

# 大同大學 98 學年度研究所碩士班入學考試試題

考試科目: 計算機概論

所別: 資訊工程研究所

第 1/2 頁

註: 本次考試 不可以 參考自己的書籍及筆記; 不可以 使用字典; 不可以 使用計算器。

## I Multiple-choice Questions: (45%)

01. \_\_\_\_\_ The OSI model defines network architecture in (1) 4 (2) 7 (3) 5 (4) 4 layers.
02. \_\_\_\_\_ To store audio on a digital storage device, which of the following format uses the least amount of space?  
(1) wav (2) mid (3) mp3 (4) cda
03. \_\_\_\_\_ Which of the following is not an OS? (1) Windows (2) SQL (3) Linux (4) Solaris
04. \_\_\_\_\_ Which of the following is not a characteristic of structured programming? (1) use of goto statements (2) top-down design (3) only one entry and exit to each program module (4) weak coupling and strong cohesion
05. \_\_\_\_\_ An assembly program needs to be (1) compiled (2) parsed (3) interpreted (4) assembled.
06. \_\_\_\_\_ The three control structures found in structured programming are sequence, iteration, and (1) repetition (2) selection (3) function (4) recursion
07. \_\_\_\_\_ Whether a microprocessor is 32-bit or 64-bit is determined by (1) the number of registers (2) the width of the address bus (3) the width of the control bus (4) the width of the data bus
08. \_\_\_\_\_ Two programming languages specifically designed for artificial intelligence are (1) C and C++ (2) Java and C++ (3) LISP and PROLOG (4) FORTRAN and COBOL
09. \_\_\_\_\_ What kind of list is also known as a queue? (1) LIFO (2) FIFO (3) ordered (4) unordered
10. \_\_\_\_\_ Digital signatures are a mean to ensure the security of a document. What type of key does the sender of a message use to sign the message? (1) private (2) public (3) secret (4) certified
11. \_\_\_\_\_ Which is the language of choice for providing worldwide Internet solutions? (1) Java (2) C (3) C++ (4) VB
12. \_\_\_\_\_ A malicious stand-alone program that appears to be helpful is called a (1) worm (2) Trojan horse (3) logic bomb (4) mail bomb.
13. \_\_\_\_\_ Which of the following is an error-correcting code? (1) bytecode (2) Hamming code (3) parity code (4) checksums.
14. \_\_\_\_\_ Which of the following is not an e-mail related protocol? (1) IMAP (2) MIME (3) POP3 (4) SMTP.
15. \_\_\_\_\_ Which of the following is not a valid IP address? (1) 210.121.8.3 (2) 122.256.32.10 (3) 63.11.31.1 (4) 121.107.255.33

## II Short-answered Problems:

1. Give the postfix and prefix forms of  $(a+b)*d+e/(f+a*d)+c$  (3%)
2. A certain binary tree has inorder sequence D G B E A F H C and preorder sequence A B D G E C F H. Draw the binary tree. (3%)
3. What is a critical section? What is a mutex, and what is a semaphore? What is the purpose of using a mutex or a semaphore? (4%)
4. What are the three pillars of OOP? What are the three editions of Java? (4%)
5. State the differences among the hub, the switch, and the router. (3%)
6. What is cloud computing? (3%)
7. What are the two most important properties of Huffman encoding? (4%)
8. Please give the state transition diagram for the following transition function and characterize the input strings acceptable by this finite automaton. (4%)

States	inputs	
	0	1
q <sub>0</sub>	q <sub>2</sub>	q <sub>1</sub>
q <sub>1</sub>	q <sub>3</sub>	q <sub>0</sub>
q <sub>2</sub>	q <sub>0</sub>	q <sub>3</sub>
q <sub>3</sub>	q <sub>1</sub>	q <sub>2</sub>

q<sub>0</sub> serves both as the initial and final states.

9. State the four conditions all of which must be satisfied for deadlock to occur. (5%)
10. For each of the programming paradigms below, give a programming language that supports the paradigm: the imperative paradigm, the declarative paradigm, the functional paradigm, and the object-oriented paradigm. (5%)
11. Prove that the following grammar is ambiguous. (4%)  
<S> → <A>  
<A> → <A> + <A> | <id>  
<id> → a | b | c

<背面繼續>

# 大同大學 98 學年度研究所碩士班入學考試試題

考試科目: 計算機概論

所別: 資訊工程研究所

第 2/2 頁

註: 本次考試 不可以參考自己的書籍及筆記; 不可以使用字典; 不可以使用計算器。

<接前頁>

12. An algorithm for solving the Towers of Hanoi with  $n$  disks and three posts labeled A, B, and C is as follows:

*If (post A has only 1 disk)*

*Then move the disk from post A to post C*

*Else*

*a. Recursively move the top  $n-1$  disks from post A to post B.*

*b. Move the remaining bottom disk from post A to post C.*

*c. Recursively move the  $n-1$  disks from post B to post C.*

Find a recurrence for the above algorithm and solve the recurrence. (5%)

13. In the IEEE 754 standard for storing floating-point numbers in single precision (32 bits), how many bits are assigned to the mantissa field? How many bits for the exponent field? How much is the bias? Compute the encoding of  $\pi = 3.14159265$  in single precision by this standard if no rounding is employed. Express your answer in hexadecimal notation. (5%)

14. Simplify the following Boolean function and implement the corresponding circuit using AND, OR, and NOT gates, one gate of each type. (3%)

$$F = (A + \bar{B} + \bar{C})(A + \bar{B}C)$$