STATE UNIVERSITY OF ZANZIBAR (SUZA)

SCHOOL OF COMPUTING, COMMUNICATION AND MEDIA (SCCM)

DEPARTMENT OF COMPUTER SCIENCE AND IT

END OF SEMESTER EXAMINATION

FEB, 2024

BACHELOR OF INFORMATION TECHNOLOGY APPLICATION AND MANAGEMENT

SEMESTER	I	ACADEMIC YEAR	2023/2024
COURSE CODE & TITLE	INF2105: Software Application Development		
DATE	Monday | 04th March 2024	TIME ALLOWED: 3 HOURS | 09:00 AM - 12:00PM	

INSTRUCTIONS TO STUDENT

1. This paper consists of **TWO (2)** sections A and B which carry 24 marks and 36 marks respectively.
2. Answer **ALL** questions from section A and any **THREE (3)** questions from section B.
3. Cellular **PHONES** and any other **UNAUTHORIZED** materials are **NOT** allowed in the examination room.
4. Don't write anything in this paper.
5. **START EACH QUESTION IN A NEW PAGE.**
6. This examination consists of 6 printed pages, including the cover page

Answer ALL questions

1. Answer the questions below about this class. [10 marks]

```
public class Skier {
private static final int MAXIMUM_POINTS = 999;
private String name;
private int slalomPoints;
private int giantSlalomPoints;
private int superGPoints;
private String ussaNumber;
public Skier(String name, String ussaNumber) {
this.name = name;
this.ussaNumber = ussaNumber;
}
public String getBestEvent() {
if (slalomPoints < giantSlalomPoints) {
if (slalomPoints < superGPoints) {
return "Slalom";
}
return "Super G";
}
if (giantSlalomPoints < superGPoints) {
return "Giant Slalom";
}
}
}
```

i. What are the names of the instance variables declared in this class?
ii. What are the signatures of the constructors declared in this class?
iii. What are the names of the parameters declared in this class?
iv. What are the signatures of the methods declared in this class?
v. What are the names of the constants declared in this class?

2. In this question, I show you the signatures of some constructors and methods that could be defined for a Restaurant class, a class intended to store information about a restaurant. I would like you to show me how you would call the methods. If the method or constructor returns a value, I would like you to put the call on the right hand side of an assignment statement so that the returned result is saved in a variable. For the purposes of this question, you can assume that the following variables have been declared and initialized, if necessary: [10 marks]

```
Restaurant restaurant;
String restName;
String restAddress;
String menu;
Person restOwner;
String ownerName;
String[] dessertList;
```

i. public Restaurant (String name)
ii. public String getAddress()
iii. public void printMenu()
iv. public void setOwner (Person owner)
v. public String[] getDessertList()

3. Please answer the following true/false questions. If your answer is false, give a brief [4 marks]

Reason: Object is the instance of class'

explanation of why it is false.

i. Class and object mean the same thing. F
ii. A method signature includes information about the number and types of parameters that a method has. T
iii. An interface can be used as the type of a variable T
iv. A subclass can add behavior that is not present in the superclass. T
v. Testing allows us to prove that our programs are correct. F
vi. If FileNotFoundException occurs when a program is executed, it means that the program contains a bug. F
vii. Instance variables should always be declared to be public. F
viii. Variables should be declared to be local, rather than instance variables, whenever possible. (If the program would not work if they were local variables, consider that to be "not possible".) T

Answer any three Questions, Each question carries 12 marks

4. a. Design a program that lets the user enter the total rainfall for each of 12 months into a list. The program should calculate and display the total rainfall for the year, the average monthly rainfall, and the months with the highest and lowest amounts. [4 marks]

b Write a program that calculates and displays the average of a group of test scores, all integers, where the lowest score in the group is dropped. There are six test scores in the group. The program must use the following functions: [8 marks]

getScores() must be called by the main function and should ask the user for the six test scores and return them.

calcAverage() should calculate and return the average of the five highest scores and also the lowest of the six test scores. This function should be called just once by the main function, and should be passed the six scores.

findLowest() should find and return the lowest of the six scores passed to it. It must be called by calcAverage function, which uses it to determine which of the six scores to drop. **(Do NOT use any built-in function)**

5. A training centre conducts a total of 7 tests for its students. Students are allowed to skip few tests. Let there be 25 students in the batch. So in the main class for every student, read the number of tests taken and the marks scored in each test. A class 'TestDetails' should be defined with a 2D array of float type to store the marks of all the students. Define a method 'storeMarks()' that will receive the following details for every student from the main class and create in the 2D array, those many columns equal to the number of tests, so as to store the marks. There is no need to store the number of tests. Define another method 'displayMarks()' to print the details. [12 marks]
Also the training centre wishes to keep those students in notice period who have taken < 3 tests and those who have not scored ≥ 50 in at least 3 tests. Derive another class 'NoticePeriod' from 'TestDetails' that includes a method to count and print the number of students in bench. Also it should print the ID of those students assuming the row index of the array to be their ID. While checking do not proceed to check the marks in all tests, if the student has already scored more than 50 in 3 tests. Instantiate this class from the main class and do the required processing.

6. a. Define a class FruitSalad with class attributes fruits, which is initially [melons,pineapples] and servings which is initially 4. [4 marks]
Write constructor method that takes arguments ingredients (a list of strings) and numservings (an integer) and stores the supplied values in instance attributes fruits and servings (the servings remaining) respectively.
Write a toString method that returns a string containing the number of remaining servings and the fruits in the fruit salad. The string should look like this: "2 servings of fruit salad with [bananas,apples]"
Write a method add that takes a string as an argument and appends it to the end of the list fruits.

Finally, write a method serve of no arguments that returns 'enjoy' if it has been called a number of times that is less than or equal to the value of numservings supplied when the associated instance was created, or 'sorry' otherwise. It should update the servings of the instance, make sure that this variable never becomes negative.

b. Java categorizes some exceptions as checked (like IOException) and others as unchecked (like NullPointerException). A method that might encounter checked exceptions either has to have a try-catch block to handle the exception or has to declare the exception in a throws clause in the method heading to indicate that the method might generate that exception. But neither of these are required for unchecked exceptions. Why not? [2 marks]

c. [6 marks]

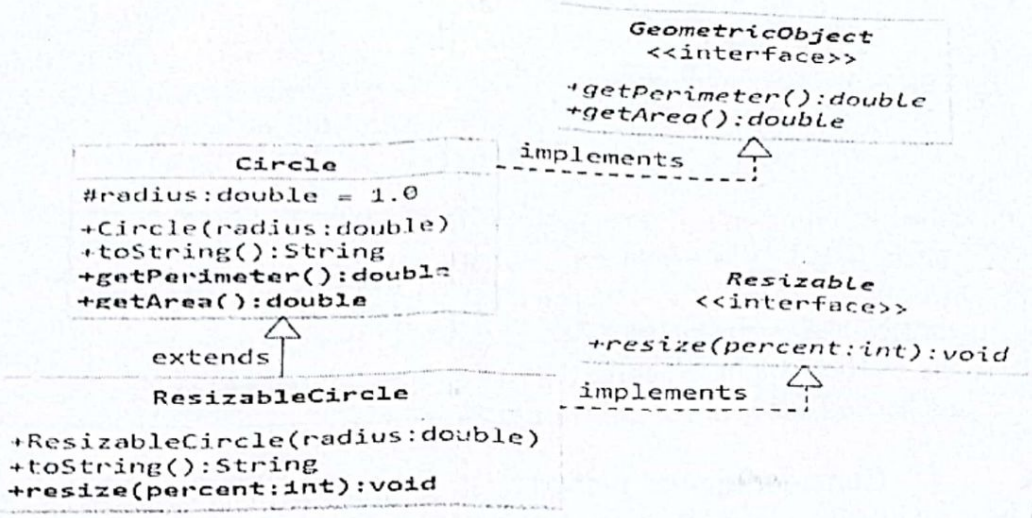
i. Consider the following code:

```
public class Exceptional {
  public void x() {
    throw new IndexOutOfBoundsException();
  }
  public void y(int n) {
    try {
      if (n > 10) {
        x();
      } else {
        z();
      }
    } catch (IndexOutOfBoundsException e) {
      System.out.println("index out of bounds caught in y");
    } catch (Exception e) {
      System.out.println("exception caught in y");
    }
  }
  public void z() {
    throw new NullPointerException();
  }
}
```

What happens when each of the following groups of statements are executed? Indicate what output is produced or what unhandled exceptions are generated.

i. Exceptional ex = new Exceptional(); ex.z();
ii. Exceptional ex = new Exceptional(); ex.y(42);
iii. Exceptional ex = new Exceptional(); ex.y(5);

7. [12 marks]



a. Write the interface called GeometricObject, which declares two abstract methods: getParameter() and getArea(), as specified in the class diagram.

b. Write the implementation class Circle, with a protected variable radius, which implements the interface GeometricObject.

c. Write a test program called TestCircle to test the methods defined in Circle.

d. The class ResizableCircle is defined as a subclass of the class Circle, which also implements an interface called Resizable, as shown in class diagram. The interface Resizable declares an abstract method resize(), which modifies the dimension (such as radius) by the given percentage. Write the interface Resizable and the class ResizableCircle.

e. Write a test program called TestResizableCircle to test the methods defined in ResizableCircle.