

國立交通大學九十學年度碩士班入學考試試題

科目名稱：計算機概論(071)

考試日期：90年4月22日 第3節

系所班別：資訊科學系

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*作答前,請先核對試題、答案卷(試卷)與准考證上之所組別與考試科目是否相符!!

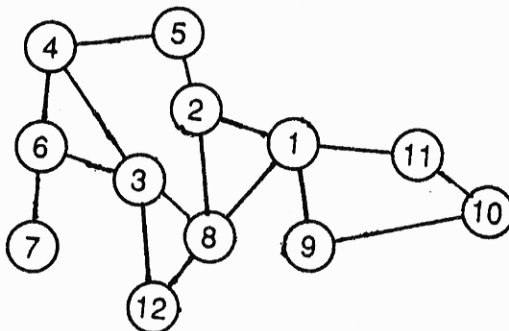
(A) (10%) 單選, 答錯不倒扣。

1. The software used to explore the Internet is called
(a) ISP. (b) a browser. (c) e-mail. (d) PDA.
2. The file format most suitable for photographs is
(a) PNG (b) GIF (c) HTM (d) JPG
3. HTML consists of a set of commands call tags. The tag used for links is the
(a) body tag (b) anchor tag (c) head tag (d) image tag
4. Which is not an image tag attribute in HTML ?
(a) SRC (b) ALIGN (c) HEIGHT (d) HREF
5. Which is not a type of database model
(a) relational (b) network (c) hierarchical (d) operational
6. The set of widely accepted video standards is known as
(a) WORM (b) CD-R (c) MPEG (d) DVD.
7. A license for a customer to make multiple copies of a given piece of software is called a
(a) site license. (b) transfer license. (c) copy license. (d) matching license.
8. To access the Internet, TCP/IP software is
(a) not available to computers in a LAN.
(b) used by all different types of computers.
(c) used only by mainframes.
(d) limited to certain types of personal computers.
9. In a network, a computer dedicated to screening access from outside the network is called a(n)
(a) connector (b) firewall (c) web server (d) bridge.
10. The unique address of a web page or file on the Internet is called a(n)
(a) domain (b) applet (c) URL (d) http

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(B)

- Assume in a byte machine, A is an array declared as $A[-1..m, 2..n]$ and each element occupied 3 bytes. The address of $A[3,5]$ is at 180 and $A[5,3]$ is at 138.
 - Find the address of the element $A[-1,2]$. (2%)
 - Find m or n . (only $m=?$ or $n=?$) (2%)
- A queue is maintained in an array $Q[\text{Maxsize}]$ as circular. The condition **fornt==rear** is **true** if the queue is empty and the queue is full! Derive two different kind methods to solve this problem.(4%)
- Let P be a pointer to a circular singly linked list. Use this list to representation as a queue. Write algorithms to add and delete elements of the queue.(specify the value when the queue is empty). What are the time complexity of your algorithms.(6%)
- Prove by induction. For any nonempty max heap, H , if N_0 is the number of leaf nodes and the N_2 the number of degree 2, then $N_0 = N_2 + 1$. (4%)
- We have a list of records($R_1, R_2, \dots, R_n$). Each record, R_i , has a key value K_i . The sorting problem then of find a permutation, σ , such that $K_{\sigma(i)} \leq K_{\sigma(i+1)}, 1 \leq i < n-1$. The sorted list is ($R_{\sigma(1)}, R_{\sigma(2)}, \dots, R_{\sigma(n)}$). If we wanted the permutation have other property : If $i < j$ and $K_i = K_j$ in the input list, then R_i precedes R_j in the sorted list. To indicate the following sorted methods can be used or can't be used. (6%)
 - inserted sort
 - quick sort
 - merge sort
 - heap sort
 - selected sort
 - bubble sort
- Given an undirected graph as following, it representation as adjacency-list and the nodes are saved as ascending order of the vertices number. List the visit order of vertices number from vertex 1. (6%)
 - by depth-first search
 - by breadth-first search



(B)

7. There are three major methods of storing files of data in secondary storage. Please describe these file organizations. 9%
8. What is a VPN (virtual private network)? What basic techniques are applied to make a VPN possible? 10%
9. Explain the following terms: (a) CSMA/CD, (b) ADSL, (c) RAID. 6%
10. The following questions are about 2-3-4 tree
 - a. Define a 2-3-4 tree. 2%
 - b. In what case a 2-3-4 tree has the minimum height? And what is the height of that 2-3-4 tree with the minimum height (give me a better bound rather than $O(\log n)$)? 2%
 - c. Suppose that you have a 2-3-4 tree, T , in which you have stored n integers. Describe the algorithm to insert an integer in to T . 2%
 - d. Which one of the two, $O(\log n)$ or $\Theta(\log n)$, can best describe the time complexity for insertion the integer? Please give me your reason. 2%
11. Stack
 - a. Give me an example that in a computer system where there needs a stack. 2%
 - b. How to implement a queue using 2 stacks? You should describe the methods to do **inqueue** (insertion an item into a queue) and **dequeue** (deletion an item from a queue) in term of stack operations. 5%
 - c. What is the worst case time complexity for a single **dequeue**? 2%
 - d. Suppose that you start with an empty stack. After a sequence of n **inqueues** and **dequeues** operations, what is the average cost for each operation. And what is (are) your reason(s). 5%
12. 在一個電腦網路中, 如果兩部電腦可以連接則這兩部電腦間存在一條 path (電線連接電腦再經過電線連到下一部電腦, ...), 而且 path 上的電腦均工作正常。
 - a. 如果電線很貴而你要將 n 部工作正常的電腦用最少的電線連起來, 你要怎麼連接這些電腦? 如何算出你要的答案? 你所用的演算法的 time 以及 space 的 complexity 分別為何? 5%
 - b. 如果將 n 部電腦連接的網路已經在了。你要如何檢查在現有的網路中, 如果壞掉一部電腦, 所有其他的電腦仍互相連接。你的演算法 time 及 space 的 complexity 為何? 5%
 - c. 如果所有電腦兩兩之間都有線相連, 則不管電腦壞掉幾部, 所有正常工作的電腦都仍可以互相連接。這種連法是否可行? 為什麼? 3%