STIA1023 CONFIDENTIAL

UNIVERSITI UTARA MALAYSIA

FINAL EXAM
SECOND SEMESTER SESSION 2011/2012

COURSE CODE / NAME: STIA1023 ADVANCED PROGRAMMING
DATE: 24 JUNE 2012 (SUNDAY)
TIME: 9.00 A.M. – 11.30 A.M. (2 ½ HOURS)
VENUE: DSB K. TWD

INSTRUCTIONS:

1. This exam paper contains THREE (3) sections in FIFTEEN (15) 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 questions on the exam paper.

MATRIC NO: ____________________________  [with number]
( with word )  [with number]

IDENTIFICATION CARD NO:

LECTURER:

GROUP: □ TABLE NO: □

DO NOT OPEN THIS EXAMINATION PAPER UNTIL INSTRUCTED

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SECTION A: MULTIPLE CHOICES QUESTION (20 MARKS)

**Instruction:** Circle the correct answer.

1. Given:

```java
public class AB extends YZ {
    public String print() {
        return "Sintok";
    }

    public static void main(String[] args) {
        AB ab = new AB();
        YZ yz = new AB();
        System.out.println(ab.print() + " " + yz.print());
    }
}

class YZ {
    public String print() {
        return "UUM";
    }
}
```

What is the output?

a. Sintok Sintok  
b. UUM UUM  
c. Sintok UUM  
d. Compilation fails

2. Given:

```java
public class Test1 {
    public static void main(String[] args) {
        int[] a = {5, 6, 7};
        int[] b = new int[3];
        b[1] = a[2];
        System.out.println(b[a[1]]);
    }
}
```

What is the output?

a. 6  
b. 7  
c. An exception is thrown at runtime  
d. Compilation fails
3. Based on the following statements, which one is FALSE?

   a. Inheritance create an has-a relationship between the parent and child classes.
   b. One purpose of inheritance is to reuse existing classes.
   c. Protected visibility provides the best possible encapsulation that permits inheritance.
   d. A child class can override the parent’s definition of an inherited method.

4. Which of the following Java codes gives an ERROR?

   a. public abstract class AB {} 
   b. abstract class AB {} 
   c. public abstract class AB extends YZ{} 
   d. public class AB extends abstract YZ{}

5. Given:

   ```java
   class Test2 {
       private final void display() {
           System.out.println("Animal");
       }
   }

   public class Test1 extends Test2 {
       private final void display() {
           System.out.println("Cat");
       }

       public static void main(String[] args) {
           Test2 t2 = new Test1();
           t2.display();
       }
   }
   ```

   a. Animal 
   b. Cat 
   c. Compilation fails 
   d. Runtime error

6. All exception classes inherit from this class:

   a. Error 
   b. RuntimeException 
   c. Java Exception 
   d. Throwable
7. You use this keyword to throw an exception manually.
   a. try
   b. throws
   c. throw
   d. System.exit(0)

8. Which of the following Swing classes is used to create a window?
   a. JFrame
   b. JDialog
   c. JWindow
   d. JPanel

9. The size of a window object named `firstWindow` is set using the `setSize()` method as follows:
   ```java
   firstWindow.setSize(200, 400);
   ```
   What is the size of the width of `firstWindow`?
   a. 200 mm
   b. 200 pixels
   c. 400 mm
   d. 400 pixels

10. Which of the following statements is **FALSE** about `GridLayout` manager?
    a. The layout manager arranges components in two-dimensional grid with a certain number of rows and columns.
    b. All cells in the grid must be of the same size no matter how you resize the window.
    c. Components are added in the grid from right to left column, starting from the top row.
    d. The number of rows and columns are given as arguments to the `GridLayout` constructor.

11. Suppose you are using several `JPanels` in your `JFrame`. Can a different layout manager type be set for each `JPanel`?
    a. No, only one type of layout manager is used for the entire frame.
    b. Yes, each container has its own layout manager, independent of any others.
    c. No, all `JFrames` in a frame use the same layout manager.
    d. Yes, but only if `JPanels` are nested.
12. Which of the following event objects is fired when you click a JMenuItem?
   
   a. ActionEvent  
   b. TextEvent  
   c. ItemEvent  
   d. MenuItemEvent

13. Method `getSelectedFile()` of the `JFileChooser` object returns an object of what type?
   
   a. FileOutputStream  
   b. File  
   c. String  
   d. None of the above

14. Which stream class that allows us to output a sequence of bytes?
   
   a. FileInputStream  
   b. FileOutputStream  
   c. FileInputStream  
   d. OutputStream  
   
15. What is the result if the code below is executed in an empty directory?

   ```java
   File f1 = new File("dirname");
   File f2 = new File(f1, "filename");
   ```

   a. Only a new directory called `dirname` is created in the current working directory.
   b. A new directory called `dirname` is created in the current working directory. A new file called `filename` is created in directory `dirname`.
   c. A new directory called `dirname` and a new file called `filename` are created, both in the current working directory.
   d. Neither the directory nor the file is created.
16. Which of the following is NOT a concrete class in the Java Collection Framework?

   a. Collection
   b. Stack
   c. ArrayList
   d. Vector

17. Which of the following is FALSE about list in Java?

   a. Values of mixed types may be stored in a LinkedList.
   b. A list can contain duplicate elements.
   c. You can traverse a list in both directions by using the Iterator interface.
   d. The ArrayList class is located in the java.util package.

18. All elements in a list are always ________________.

   a. sorted
   b. indexed
   c. duplicated
   d. linked

19. The basic operation in stack to remove an item is pop. What is the basic operation to insert an item?

   a. poll
   b. peek
   c. push
   d. pull

20. What concept does a queue apply?

   a. LIFO
   b. FIFO
   c. FILO
   d. LMFO
STIA1023 Advanced Programming

SECTION B: STRUCTURED QUESTION (65 MARKS)

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

1. Complete the following method for calculating the perimeter of a rectangle. Assume:

```java
public double calcPerimeter()
{
    double length;
    double width;

    are attributes defined for the rectangle class.

    ________________ __________________;
    ________________ __________________;
    ________________ __________________;
    
    (4 marks)
```

2. Analyze the following program:

```java
public class Test {
    public static void main(String[] args) {
        int[] y = {1, 2, 3, 4};
        for (int i = 0; i < y.length; i++)
            if (y[i] % 2 == 0) y[i] = y[i] + 1;
        for (int i = 0; i < y.length; i++)
            System.out.print(y[i] + " ");
    }
}
```

Write the output of this program.

(4 marks)
3. a) Given the following codes:

```java
public class SuperEg {
    public SuperEg() {
        System.out.println("This is SuperEg");
    }

    public void display() {
        System.out.println("This is display one");
    }
}

class Xyz extends SuperEg {
    public Xyz() {
        super();
        System.out.println("This is One");
    }

    public Xyz(int x) {
        super();
        System.out.println("This is Two");
        display();
    }

    public void display() {
        System.out.println("This is display two");
    }

    public static void main(String[] args) {
        Xyz xyz = new Xyz();
        SuperEg s = new Xyz(1);
        s.display();
    }
}
```

What is the output? (6 marks)
b) Given the following information:

V is the superclass of C.
P is the subclass of C.
C is a superclass of T.
L inherits from V.
D is the subclass of L.

Write the Java codes to represent the above statement (Write only the class header with empty body).  

(6 marks)

4. Look at the following method definition. Suppose the method’s body can potentially throw an IOException.

```java
public void displayFile (String name) {
  //open the file
  File file = new File(name);
  Scanner inputFile = new Scanner(file);

  //Read and display th file’s content
  while (inputFile.hasNext())
  {
    System.out.println(inputFile.nextLine());
  }

  //close the file
  inputFile.close();
}
```

a) State the part in the above code that contain the error.  

(2 marks)
b) Give the reason why this method will not compile. (4 marks)

c) Correct the error. (3 marks)

5. The following code is a simple GUI program that uses inheritance to inherit from JFrame class:

```java
public class Greeting extends JFrame {
    public Greeting() {
        super("Welcome");
        JLabel msg = new JLabel("Hello, World!");
        add(msg);
        setSize(100, 200);
        setVisible(true);
        setDefaultCloseOperation(EXIT_ON_CLOSE);
    }
    public static void main(String[] args) {
        Greeting myFrame = new Greeting();
    }
}
```

Rewrite another version of this program which DOES NOT use inheritance but produce the same output. (5 marks)
6. a) Files can store program, music, pictures, video and so on. List THREE (3) reasons for using file for I/O.

(3 marks)

b) What is the difference between a text file and a binary file?

(2 marks)

c) Complete the code fragments below that can read the whole contents of a file using the Scanner class and print them to the screen.

(6 marks)

```java
File infile = new File("MyFile.txt");
{
    // read line one by one till all line is read.
    Scanner scan = new Scanner(infile);
    while (scan.hasNextLine()) { // check if there are more line
        String line = scan.nextLine();
        System.out.println(line);
    }
    e.printStackTrace();
}
```
7. Given below are several methods which exist in the `LinkedList` class.

<table>
<thead>
<tr>
<th>Constructor Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>LinkedList()</code></td>
</tr>
<tr>
<td>Constructs an empty list.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>boolean add(E o)</code></td>
</tr>
<tr>
<td>Appends the specified element to the end of this list.</td>
</tr>
<tr>
<td><code>void add(int index, E element)</code></td>
</tr>
<tr>
<td>Inserts the specified element at the specified position in this list.</td>
</tr>
<tr>
<td><code>void addFirst(E o)</code></td>
</tr>
<tr>
<td>Inserts the given element at the beginning of this list.</td>
</tr>
<tr>
<td><code>void addLast(E o)</code></td>
</tr>
<tr>
<td>Appends the given element to the end of this list.</td>
</tr>
<tr>
<td><code>E get(int index)</code></td>
</tr>
<tr>
<td>Returns the element at the specified position in this list.</td>
</tr>
<tr>
<td><code>E getFirst()</code></td>
</tr>
<tr>
<td>Returns the first element in this list.</td>
</tr>
<tr>
<td><code>E getLast()</code></td>
</tr>
<tr>
<td>Returns the last element in this list.</td>
</tr>
<tr>
<td><code>int indexOf(Object o)</code></td>
</tr>
<tr>
<td>Returns the index in this list of the first occurrence of the specified element, or -1 if the List does not contain this element.</td>
</tr>
<tr>
<td><code>int lastIndexOf(Object o)</code></td>
</tr>
<tr>
<td>Returns the index in this list of the last occurrence of the specified element, or -1 if the list does not contain this element.</td>
</tr>
<tr>
<td><code>E remove(int index)</code></td>
</tr>
<tr>
<td>Removes the element at the specified position in this list.</td>
</tr>
</tbody>
</table>

By using appropriate method(s) as given above, write Java statement(s) to accomplish the following tasks:

a) Create a `LinkedList` object named `listNum`.  
(2 marks)

b) Insert a sequence of data 4, 6, 8 into the linked-list `listNum`.  
(3 marks)
c) Retrieve and display the first and last element in the linked-list listNum.
   (2 marks)

d) Remove the second element of the linked-list listNum.
   (1 mark)

8. a) Describe what will happen if the pop operation is performed to an empty stack.
    (2 marks)

   b) Briefly explain the peek operation of a stack.
    (2 marks)

   c) Give two (2) examples of the use of stack.
    (2 marks)

9. a) Explain why you cannot create a queue in Java by using the following statement:

    ```java
    Queue q1 = new Queue();
    ```
    (2 marks)
b) State the name of the class that you need to use to create a queue in Java.  
(2 marks)

c) Give **TWO(2)** differences between stack and queue.  
(2 marks)
SECTION C: CASE STUDY (15 MARKS)

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

1. Mamat’s Service Center (MSC) performs some basic automotive maintenance services. The type of services and its respective charges are listed below:

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Charge (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil change</td>
<td>8.00</td>
</tr>
<tr>
<td>Radiator flush</td>
<td>18.00</td>
</tr>
<tr>
<td>Transmission flush</td>
<td>30.00</td>
</tr>
<tr>
<td>Inspection</td>
<td>15.00</td>
</tr>
<tr>
<td>Exhaust replacement</td>
<td>100.00</td>
</tr>
</tbody>
</table>

MSC gives a discount of 10% from the total charge to a client who is a registered member of its service center. In the figure below is the GUI for the MSC application that allows a user to calculate the total charge based on the type of services selected by the user. The user needs to enter the registration number of the vehicle to be serviced in a text field (named `regNoTF`) and selects the type of services that need to be performed. The selection is done by clicking the respective radio buttons (refer to figure for their names) associated with the services as shown in the figure. The user also needs to specify from the combo box (named `memberCB`) whether the customer is a member of MSC or not. Finally, when the user clicks the calculate button (named `calcBtn`) the program will display the output containing the vehicle registration number and the calculated total charge (minus discount if it is given) in the text area (named `outputTA`).
Based on the description given, write the event-handling method for Calculate button, calcBtn.

**Note:**
To get the user-selected item in a combo box, you can use `getSelected() method. To get the user-selected radio button you can use isselected() method.

(15 marks)

```java
private void btnCalActionPerformed(java.awt.event.ActionEvent evt) {

```