UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS
COLLEGE OF INFORMATICS AND ELECTRONICS

Assessment Paper

MODULE CODE: CS4013 **MODULE TITLE**: Object Oriented Design
MODULE CODE: CS4113 **MODULE TITLE**: Object Oriented Programming

TERM: Autumn Semester, 2006 **EXAM DURATION:** 2.5 hours
VALUE OF EXAM: 40%

LECTURER: Chris Exton

INSTRUCTIONS TO CANDIDATES:
Answer all 4 questions. (Total 40 marks)

Question 1. (20 marks)

Give a short description of each of the following, using a sample of Java code to provide a simple implementation example as part of your answer.

Polymorphism
Inheritance
Method overloading
Information Hiding
Garbage Collection (Your code example should illustrate what method may be invoked by the GC before an object is collected)

Question 2. (6 marks)

What are the names given to the "is-a" and "has-a" relationships in Object Oriented programming? Explain the difference between both relationships. Write some sample Java code that illustrates both of the above, making sure to highlight where in the code the relationship can be observed.

Question 3. (6 marks)

You compile and execute the following program. What is the EXACT output?

```
public class Exam1
{
  public int tempInt = 65;
  public static int tempInt2 = 65;

  public Exam1()
  {
    int tempInt2 = 68;
    tempInt2++;
    System.out.println("Good morning HAL here");
  }

  public Exam1(int inValue)
  {
    super();
    tempInt2++;
    System.out.println("Welcomes");
    tempInt = 78;
    System.out.println("or is it " + ++tempInt + "?");
  }

  public static void main(String args[])
  {
    tempInt2++;
    System.out.println("Start Here");
    Exam1 temp = new Exam1(93);
    temp.start(55);
    tempInt2++;
    System.out.println("Good bye " + tempInt2);
  }

  public void start(float inValue)
  {
    tempInt2++;
    System.out.println("maybe " + ++tempInt2 + " welcomes");
  }

  public void start(long inValue)
  {
    tempInt2++;
    System.out.println("In fact " + ++tempInt + " welcomes");
  }
}
```

Question 4. (8 marks)

You compile and execute the following program. What is the EXACT output?

```
public class Exam2
{
  public Exam2()
  {
     System.out.println("Be the machine!!!");
  }

  public Exam2(int inValue)
  {
    new Test1();
    System.out.println("The Answer is " + inValue);
  }

  public static void main(String args[])
  {
     Test1 temp = new Test1();
     temp.start(34);
  }

  public void start()
  {
    System.out.println("Should keep up with the reading");
  }

  public static void main()
  {
    System.out.println("Wished I did that exercise that covered this");
  }
}

class Test1 extends Exam2
{
  public int Test1()
  {
    System.out.println("I will study more next time!!");
    return 0;
  }

  public void start(int inValue)
  {
    System.out.println("I am sure i know this!");
  }

}
```