

- 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 $i = 0, 1, 2, \dots$ 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 .

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%)

