FINAL EXAM
FIRST SEMESTER SESSION 2011/2012

COURSE CODE / NAME : STIA1023 ADVANCED PROGRAMMING
DATE : 16 JAN 2012 (MONDAY)
TIME : 8.30 PM – 11.00 PM (2 ½ HOURS)
VENUE : DMS

INSTRUCTION :

1. This exam paper contains THREE (3) sections in FOURTEEN (14) printed pages, excluding the cover page.
2. Section A contains TWENTY (20) multiple choices questions. Section B contains NINE (9) structured questions. Section C contains ONE (1) case study question.
3. You are required to answer ALL of the questions on the exam paper.

| MATRIC NO : | ________________________________ | ______ |
| (with word) | (with number) |

| IDENTIFICATION CARD NO. : | ______ |
| _________________________ |

LECTURER : ______________________________

GROUP : ______ TABLE NO. : ______

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CONFIDENTIAL
SECTION A: MULTIPLE CHOICES QUESTION (20 MARKS)

**Instruction:** Circle the correct answer.

1. Given below is the definition of a class named `Ameoba`.

```java
public class Ameoba {
    double weight = 5.0;
    double percentGrowthRate = 1.0;

    public double grow (int days) {
        for (int i=0; i<days; i++) {
            weight = weight + percentGrowthRate * weight;
        }
        return weight;
    }
}
```

What is the output of the following program?

```java
public class AmeobaTest {
    public static void main(String[] args) {
        Ameoba spec1 = new Ameoba();
        System.out.println(spec1.grow(3));
    }
}
```

a. 10.0  
b. 20.0  
c. 40.0  
d. 80.0  

2. Which of the following statement will print the size of `array1`?
   ```
   double[] array1 = {1.25, 3.09, 5.78, 7.89, 9.99};
   ```
   a. System.out.println(array1.size());
   b. System.out.println(array1.length());
   c. System.out.println(array1.length);
   d. System.out.println(array1.size());

3. Class A has the 'is-a' relationship with class B. In other words, class A is the _______ while class B is the _______.
   a. superclass, subclass  
b. subclass, superclass  
c. topclass, downclass  
d. downclass, topclass
4. You need to complete the following codes by filling the underlined parts with the correct keywords. Class AAA exists in a different package as compared to class BBB.

```java
class AAA {
    _______ void m1() {
        System.out.print("This is M1");
    }
}

class BBB _______ AAA {
    public void m2(String s) {
        m1();
        System.out.print("HAHAHA" + sound);
    }
}
```

Which of the following are the correct keywords?

a. default, extends
b. no keyword required, extends
c. protected, extends
d. no keyword required, implements

5. Which of the following statement is FALSE?

a. A class which contains only normal methods can be declared as abstract.
b. An abstract class cannot be used to create objects.
c. A child class must be declared abstract if it does not override the abstract method inherited from its abstract parent.
d. An abstract parent class can declare its abstract method as private.

6. Select the statement which is TRUE about exception handling.

a. A try block can exist by itself, without a catch block or finally block.
b. If you write a method that declares that it can throw a checked exception, you must also wrap the exception throwing code in a try / catch block.
c. Only checked exceptions can be caught.
d. Runtime exceptions can be handled or declared.
7. Given are the following code fragments:

```java
int a = 10, b = 50;
try {
    if (b > a) throw new ScaryException();
    b = b - a;
} catch (ReallyScaryException eee) {
    b = b - a;
} catch (ScaryException huhu) {
    b = b - a;
} finally {
    b = b - a;
}
```

What is the value of \( b \) after the code fragments are executed?

a. 10  
b. 20  
c. 30  
d. 40

8. The type of button such as JButton that is used in GUI is called a ____________.

a. playbutton  
b. pushbutton  
c. eventbutton  
d. layoutbutton

9. Which of the followings represent a term where a panel is placed in another panel in order to achieve effective layout of GUI components?

a. Border factory  
b. Layout manager  
c. Container  
d. Nested panel

10. Which of the explanation below is TRUE regarding absolute positioning?

a. A layout manager that places components in one of the five regions, known as north, south, east, west and center.  
b. A placement where GUI objects can be placed on the content pane without using any layout manager.  
c. A design form whereby GUI components are arranged in a layout which by default has no gaps between its regions.  
d. A placement which fix GUI components in left-to-right and top-to-bottom order.
11. Distinguish the **CORRECT** three menu-related classes that can be used in GUI to create and add menus.
   
   a. JMenuBar, JMenu, JMenuList  
   b. JMenu, JMenuIndex, JMenuList  
   c. JMenuList, JMenuItem, JMenuBar  
   d. JMenuBar, JMenu, JMenuItem  

12. Which of the followings is the highest class in event delegation-based model?
   
   a. EventObject  
   b. EventListener  
   c. AWTEvent  
   d. ItemEvent  

13. This **File** object method can be used to return a boolean value depending on whether the tested file is associated to a file or a directory.
   
   a. exists()  
   b. canRead()  
   c. isFile()  
   d. length()  

14. Which is the correct statement to create a **FileInputStream** object from a file named “Myfile.dat”?
   
   a. `new FileInputStream().createReader(new File("MyFile.dat"));`  
   b. `new FileInputStream().createReader(new String("MyFile.dat"));`  
   c. `new FileInputStream(new File("MyFile.dat"));`  
   d. `new File(new FileInputStream("Test"));`  

15. Which is a **FALSE** statement about **DataOutputStream** object?
   
   a. `DataOutputStream object is connected to the file directly.`  
   b. `DataOutputStream object provides high-level access to a file by converting primitive data value to a sequence of bytes.`  
   c. `DataOutputStream object produces a binary file.`  
   d. `Data written by DataOutputStream must be read using DataInputStream in the same order as they are stored.`
16. Which of the following operation is **NOT** available in a List object?
   - a. Add an element into a list
   - b. Remove an element from a list
   - c. Return the index of an element in a list
   - d. Sort the elements in a list

17. Which of the following is **TRUE** about ArrayList and Vector in Java?
   - a. In terms of processing time, it is faster to use ArrayList as compared to Vector.
   - b. ArrayList is implemented using array while Vector is implemented using linked nodes.
   - c. Dynamic array expansion is only performed in Vector but not in ArrayList.
   - d. You can iterate in ArrayList using ListIterator but not in Vector.

18. What is the output if the following code fragment is executed?

   ```java
   LinkedList list1 = new LinkedList();
   list1.add("1");
   list1.add("2");
   list1.add("3");
   list1.add("4");
   ListIterator listItr = list1.listIterator();
   while (listItr.hasPrevious()) {
       System.out.print(listItr.previous() + " ");
   }
   ```

   - a. 1 2 3 4
   - b. 4 3 2 1
   - c. No output is displayed.
   - d. Run time error.

19. Which of the following is **TRUE** about Stack class in Java?
   - a. The Stack class is a subclass of the ArrayList class.
   - b. When you want to create a new Stack object, you can specify its size in the constructor.
   - c. You will not get a compile error if your codes contain a statement that calls the `pop()` method to the Stack object when it is empty.
   - d. To add an item at a specific position in stack, you can use the `push()` method with an index.

20. Queue in Java is _____________
    - a. an interface.
    - b. a concrete class.
    - c. an abstract class.
    - d. a subclass of the Vector class.
SECTION B: STRUCTURED QUESTION (65 MARKS)

**Instruction:** Answer all questions in the space provided.

1. Explain the difference between a primitive type variable and an object reference variable and give example for each explanation.  
   (4 marks)

2. The following `count()` method is supposed to print all string elements in the array that contain the alphabet “a”. Identify and briefly explain **TWO (2)** errors in the codes.  
   (4 marks)

```java
public void count(){
    String [] a = {"af","bc","io","kl","ar","gt"};
    String [] c = new String[];  
    c = a;
    for (int i =0; i < 6; i++){  
        if(c.indexOf("a")>=0)  
            System.out.println(c[i]);
    }
}
```
3. a) Given below is the definition of the Vehicle class.

```java
public class Vehicle {
    String type;
    int year;

    public Vehicle(String t, int y) {
        type = t;
        year = y;
    }

    protected void display() {
        System.out.println("Type = " + t + " Year = " + year);
    }
}
```

i) Name the parent class of this Vehicle class.

   (1 mark)

ii) Class Car is a child of Vehicle class. It contains an additional attribute which is the
car registration number which is declared as:

   String regNo;

Class Car also overrides the display() method from Vehicle so that the
method can display the car's type, year and registration number. Write the
complete definition of the display() method in Car class. You are REQUIRED
to use the super keyword.

   (4 marks)

iii) Suppose that we want to define the constructor for class Car. The following is the
incomplete definition of the constructor. Fill in the blank lines with the correct
codes.

```java
public Car(String t, int y, String r) {
    /* blank lines */
}
```

(3 marks)
b) State **TWO (2)** differences between concrete class and abstract class.

(4 marks)

4. Suppose that there are **FIVE (5)** exception classes which are AlphaEx, BetaEx, TetaEx, GammaEx and DeltaEx. BetaEx is the **child** of AlphaEx. TetaEx is the child of BetaEx. TetaEx is also the **parent** of GammaEx and DeltaEx. Write the correct **try** and multiple **catch** blocks that can catch all of these five exceptions.
   **Note:** Each **try** and catch block should be empty (you don’t have to put any statements inside your try/catch blocks).

(6 marks)
5. Referring to the following statements:

```java
Container contPane = getContentPane();
JTextArea txtA = new JTextArea();
contPane.add(txtA);
txtA.setText("Hello\n");
```

write Java statement(s) to perform the following tasks using Java Swing classes.

a) Add the text “I am taking a test” to txtA. (2 marks)

b) Create a label with reference txtLabel and set the title of the label as “Always Smile!”. Then add the label to contPane. (3 marks)

6. a) What is the difference between binary file and text file contents format? (2 marks)

b) What is the method that is called at the end of all file IO operations? (1 mark)
c) Based on the Java IO statement below, suppose that we are interested in writing two values (an integer and a character) to a binary file named “sample.dat”. Fill in the blanks with the required Java statements to complete the tasks. (8 marks)

```java
File file = new File("_________");
FileOutputStream outFile = new
FileOutputStream(_______);
__________________________ outData = new
___________________________(__________);
outData.___________(879);
outData.___________('A');
outData.___________().
```

7. The following list is created as follows:
   Vector list = new Vector(4);

a) What is the size and capacity of this list? (2 marks)

b) When will the first dynamic array expansion be performed in this list? (2 marks)

c) Suppose the following elements are added to this list in the order as given:


After all of these elements are added, the memory status of the list is as follows:

```

```

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Write all the Java `add()` statements to add all of the given elements in the order given to the list so that the list becomes as shown in the memory status above.

(7 marks)

8. **Describe the use of each of the following Stack methods:**

   (6 marks)

<table>
<thead>
<tr>
<th>Methods</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>push()</td>
<td></td>
</tr>
<tr>
<td>pop()</td>
<td></td>
</tr>
<tr>
<td>peek()</td>
<td></td>
</tr>
</tbody>
</table>
9. Write the outputs of the following codes:

```
Queue q1 = new LinkedList();
Queue q2 = new LinkedList();
int i = 1;
while (q1.size() <= 3) {
    q1.offer(i);
    i++;
}
System.out.println(q1.peek());
System.out.println(q2.peek());
q2.offer(q1.poll());
q2.offer(q1.element());
System.out.println(q2.remove());
while (q1.size()>0) {
    System.out.println(q1.poll());
}
```

(6 marks)
SECTION C: Case Study (15 MARKS)

**Instruction:** Answer all questions in the space provided.

1. Humpty Dumpty is helping Mary to feed her lambs while she’s gone out of town. Mary farm has security installed to it whereby a password is needed to open the gate at her farm. Mary will send Humpty a new password to open the gate everyday but the password will be in backwards since Mary doesn’t want just anybody to access her farm other than Humpty. Humpty now has to convert the password back to normal. For example, if the password sent by Mary is “elppa” then the correct password is “apple”.

There are also many gates at Mary farm but only one gate is actually working at a specific time. Thus, Humpty needs to identify which gate is the correct one to use as the gate will change every few hours. The information about the gate timing is provided as below (it’s not the feeding time from 6 p.m. until 5 a.m.):

<table>
<thead>
<tr>
<th>Time</th>
<th>Gate</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 a.m. until 11 a.m.</td>
<td>North</td>
</tr>
<tr>
<td>12 p.m. until 1 p.m.</td>
<td>South</td>
</tr>
<tr>
<td>2 p.m. until 5 p.m.</td>
<td>East</td>
</tr>
<tr>
<td>6 p.m. until 5 a.m.</td>
<td>Not feeding time</td>
</tr>
</tbody>
</table>

To use this application (refer to figure below), Humpty should input the password sent by Mary at tfBackPass. Humpty then needs to input the clock time at tfHour (for the clock hours) and select the time from the combo box, cbTime. The correct password as well as which gate to be used will be displayed at tfNewPass and tfGate respectively when button Enter, bEnter is clicked.

Based on the description, write the event-handling method for Enter button, bEnter. (To get the user-selected radio button you can use isSelected() method) (15 marks)
private void bEnterActionPerformed(java.awt.event.ActionEvent evt) {