國立中正大學
112學年度碩士班招生考試
試 題

[第1節]

科目名稱	計算機概論
系所組別	資訊管理學系－甲組 乙組
	資訊管理學系醫療資訊管理

－作答注意事項－

※作答前請先核對「試題」、「試卷」與「准考證」之系所組別、科目名稱是否相符。

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5. 試卷作答限用藍色或黑色筆（含鉛筆）書寫。
6. 試題須隨試卷繳還。

國立中正大學112學年度碩士班招生考試試題

科目名稱：計算機概論　　本科目共 2 頁　第 1 頁

系所組別：資訊管理學系-甲組、乙組

資訊管理學系醫療資訊管理

[Session I] Multiple Choice 選擇題(單選，每題 3 分)

Choose ONE answer only for each question (3 points for each question)

1. The memory location of a certain program is $DC20_{(16)}$ to $E0B9_{(16)}$, how many bytes is the memory occupied by this program?

   A. 1.28K　　B. 7.81K　　C. 0.488K　　D. 1.15K

2. Which of the following value is $BCD_{(16)}$'s 15's Complement?

   A. 433　　B. 432　　C. 68B　　D. 6AD

3. What is the average rotation time to locate the specific sector in a disk which rotates at the speed of 5400 revolutions per minute?

   A. 5.6msec　　B. 11.1msec　　C. 8.3msec　　D. 83msec

4. Which of the following item is not an input signal of CPU?

   A. Interrupt Request　　B. Data Bus　　C. Address Bus　　D. DMA Request

5. Which of the following has the shortest fetch speed?

   A. Index Addressing　　B. Relative Addressing

   C. Absolute Addressing　　D. Indirect Addressing

6 What is a logic error?

   A. An error that occurs when a program is running because, for example, the wrong operator was used.

   B. An error in a statement that does not conform to the syntax of the programming language.

   C. An error in the hardware from overheating.

   D. An error introduced by the compiler when it guesses at how to fix a syntax error.

7. The ping program use which of the following protocol?

   A. LDAP(lightweight directory access protocol)

   B. SAP(session announcement protocol)

   C. ICMP(internet control message protocol)

   D. SNMP(simple network management protocol)

8. What is the approach that attackers use role playing to represent themselves as people of authority who are requesting information?

   A. trapdoor　　B. social engineering

   C. data diddling　　D. Trojan horse

[Session II] Problems and Calculations 計算與簡答題

1.(5 pts) Express the following function in a simplified product of sums and implement it using only NOR gate:

$F(W, X, Y, Z) = \sum m(3, 4, 6, 11, 12, 13, 14) + \sum d(9, 15)$

2. (a) (8 pts) What is SOP and POS respectively?

(b) (8 pts) Use simplified F together with its don't care condition d with SOP and POS respectively.

$F(A, B, C, D) = \sum(0, 1\ 2, 8, 9, 12, 13)$

$d(A, B, C, D) = \sum(10, 11, 14, 15)$

3. (a) (4 pts) A non-pipeline processor A has an average Clock Per Instruction of 4 and has a clock rate of 40MHz. What is the Million Instruction Per Second rate of the processor?

(b) (4 pts) A four-stage pipeline processor B has the same clock rate as processor A, what is the maximum speedup of processor B compared with A?

4. Accounts for the following algorithms, what are the worst time, average time, extra memory need, and stability while using the algorithm to sort *n* object?

(a) (16 pts) bubble sort

(b) (16 pts) quick sort

5. For the following I/O interfaces, please explain how do they work, the differences between them, and their efficiency in terms of data transfer rate and processor utilization.

(a) (5 pts) Programmed input/output

(b) (5 pts) Interrupt-device input/output

(c) (5 pts) Direct Memory Access

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[第 2 節]

科目名稱	管理資訊系統
系所組別	資訊管理學系-甲組

—作答注意事項—

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國立中正大學 112 學年度碩士班招生考試試題

科目名稱：管理資訊系統　　本科目共 1 頁　第 1 頁

系所組別：資訊管理學系-甲組

總共 4 大題，每大題 25 分

1. Regarding the information systems function in an organization, please
   a. Describe the services provided by the information systems department. (8 分)
   b. Define and compare the roles played by programmers, system analysts, and business analysts. (8 分)
   c. Define and compare the roles played by chief information officer (CIO), chief security officer (CSO), chief data officer (CDO), and chief knowledge officer (CKO). (9 分)

2. Regarding the tools and technologies for safeguarding information resources, please
   a. Name and describe three authentication methods. (8 分)
   b. Describe the role of encryption and digital certificates in a public key infrastructure. (8 分)
   c. Describe the roles of firewalls, intrusion detection systems, and intrusion protection systems in promoting security. (9 分)

3. Regarding the computer hardware platforms, please
   a. Explain how businesses can benefit from virtualization, green computing, and multicore processors. (8 分)
   b. List the essential characteristics of cloud computing and distinguish between a public cloud and a private cloud. (8 分)
   c. Identify and describe the security problems posed by cloud computing. (9 分)

4. Regarding information systems development, please
   a. Define an application software package and explain the advantages and disadvantages of developing information systems based on application software packages. (8 分)
   b. Define outsourcing and describe the advantages and disadvantages of using outsourcing for building information systems. (8 分)
   c. Define rapid application development and agile development and explain how they can speed up system building. (9 分)

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試 題

[第2節]

科目名稱	資料結構
系所組別	資訊管理學系-乙組

—作答注意事項—

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國立中正大學 112 學年度碩士班招生考試試題

科目名稱：資料結構　　本科目共 3 頁　第 1 頁

系所組別：資訊管理學系-乙組

1. (10 points) Give tight asymptotic bounds for each of the following recurrences.

(1) $T(n) = 2T\left(\frac{n}{2}\right) + n$

(2) $T(n) = T\left(\frac{n}{4}\right) + T\left(\frac{3n}{4}\right) + n$

(3) $T(n) = T\left(\frac{n}{5}\right) + T\left(\frac{3n}{4}\right) + n$

(4) $T(n) = 2T(\sqrt{n}) + \log n$

(5) $T(n) = 2T\left(\frac{n}{2}\right) + \frac{n}{\log n}$

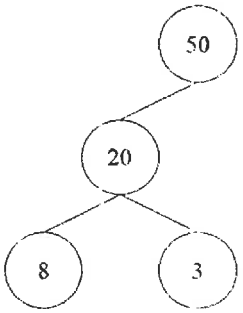
2. (8 points) Given a 3-D integer array A[3][5][7]. The address of the first element A[0][0][0] is 1000, and size of an integer is 4 bytes. Please find the possible addresses of A[1][2][4] (for both row-major and column-major).

3. (8 points) A postfix expression is given as "abc/de − +/fg +×". The values a, b, c, d, e, f, g are 8, 4, 2, 3, 1, 2, 1, respectively.
(1) Convert the expression to an infix expression.
(2) Evaluate the expression to get an output.

4. (10 points) Given the following recurrence function. Please calculate f(2) and f(4).

```
int f (int x) {
  if (x == 1)
    return 0;
  else
    return x * f(x - 1) + x * x * x;
}
```

5. (5 points) Please explain why the following binary tree is not a max-heap.



6. (10 points) (True or False) Given the binary tree where the outcome of inorder traversal is BADECF and

postorder traversal is BDEFCA. Please answer the following questions.

(1) Whether A is the root.

(2) Whether D is E's parent.

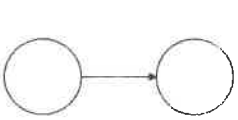
(3) Whether E is a leaf node.

(4) Whether C has 2 children.

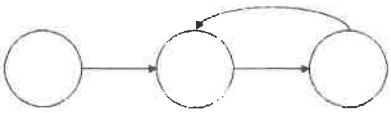
(5) Whether F is E's child.

7. (10 points) Which of the following digraphs is (are) strongly connected?

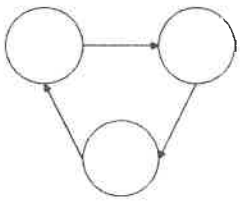
(1)



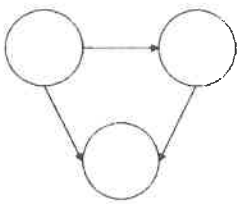
(2)



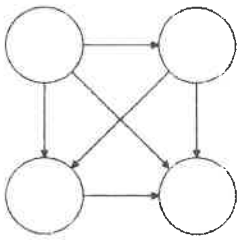
(3)



(4)



(5)



8. (4 points) Please illustrate the update formula of Floyd-Warshall algorithm, if $d_{ij}^{(k)}$ denotes the weight of a shortest path from vertex i to vertex j for which all intermediate vertices are in the set $\{1, 2, \cdots, k\}$.

9. (9 points) Given the following list, show the steps of locating the target '21' by binary search.
1 3 5 7 9 11 13 15 17 19 21 23
Show the top, bottom, and middle elements in each step.

10. (10 points) What is an optimal Huffman code for the following elements with their frequencies?
a: 15, b: 20, c: 25, d: 10, e: 30

11. (8 points) Construct an AVL tree by inserting 2, 3, 5, 1, 4, 6, 7, and 8 successively from a null tree.

12. (8 points) Given a matrix-chain product $M1 \cdot M2 \cdot M3 \cdot M4$. Please find the optimal parenthesization of the matrix-chain product where the dimensions are: $M1: 25 \times 30$, $M2: 30 \times 15$, $M3: 15 \times 40$, and $M4: 40 \times 20$, respectively.