A-1. (6%)Define *polymorphism* and give an example.

A-2. (6%)Define *transitive dependency* and give an example.

A-3. (4%)Define the terms *unit testing* and *integration testing*.

A-4. (6%)What is the *UML*? Give two tools (diagrams) in the UML for process modeling.

A-5. (6%)Describe the principles for the interface design of an information system.

A-6. (6%)What is a *bill of materials*? Give an example, and show how to represent your example by means of relations.

A-7. (6%)Explain what tasks are required to use a relational DBMS for object persistence.

A-8. (10%)Let $n_0$ be a positive integer that is input by the user, For $i = 0,1,2, \ldots$ define

if $n_i$ is even then $n_{i+1} = n_i / 2$

if $n_i$ is odd then $n_{i+1} = 3n_i + 1$

if $n_i$ is 1 the sequence ends.

Numbers that are generated this way are called hailstones. Use either one of C, C++, JAVA, BASIC, or PASCAL language to code a program that generates some hailstones. Your program should invoke the *function* like

void hailstones(int n)

to compute and print the sequence generated by n.

(背面仍有題目,請繼續作答)

B1

(a) What is DDR SDRAM and explain why it is better than SDRAM? (4%)

(b) Please explain the different O.O. features: Polymorphism (3%) Overloading (3%)

B2.

(a) The way we used to call subroutine contains "Call by value" and "Call by reference". Please use a example to describe when is suitable to use "Call by reference" (5%)

(b) Please use the following skeleton to write a program to print out the addresses and the value of each array cell(7%)

```
void arrayinformation (int ... ... .....      ) /* Please assign proper parameters*/
{
     int counter;
    printf("Array information \n");
    printf(" index     address     value\n");
        /* please finish the array information */
    printf("....
}
main ( )
{   int arraydata[] = {0, 1, 2, 3, 4};
   /* call arrayinformation */
}
```

(c) Please write a C program to stack the nodes a tree into a queue in level order and print out by popping out the stack. (13%) (Tree node structure is shown as following)

```
typedef struct node *tree_pointer;
typedef struct node {
    int data;
    tree_pointer left_child, right_child;
};
```

B3:

(a) A company applies a class C IP domain and proposes to assign those IP to 3 departments. Assume that Net3 contains 80 computers, Net2 and Net 1 have 40 computers. Please use figure 1. to answer the following questions: (all servers and key devices are listed, no more server will be used)

i. How to set up a network card on TCP/IP protocol for **New PC?** (Please give a reasonable IP address, DNS, and Gateway) (3%)

ii. Please list the netmasks of these three subnets? (6%)

iii. Please correct the wrong settings in this figure. (3%)

iv. If **New PC** is connected to MailServer1, please show what the New PC's ARP table will contain at least? (3%)