UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

B. Sc. Examination 2003

COMPUTER SCIENCE

IS51008A(CIS109) Introduction to Java and Object–Oriented Programming

Duration: 3 **hours**

Date and time:

Answer all 10 questions from section A (multiple choice) and 6 questions from section B. Each question from Section A is worth 2 marks (20 marks in total) and each question from section B is worth 10 marks (60 marks in total).

THIS EXAMINATION PAPER MUST NOT BE REMOVED FROM THE EXAMINATION ROOM

Section A(20 Marks)

Answer all questions from section A

QUESTION 1

Consider the following program:-

```
public class A
{
   public static void main(String[] args)
   {
    System.out.println(x+1);
   }
}
```

Which one of the following is true:

(a) This program has a compilation error.

(b) This program will compile correctly.

(c) None of the above.

QUESTION 2

Consider the following program:-

```
public class A
{
   public static void main(String[] args)
   {
    int x=1;
    int y=2;
    x=y;
    y=x;
    System.out.println(y);
   }
}
```

Which one of the following is true:

(a) This program has a compilation error

(b) This program prints `2`

(c) This program prints `1`

(d) None of the above.

QUESTION 3

Consider the following program:-

```
public class A
{
   public static void main(String[] args)
   {
    System.out.println("a");
    System.out.print("b");
    System.out.print("c");
   }
}
```

Which one of the following is true:

(a) This program prints

```
a
b
c
```

(b) This program prints

```
ab
c
```

(c) This program prints

```
a
bc
```

(d) None of the above.

QUESTION 4

Consider the following program:-

```
class div1
{
    public static void main(String[] args)
    {
     System.out.println(3/2);//int divided by int
    }
}
```

Which one of the following is true:

(a) This program prints 1

(b) This program prints 1.5

(c) This program prints 2

(d) None of the above.

QUESTION 5

Consider the following program:-

```
class W
{
        public static void main(String[] args)
        {
          String s;       //Declaration of variable s
          s = 1;          // assignment statement
          System.out.println(s);
        }
}
```

Which one of the following is true:

(a) This program has a compilation error

(b) This program prints 1

(c) None of the above.

QUESTION 6

What is the value of the following expression:- `(1<2 && (2<1 || 3==4))`

(a) true

(b) false

(c) None of the above.

QUESTION 7

Consider the following program:-

```
class W
{
        public static void main(String[] args)
        {
          if (1<2) System.out.print(1);
          else System.out.print(2); System.out.print(3);
        }
}
```

Which one of the following is true:

(a) This program has a compilation error

(b) This program prints 13

(c) This program prints 23

(d) None of the above.

QUESTION 8

Consider the following program:-

```
public class C
{
   public static void main(String[] args)
   {
    int i
    for(i=1;i<5;i++);
    System.out.println(i);
   }
}
```

Which of the following best describes its behaviour.

(a) 4 will be printed

(b) 5 will be printed

(c) 6 will be printed

(d) None of the above.

QUESTION 9

Consider the method `p`.

```
static int p(int n)
{
  return (n+1);
}
```

Which of the following is a legal call to `p`?

(a) `p();`

(b) `p(3);`

(c) `p(3,2);`

(d) `p("hello");`

QUESTION 10

Consider the program:

```
public class F
{
  static void p(int n)
  {for (int i=0;i<n;i++)System.out.print("*");
  }

  public static void main(String[] args)
  {
   p(4);
  }
}
```

Which one of the following is correct:

(a) It has a compilation error

(b) It outputs `****`

(c) It outputs `4`

(d) None of the above.

Section B(60 marks)

Answer 6 questions from section B

QUESTION 11

Write a complete Java program which

- Asks the user how many integers she will enter.
- It then inputs the correct number of integers from the keyboard and stores them in an array.
- It then prints the integers out in the opposite order to which they were entered.
- It finally prints the integers out in the same order to which they were entered.

[10 Marks]

QUESTION 12

(a) Using type casting, write a Java statement which prints the character whose unicode value is 37.

[2 Marks]

(b) Consider

```
public class AplusB
{
    public static void main(String [ ] args)
        {
         System.out.println('a'+'b');
         System.out.println((char)('a'+'b'));
        }
}
```

On my computer this prints out
195
ã
Explain why.

[4 Marks]

(c) Consider the following two programs:

```
import java.io.*;
class Try
{
 public static void main(String[] args) throws IOException
 {
  BufferedReader in =new BufferedReader(new InputStreamReader(System.in));
  System.out.println("please type something in ending with 'enter'");
  int c=in.read();
  System.out.println("You typed in " +(char)c);
 }
}
```

```
import java.io.*;
class Try1
{
 public static void main(String[] args) throws IOException
 {
  BufferedReader in =new BufferedReader(new InputStreamReader(System.in));
  System.out.println("please type something in ending with 'enter'");
  int c=in.read();
  System.out.println("You typed in " + c);
 }
}
```

What is the output of each and why?

[4 Marks]

QUESTION 13

Suppose that `dir1` is a directory in the `CLASSPATH`. Also supose that `dir2` is a subdirectory of `dir1`. Suppose the following class resides in the directory `dir2`:

```
package P;
public class A
{
        public static void method1()
        {
          System.out.print(" hello");
        }
}
```

(a) What does `P` have to replaced by so that `method1` of class `A` can be called from anywhere?

[2 Marks]

(b) Having correctly replaced the `P` above, what would you write in order to call `method1` of class `A` from a class in a different directory?

[2 Marks]

(c) What would the import statement be that would enable the call to `method1` to be abbreviated?

[2 Marks]

(d) Further suppose that `dir3` is a subdirectory of `dir2`. Consider the class `B` in `dir2`:

```
package Q;
public class B
{
        public static void method1()
        {
          System.out.print(" hello");
        }
}
```

(e) What does `Q` have to be replaced by so that `method1` of class `B` can be called from anywhere?

[2 Marks]

(f) Having correctly replaced the `Q` above, what would you write in order to call `method1` of class `B` from a class in a different directory?

[2 Marks]

QUESTION 14

(a) Briefly describe what a file is and why files are needed.

[4 Marks]

(b) Consider:

```
import java.io.*;
public class P
{
   public static void main(String[] args) throws Exception
   {
     BufferedReader in =new BufferedReader(new FileReader("fff.dat"));
     in.readLine();
     in.readLine();
     System.out.println(in.readLine());
   }
}
```

What is the ouptut of `P` when the file `fff.dat` contains the following four lines:

```
hello
what is
your name?
Is it Roshini?
```

[2 Marks]

Write a program that prints out the hundredth character of `ggg.dat`.

[4 Marks]

QUESTION 15

Consider the classes `Date` given by:

```
package LectureSimpleObjects;
public class Date
{
    public int day;
    public int month;
    public int year;

    public Date(int d, int m, int y)
    {
      day=d;
      month=m;
      year=y;
    }
}
```

and the class `Person` given by:

```
package LectureSimpleObjects;
import LectureSimpleObjects.*;
public class Person
{
    public String firstname;
    public String lastname;
    public Date dob;
    public boolean sex; //true= female, false = male

    public Person(String f, String l, Date birth , boolean s)
    {
      firstname=f;
      lastname=l;
      dob=birth;
      sex=s;
     }
    public Person(String f, String l, Date birth, String s)
    {
      firstname=f;
      lastname=l;
      dob=birth;
      if (s.charAt(0)=='f' || s.charAt(0)=='F') sex=true;
      else sex=false;
    }
}
```

(a) Write an expression, using `new`, of type `Date` which represents 2 March 2001.

[2 Marks]

(b) Write an expression, using `new`, of type Person, representing the man John Smith born on 12 May 2002.

[3 Marks]

(c) Define a class `house` that consists of three fields:

(i) an integer which gives its number

(ii) another integer which gives the number of rooms in the house

(iii) an array of `Person`s living in the house.

Your definition should include a constructor method with three parameters.

[5 Marks]

QUESTION 16

(a) Consider the class `LectureSimpleObjects.Person` on page 16. We now require a person to have a middle name.

Achieve this using inheritance, by extending the class `LectureSimpleObjects.Person` to a class `LectureInheritance.Person`, again with two constructor methods.

[8 Marks]

(b) Using the example in part (a) above, or otherwise, explain the keyword `super`.

[2 Marks]

QUESTION 17

Consider the classes `LectureSimpleObjects.Date` and `LectureSimpleObjects.Person` on page 16.

(a) Define an instance method `age` for the class `LectureSimpleObjects.Person` which take a `Date` (representing today's date) as its only parameter. The instance method `age` returns the person's age last birthday as an `int`.

[4 Marks]

(b) Given a variable `x` of type `Person`, write an expression whose value is `x`'s birthday on 25 December 2002.

[2 Marks]

(c) Using `try` and `catch` and the method `Integer.parseInt`, write a static method, `isInt` that takes a String as a parameter and returns `true` if the String contains only digits and `false` otherwise.

[4 Marks]

QUESTION 18

(a) Assuming `v` is a variable of type Vector, explain the error in the expression:

```
v.elementAt(0)==1
```

[2 Marks]

(b) Briefly explain the need for the Java 'wrapper' class `Integer`.

[2 Marks]

(c) Assuming that the zeroth and first elements of the Vector v are Objects of type Integer, write a statement whose effect is to add a new element to v. The value of this new element is the sum of the first two elements of v.

[3 Marks]

(d) Write a method whose heading is
`static double average(Vector v)`
which returns the average of all elements in a non–empty Vector of Objects of type Integer.

[3 Marks]