

國立交通大學九十二學年度碩士班入學考試試題

科目名稱：計算機概論(582) (592) 考試日期：92年4月19日 第2節

系所班別：科技管理研究所 組別：甲組、乙組 第1頁,共2頁

*作答前,請先核對試題、答案卷(試卷)與准考證上之所組別與考試科目是否相符!!

請照題號依序作答，不可以使用任何計算器。

10%(I) Answer the following questions regarding the Software Engineering:

- What is the difference between **system requirements** and **system specifications**? (2%)
- Explain the concept of the Software Life Cycle. (2%)
- Summarize the distinction between **top-down** and **bottom-up** design strategies.(2%)
- Contrast the information represented in **dataflow diagrams** with that given in **structure charts**. (2%)
- What is black-box testing? What is glass-box testing? (2%)

10%(II) Briefly answer the following questions regarding the Software Engineering:

- Rational ROSE** is one of the popular CASE tools. What is a **CASE tool**? (2%)
- What is an **entity-relationship diagram**? Explain it with an example. (2%)
- What is the difference between a **class diagram** and an **entity-relationship diagram**? (2%)
- What is a **Design Pattern**? (2%)
- What is Object-Oriented Technology? (2%)

10%(III) Briefly answer the following questions: (2% for each)

- What is **HTTP**? What is a **WWW** server?
- What is **Client/Server** Computing Model?
- What is **3-Tier** or **multi-Tier** Computing Model?
- Explain **virus**, **worm**, and **Trojan horse**.
- What is **CORBA**? What is the **OMG** organization?

10%(IV) Briefly answer the following questions: (2% for each)

- Explain "**Overflow**" and "**Underflow**" for representing data in the computer.
- If an **ECC** (Error Correcting Code) can automatically correct the error when one bit of the data is error, what is the minimum **Hamming distance** of the code?
- What is the "**Principle of Locality**"? Explain how to use it in memory hierarchy design efficiently.
- Compare **CISC** and **RISC** computer architectures.
- What is von **Neumann bottleneck**?

10%(V) Consider the Data Base Management System:

- Design a Relational Database containing information about the student information, their basic data, and their scores in a university. Use at least two tables. (7%)
- Give a SQL statement to "Get the list of the students that score of 'Introduction to Computer Science' ≥ 90 and his average score of all subjects < 80 ".(3%)

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10%(VI) Consider the following C/C++ programs:

5%(a) Give the output of the following C program:

```
#include <stdio.h>
int c=0; /* global variable*/
int testaa() { int x = 0; c+= x; return ++x; }
int testbb() { static int x = 0; c+= x; return x++; }
int main() {
    int a1= testaa(), a2=testaa(), a3=testaa();
    int b1= testbb(), b2=testbb(), b3=testbb();
    printf("a=%d %d %d\n", a1, a2, a3);
    printf("b=%d %d %d\n", b1, b2, b3);
    printf("c=%d\n", c); return 0;
}
```

5%(b) Give the output of the following C++ program:

```
#include <stdio.h>
long K,L;
long P(long X) {
    long K; L = X+1; K = K+1;
    return L + (X++);
}
long Q(long& X) { /* Note that X is call by reference */
    long K; L = X+1; K = K+1;
    return L + (X++);
}
int main() { int ans; K = 1; L = 1;
    ans = P(K); printf("%3d %3d %3d\n", ans, K, L);
    ans = P(L); printf("%3d %3d %3d\n", ans, K, L);
    ans = Q(K); printf("%3d %3d %3d\n", ans, K, L);
    ans = Q(L); printf("%3d %3d %3d\n", ans, K, L);
}
```

10%(VII) Consider the Data structure abstraction. You can explain your algorithms

using a C++ template class or a Java class as an example for each.

- Describe how a STACK can be implemented as a linked list. Diagram the PUSH and POP operation for the linked-list implementation. (Draw the figures before and after the push/pop operations.) (5%)
- Describe how a QUEUE can be implemented as a circular queue using array. Write all the necessary operations for a queue (enqueue, dequeue, empty, isfull). (5%)

10%(VIII) Consider the recursive algorithms.

- Write a C/C++ function `long gcd(int m, int n)`; to find the Greatest Common Divisor of m and n ; where m, n are integers. (might be negative). (5%)
- Explain the Fibonacci rabbit problem and write it's recursive function. (5%)

10%(IX) Consider the infix, prefix, and the postfix notation of an expression:

- Describe a process to convert an infix expression into a postfix expression. (5%)
- Express each of the following infix expression in postfix notation and prefix notation:

b-1. $38*49/7-50*66+72/8$. (2%)

b-2. $2*(3*4/(55-49)+88/22)-99$ (3%)

10%(X) Consider the protocol stack used in computer network:

- Describe the four layers of the TCP/IP protocol stack. (3%)
- Explain the meaning of "TCP is a reliable and connection-oriented protocol." (3%)
- Describe the OSI 7-Layer Reference Model. Explain the function of each layer.(4%)