

國立中山大學100學年度碩士班招生考試試題

科目：計算機概論【資管系碩士班甲組】

選擇題（每題五分）請注意前 7 題是單選題，後 6 題為複選題。

1. (single choice) Given a list of input data: 15, 12, 9, 22, 18, 43, 2, and 38. A binary search tree is constructed based on the above input. Using binary search, how many comparisons you need to get the answer when searching for 38? (A) 2 (B) 3 (C) 4 (D) 5 (E) None of the above.
2. (single choice) Which of the following data structures is suitable for handling recursive calls? (A) tree (B) queue (C) array (D) stack.
3. (single choice) An $m \times m$ matrix denotes the social relationship among m persons. John is one of them. We can find John's friends from the matrix. A group of persons is in the same social circle if they all know each other. For example, John knows three persons, A, B, and C. The group, John, A, B, and C, is in the same social circle because they all know each other. What is the time complexity of finding John's social circle? (A) $O(m)$ (B) $O(m^2)$ (C) $O(m^3)$ (D) None of the above.
4. (single choice) Which of the following statements is **NOT** true?
(A) Multiprogramming means that more than one program are ready to be executed at the same time.
(B) Multiprogramming can improve CPU utilization.
(C) Multiprocessing means that more than one processor can execute programs in parallel.
(D) Multiprocessing is able to reduce the CPU time for each process.
5. (single choice) Which of the following I/O device is not "interrupt" based? (A) Keyboard (B) Monitor Display (C) Ethernet LAN card (D) None of the above.
6. (single choice) What is the syntax of creating a database table?
(A) OPEN DATABASE [table_name] (.....)
(B) CREATE TABLE [database_name] (.....)
(C) OPEN TABLE [database_name] (.....)
(D) CREATE DATABASE [table_name] (.....)
7. (single choice) Given a list, do the following: (Step 1) Find an element S from the list. Split the list into two and exchange elements such that all the elements in the first one are smaller than or equal to S and those in the second one are greater than S. (Step 2) Repeat step 1 until the given list is sorted. What kind of sort is it?
(A) Merge sort
(B) Index sort
(C) Quick sort
(D) Insertion sort
8. (multiple choices) Which of the following statements is/are true?
(A) In term of connection overhead, UDP has less overhead than TCP.
(B) For large amount of data transmission, UDP is more efficient than TCP.
(C) In an unreliable network, such as wireless network, TCP still can provide reliable transmission.

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- (D) None of the above is true.
9. (multiple choices) Which of the following statements is/are true?
(A) In a LAN (Local Area Network) environment, message is sent in broadcast mode, but only those nodes that have been addressed in the message will receive it.
(B) ARP (Address Resolution Protocol) is used to resolve the mapping between IP address and host name.
(C) CSMA (Carrier-Sense Multiple Access) is a transmission technique used in data link layer.
(D) None of the above is true.
10. (multiple choices) Which of the following statements is/are true?
(A) In relational database, each table is indexed by a key.
(B) E-R model (Entity-Relationship Model) is a data abstract representation often used to design database.
(C) E-R model is used to avoid data redundancy.
(D) None of the above is true.
11. (multiple choices) Which of the following statements is/are true?
(A) Cache is often used to speed up memory access time.
(B) Web proxy is an extension of cache concept used to speed up web browsing.
(C) Gateway connecting two networks is an extension of cache concept used to speed up network connection.
(D) None of the above is true.
12. (multiple choices) Which of the following statements is/are true?
(A) Client-server model is a communication approach where a server is always on waiting for client's requests.
(B) (P2P) Peer-to-peer model is a communication approach where each peer can be a server or a client.
(C) Socket can be used to implement P2P or client-server communication.
(D) None of the above is true.
13. (multiple choices) Which of the following terms are belonged to Web Service?
(A) UDDI (B) CDMA (C) WSDL (D) SOAP

應用題

14. (5%) Consider the design of a program for reporting the voting survey (投票民調) in a city. We wish to categorize the whole population into the following five groups: (i) Age 19 and under, (ii) Age between 20 to 29, (iii) Age between 30 to 39, (iv) Age between 40 to 49, and (v) Age 50 and above. For each group, we further divide the people into Male and Female subgroups. We have four candidates, Alex, Bob, Carol, and Dennis, in this election. Please answer the following questions:
- (A) You are asked to use a table to show the voting survey results. Please draw a table to illustrate how to report the results of voting survey.
- (B) Your program needs to be able to (1) add a new candidate to the table, and (2) given a [age, sex] group, report the total number of votes for any candidate, and (3) given a candidate, report the total number of votes for this candidate. Which of the following data structures is the best for this program: (a) stack, (b) queue,

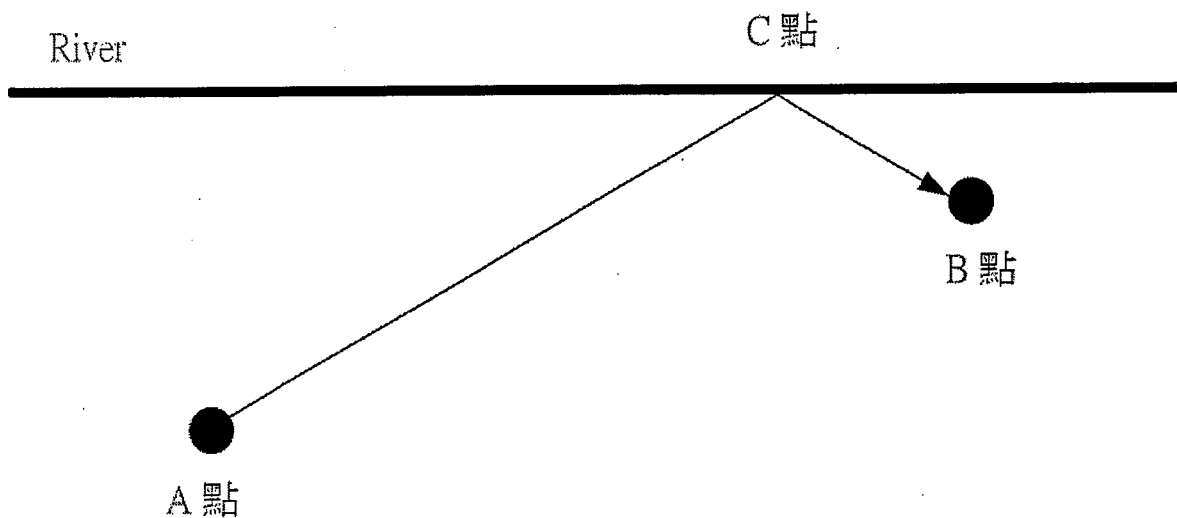
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(c) array, or (d) tree? Justify your answer. (Note that: no justification, no points.)

15. (5%) 請寫出 $a + b * c / d - e$ 式子的 postfix 。
16. (5%) 請將 1, 2, 3, 4, 5, 6, 7, 8, 9 等數目分別填入 3X3 矩陣內 (如下圖)，使每行、每列、斜對角的三個數目的加總都相等。

17. (10%) 軟體架構是當今資訊世界最熱門題材之一。
- (A) 請簡略地說明什麼是軟體架構(Software Architecture)?
- (B) 請簡略地說明什麼是 Architecture Framework(AF)?
18. (10%) 下圖中有一條河(River)，離河有些距離處有 A 點和 B 點兩個地方。張三從 A 點開始，提著水桶走到河的 C 點處裝滿水後，再走到 B 點。假設 AC 代表 A 點到 C 點的直線路程，CB 代表 C 點到 B 點的直線路程，則張三總共走了 AC + CB 的路程)。



- (A) 請問要如何定出 C 點處，如此 AC + CB 的路程將是最短的?
- (B) 請 Prove 你定出的 C 點處是會讓 AC + CB 的路程最短的。