Library copy

29

University of Ruhuna - Faculty of Technology

Bachelor of Information & Communication Technology Honours Degree
Level 2 (Semester I) Semester Examination, June/July 2023
Academic year 2022/2023

Course Unit: ICT 2123 - Object Oriented Development **Duration: 02 Hours**
(Written)

This question paper contains **six (06) pages** including this instruction page.

IMPORTANT INSTRUCTIONS

1. The medium of this examination is **English**.
2. This is a **Closed Book** examination.
3. This Examination consists of **four (04)** questions that are given equal marks.
4. You must **answer all four (04) questions** in this examination.

1.

a. ***An object-oriented system is a set of interacting objects organized into classes.***

i. Briefly describe the following concepts used in Object Oriented Programming.

- Instance
- Instantiation

[10 marks]

ii. Consider a public java class named ***Vehicle*** which is written in a file named ***Vehicle.java*** . Fill out the following table by considering the ***Elements of Vehicle class*** and their order in the file using ***List A.***

Element	Sample Code Segment (Select from ***Vehicle elements***)	Required Always (Yes/No)	Where it's appearing in the file (Select from the below given ***List A***)
Package declaration			
Import statements			
Class declaration			
Method declaration			
Field declaration			

Elements of Vehicle class

public Class Vehicle { }, private String name; , import java.util.io; , package com.ictec.veh; public void run(){ }

List A

Anywhere inside the class scope, Anywhere, First line in the file, Immediately after the package, Immediately after the import

[15 marks]

b. Consider the four (04) ***Access Modifiers*** which are used in Java.
Fill out the following table by selecting all the letters which are applied from ***List B.***

Member is	Can accessed by (Select all the letters (A,B,C,D) which are applied from ***List B***)
public	
protected	
default	
private	

List B

A - A member in the same class
B - A Member in another class in same package
C - A Member in a superclass in a different package
D - A Member in a non-super class in a different package

[15 marks]

c. ***Control statements are the statements that change the flow of execution of statements.***

i. What is the output of using the following ***for loop*** inside a Java program?

```
for(     ;     ;     ) {
        System.out.println("Hello World...!!!") ;
}
```

[05 marks]

ii. What will be the output when you compile and run the above ***MyArrayDemo*** class? Give your reasons.

```
public class MyArrayDemo {
   public static void main(String args[]) {
        int sum = 0, x = 5, y = 0 ;

        for( ; x > y ; x--, y++) {
              sum+ = (x+y) ;
        }
        System.out.println(sum) ;
   }
}
```

[15 marks]

d. ***A constructor in Java is a special method that is used to initialize objects.***

i. List down ***two (02)*** unique features of the default constructor used in a Java class.

[10 marks]

ii. Consider the given ***MyDemo*** and ***MyClass*** classes below.

```
public class MyDemo {
   public static void main(String args[]) {
      MyClass ms = new MyClass(); // → Line 3
   }
}
```

```
public class MyClass{
   int a = 3;

   {
      System.out.print(a);
   }

   static{
      System.out.print(4);
   }

   MyClass(){
      System.out.print(a+2);
   }

   MyClass(int y){
      this();
      this.a = y;
      System.out.print(a+3);
   }
}
```

What will be the output when you compile and run the above ***MyDemo*** class? Give your reasons.

[15 marks]

iii. What will be the output when you compile and run the above ***MyDemo*** class by replacing the code ***Line 3*** with the following code line. Give your reasons.

new MyClass(4);

[15 marks]

2.

a. ***Inheritance is one of the major pillars in Java OOP.***

i. By using an example briefly describe the concept of inheritance.

[10 marks]

ii. Consider the given ***Animal*** and ***Cat*** classes below.

public class Animal { ***//Rest of the code*** ***}***	***public class Cat extends Animal {*** ***//Rest of the code*** ***}***

A. Identify and write down the following things.
- Sub Class
- Indirect Super Class

B. By giving your reasons state whether the following object creations are valid in Java.
- Animal a = new Animal();
- Animal a = new Cat();
- Cat c = new Animal();
- Object o = new Animal();

[30 marks]

b. Consider the given ***MyData*** class below.

```
public class MyData {
        public void printMyData ( String a, String b ){
                System.out.println ( a + " , " + b );
        }
        public void printMyData ( double x, double y ){
                System.out.println( x + y );
        }
}
```

i. What is the OOP concept used in the above ***MyData*** class?

[05 marks]

ii. Write down the output when you invoke the ***printMyData*** method with the values given below. Give your reasons.

A. printMyData("Kusal" , "Nimal")

B. printMyData("Natasha" , 50.0)

C. printMyData(25 , 15.0)

[15 marks]

c. Consider the below given ***Fish***, ***GoldFish*** and the ***Demo*** classes.

```
public class Fish {
   public static int fins = 5;
   public String color ="White";

   public String swim(){
      return ("Fish is Swimming");
   }
}
```

```
public class GoldFish extends Fish {
   public int pairedFins = 2;
   public String color ="Gold";

   public String swim(){
      return ("Gold Fish is Swimming");
   }
}
```

```
public class Demo{
   public static void main(String[] args){
      GoldFish g = new GoldFish();
      Fish f = new GoldFish();
      //Code Line 05
   }
}
```

Write down the output when compile and run Demo class by replacing Code Line 05 with following Java statements. Give your reasons for each scenario.

A. System.out.println(***Fish.fins***);

B. System.out.println(***g.fins***);

C. System.out.println(***g.swim()***);

D. System.out.println(***f.swim()***);

E. System.out.println(***g.color***);

F. System.out.println(***f.color***);

G. System.out.println(***f.pairedFins***);

H. System.out.println(***g.pairedFins***);

[40 marks]

3.

a. ***Encapsulation is a mechanism of wrapping the data and code acting on the data (methods) together as a single unit.***

i. Write down ***one (01)*** advantage and ***one (01)*** disadvantage of Java Encapsulation. ***[10 marks]***

ii. Encapsulate the given ***Student*** class below by making necessary changes to access and modify the ***age*** field only through ***accessors*** and ***mutators***.

```
public class Student {
        protected int age;
}
```

[10 marks]

b. Consider the below given ***MyRunnable*** interface.

```
public interface MyRunnable {
        void print(int x){
                System.out.println(x);
        }
}
```

i. What is the problem associated with the ***MyRunnable*** interface.

[05 marks]

ii. Re write the ***MyRunnable*** interface in two ways by solving the problem you have identified above. (Without changing ***MyRunnable*** interface as a class or an abstract class.)

[10 marks]

iii. Write down the purpose of using an interface like ***Tager*** shown below in Java.

```
public interface Tager {
}
```

[05 marks]

c. ***Abstract class is a restricted class that cannot be used to create objects.***

i. Can an abstract class have a constructor? If yes write down ***one (01)*** usage of it.

[10 marks]

ii. Write down ***two (02)*** differences between ***Abstract Classes*** and ***Concrete Classes***.

[10 marks]

d. ***Exception is an event that disrupts the normal flow of the program.***

i. By giving an example, briefly describe the concept of ***Unchecked Exceptions.***

[10 marks]

ii. Use the following ***ExceptionDemoto*** Java classes to answer the questions given below.

```
public class ExceptionDemo{
   public static void main(String[] args){
      ExceptionDemo ed = new ExceptionDemo();
      ed.divTwoNums(10, 0);
   }

   public void divTwoNums(int x, int y){
      System.out.println ( "Begin" );

      int z = x / y ; //      --> div statement

      try{
         System.out.print ( "1" );
          // A
      }catch(Exception e){
         System.out.print ( "2" );
      }
      System.out.println ( "End" );
   }
}
```

A. What will be the output when you compile and run the above ***ExceptionDemo*** Java class. Justify your answer.

B. What will be the output when you move ***div statement*** to ***//A*** and compile and run the above ***ExceptionDemo*** Java class. Justify your answer.

C. What will be the output when you move ***div statement*** to ***//A*** and replace the catch block with following try block and compile and run the above ***ExceptionDemo*** Java class. Justify your answer.

```
finally{
        System.out.print ( "3" );
}
```

[30 marks]

4.

a. ***JDBC Driver is a software component that enables java application to interact with the database.***

i. Write down ***two (02)*** types of Java Database Connectivity (JDBC) drivers. ***[10 marks]***

ii. Complete the following statement to create a Connection object by using the given connection details below.

Host: 127.0.01 ***Port No: 3306***
DBMS: MYSQL ***Database Name: ictec***
User Name: root ***Password: 1234***

Statement:
Connection con = DriverManager. *//Youranswer* ***[10 marks]***

b. ***All Java programs have at least one thread.***

i. Write down the ***five (05)*** major stages of the ***life cycle of a Thread.*** ***[10 marks]***

ii. Consider the ***MyThread*** and ***Demo*** Java classes given below.

```
public class MyThread implements Runnable {
   public void run()
   {
      String name = Thread.currentThread().getName();
      System.out.println("Hello by "+ name );
   }
}
```

```
public class Demo {
   public static void main(String[] args)
   {
        MyThread mt = new MyThread();
        mt.setName("Perera");
        mt.start();
   }
}
```

A. Write down the output when you compile and run the above java program. Justify your answer. ***[15 marks]***

B. What are the code changes to be done to get ***Hello by Kamal*** as the output. ***[15 marks]***

c. Complete the ***MyFileRW*** class by full filling the given requirements.

Requirements:

- Purpose is to Read and Write user entered statement to a text(.txt) file
- File name: "UserData.txt"
- File location: "User" folder in "D" drive
- User entered data must append to the end of the existing data in the file
- To write: The class uses "DataOutputStream"
- To Read: The class uses "DataInputStream"
- ***MyFileRW*** class uses "Buffers" to enhance the quality of the writing and reading operations

Note:

- Assume that user entered data is already stored in a String variable named ***uData***
- Assume that you are using same ***UserData*** file for both Write and Read operations
- Assume that you have already imported all the required libraries.

```
public class MyFileRW {
        public static void main(String[] args) {
        // code part handling to get the user input
        // assume this part is already completed and data is stored in uData
                try {
                        // Your code to create the file

                        // Your code to complete the writing part

                        // Your code to complete the reading part

                } catch (FileNotFoundException ex) {
                        System.out.println("File not found");
                } catch (IOException ex) {
                        System.out.println("IOException occurred");
                }
        }
```

[40 marks]

//***End of Paper***//