

國立清華大學命題紙

101 學年度 資訊系統與應用研究所 碩士班入學考試

科目 計算機概論 科目代碼 2101 共 4 頁，第 1 頁

*請在【答案卷卡】作答

I. (25%) Answer the following questions.

1. (10%) Assume that an eight-bit floating-point format is represented as $f_0f_1f_2f_3f_4f_5f_6f_7$, where f_0 is the sign bit, $f_1f_2f_3$ is exponent (represented with the three-bit excess system), and $f_4f_5f_6f_7$ is mantissa.
 - (a) What is the largest value that can be represented? Justify your answers.
 - (b) What is the smallest positive value that can be represented? Justify your answers.
2. (5%) Explain that, in a time-sharing system, how high-priority processes can be allowed to run faster than other processes.
3. (10%) Mass storage, main memory, and general-purpose registers are all storage system. Explain the difference in their use.

II. (25%) Answer the following questions.

1. (12%) Define each of the following terms. (Please give the full name for each acronym.)
 - a. TCP/IP
 - b. DNS lookup
 - c. HTML
 - d. XML
 - e. Proxy server
 - f. DoS
2. (7%) The factorial of a positive integer n is defined as $n! = n*(n-1)*...*2*1$. Design two algorithms that compute the factorial of a given positive integer.
 - a. (3%) Based on a loop structure
 - b. (4%) Based on a recursive structure
3. (6%) Explain three of the most important characteristics of object-oriented programming languages.

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科目 計算機概論 科目代碼 2101 共 4 頁，第 2 頁

*請在【答案卷卡】作答

III. (25%) Answer the following questions.

1. (10%) Answer the following Choice Questions:

(i). Which of the following is not represented in a class diagram?

- A. Generalizations B. The methods within a class
C. The attributes within a class D. The number of instances each class will have

(ii) Which of the following is a means of controlling the complexity of a software system?

- A. CRC cards B. Modularity C. Specifications D. Beta testing

(iii) Which of the following is not a tool for designing modular systems?

- A. Structure charts B. Data dictionaries C. Class diagrams
D. Sequence diagrams

(iv) Which of the following appears to be the most functionally cohesive?

- A. A module that handles all of a customer's banking needs
B. A module that handles only transactions related to checking accounts
C. A module that only records deposits to checking accounts
D. A module that collects data for monthly statements

(v) If a class diagram indicates a one-to-one relationship between class X and class Y, then

- A. there will be only one object in the system of "type" X.
B. each object of "type" X will be associated with only one object of "type" Y.
C. there will be exactly one object of "type" X and exactly one object of "type" Y.
D. an object of "type" Y cannot occur without first constructing an object of "type" X.

2. (10%) Suppose the abstract data type StackType was defined as follows:

```
define type StackType to be
{int StackEntries[20];
  int StackPointer = 0;
  procedure push(Value)
  {StackEntries[StackPointer] ← Value;
   StackPointer ← StackPointer + 1;
  }
}
```

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科目 計算機概論 科目代碼 2101 共 4 頁，第 3 頁

*請在【答案卷卡】作答

(i). What would be the value of the variable StackPointer associated with Stack after executing the following statement?

```
StackType Stack;
```

(ii). Then, what would be the value of StackPointer associated with Stack after executing the following statement?

```
Stack.push(5);
```

3. (5%) Which of the operations SELECT, PROJECT, and JOIN are actually used when executing the following SQL instruction?

```
select A, B  
from X  
where C = D
```

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*請在【答案卷卡】作答

IV. (25%) Answer the following questions.

1. (5%) Which of the following is used for cutting a portion of an image?
 - (a) Anti-aliasing
 - (b) Clipping
 - (c) Scan conversion
 - (d) Ray tracing

2. (5%) If an RSA public key encryption system were based on the primes $p = 3$ and $q = 7$, which of the following pairs of values would be suitable for the encryption and decryption keys e and d ?
 - (a) 2 and 6
 - (b) 5 and 29
 - (c) 4 and 9
 - (d) 7 and 23

3. (5%) (a) List the prime factors of 66043.
(5%) (b) Let $f(m)$ be the number of x , $1 \leq x \leq m$, such that x and m are relatively prime, what is $f(255)$?

4. (5%) Explain the distinction between weak AI and strong AI.