, 180, 90, 150. What is the total

number of head movements needed to the requests for the following disk-scheduling algorithms?

- i. FCFS scheduling (5%)
- ii. SCAN scheduling (5%)
- iii. LOOK scheduling (5%)

8. Give a recursive algorithm to calculate the tree height for a given binary tree. (10%)

9. Assume the nodes of a binary tree T are labeled by capital letters. The inorder traversal of T is $A B C D E F G H I J$, and the preorder traversal is $G D B A C E F I H J$. What is the postorder traversal of T ? (10%)

10 Describe the major difference between the following:

- i. Interpreter vs. Compiler (5%)
- ii. CISC vs. RISC (5%)
- iii. multiprogramming system vs. time-sharing system (5%)