

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、選擇題 50 分(每題五分)

1. How many errors per pattern could be corrected when using an error-correcting code in which any two code patterns differ by a Hamming distance of 8?
A. 3 B. 4 C. 5 D. 6
2. Which of the following is not an activity performed entirely within a CPU?
A. Fetch instructions B. Perform Boolean operations
C. Perform arithmetic operations D. Move data between registers
3. Which of the following is not involved in a context switch?
A. Interrupt B. Process table C. Dispatcher D. Shell
4. Which of the following is not a means of connecting networks?
A. Switch B. Server C. Router D. Bridge
5. The insertion sort algorithm is an example of an algorithm in which of the following classes?
A. $\Theta(\lg n)$ B. $\Theta(n)$ C. $\Theta(n \lg n)$ D. $\Theta(n^2)$
6. Which of the following is not constructed by a typical compiler?
A. Source code B. Symbol table C. Parse tree D. Object program
7. Copyright laws were established
A. to allow authors to distribute their work while maintaining certain ownership rights.
B. to allow authors to maintain ownership of their ideas.
C. to restrict access to publications to certain groups within society.
D. to allow ideas to be traced back to their origins.

8. If the number of nodes in a binary tree is 2^n (where n is a positive integer), then the entire tree would contain at least
- A. 2^{n+1} nodes B. 2^{2n} nodes C. $2^{n+1} - 1$ nodes D. 2^{n+2} nodes
9. Which of the following is not a potential problem caused by multiple transactions manipulating a database at the same time?
- A. Lost update problem B. Clustering C. Deadlock D. Incorrect summary problem
10. The class of problems known as NP is so named because it is composed of which of the following?
- A. Non-polynomial problems
B. Non-programmable problems
C. Non-universal problems
D. Non-deterministic polynomial problems

二、非選擇題 50 分

1. (10%) Answer the following questions in terms of the procedure xxx below.

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procedure xxx (N)
if (N < 7) then (print the value of N)
    else (add 3 to the value of N and
        print the value of N)
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A. What value would be printed if the following procedure were executed with the value of N being 4?

B. What value would be printed if the following procedure were executed with the value of N being 9?

2. (10%) The following is an error-correcting code in which any two patterns differ by a Hamming distance of at least three.

Symbol	Representation
A	000000
B	001111
C	010011
D	011100
E	100110
F	101001
G	110101
H	111010

Decode each of the following patterns

010011 _____ 101010 _____ 011000 _____ 101101 _____

3. (10%) Give the postfix expression of the following arithmetic expression.

$$(b+c)*5+(15*m+2)/7+6$$

4. (5%) (a) A computer uses 4 bytes for real numbers. How many different numbers can it represent?

(5%) (b) A certain machine has 16-bit instructions and 6-bit addresses. Some instructions have one address and others have two. If there are n two-address instructions, what is the maximum number of one-address instructions?

5. (10%) If the prime numbers underlying an RSA encryption system are small, the system is not secure. For example, suppose you were told that the public keys of a system were $n = 15$ and $e = 13$.

A. (5%) What are the two prime numbers on which the system is based?

B. (5%) What is the value of the decryption key d ?
