Institute of Information Technology
Jahangirnagar University
B.Sc. in ICT
1st year 2nd Semester Final Examination, 2022

Course No. : **ICT 1203** Full Marks : **60**

Course Title : **Object Oriented Programming** Time : **3.0 Hours**

Do not write anything on the question paper.

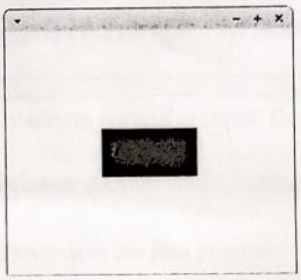
There are **7 (Seven)** questions. Figures in the right margin indicate marks.

Part – A: Mandatory to answer

(CLO1) 1. (a) Define the pillars of OOP. 2

(CLO2) (b) Let us consider two classes: A child class Boy and a parent class Human. The Boy class extends Human class. Both the classes have a common method void eat(). Boy class is giving its own implementation to the eat() method or in other words it is overriding the eat() method. Write Java code of the above example and show the output. 3

(CLO3) (c) Write a JavaFX program to produce the following scene and write the code to change the color of the rectangle to green by clicking on it. The rectangle is 100 by 50 pixels. 2



(CLO5) (d) Evaluate the following Java code and write down the output of the code. 2

```
class First
{
    int i = 10;
    public First(int j)
    {
        System.out.println(i);
        this.i = j * 10;
    }
}
class Second extends First
{
    public Second(int j)
    {
        super(j);
        System.out.println(i);
        this.i = j * 20;
    }
}
public class MainClass
{
    public static void main(String[] args)
    {
        Second n = new Second(20);
        System.out.println(n.i);
    }
}
```

(CLO4) (e) Suppose you have a character array that contains X's and O's, and you want to rearrange the contents of this array so that all the X's precede all the O's, as shown in the example below. Write your design method for the scenario and then write your code to implement your idea to solve the problem.

initial array contents	contents after rearrangement
XOOOXXOXXX	XXXXXXOOOO

2. (a) Define polymorphism. How run time polymorphism is different than compile time polymorphism? 7
   (b) Differentiate between super and this keyword. 2
   (c) Can we access the superclass version of an overridden method in the subclass? If yes, how? 3

3. (a) What is inheritance? Is any inheritance possible for a private class? Justify your answer with an appropriate example. 8
   (b) What are the categories of inheritance? Differentiate them with examples. 4

4. (a) What will be the output of the following Java program? 3

```
class A
    {
        int i;
    }
    class B extends A
    {
        int j;
        void display()
        {
            super.i = j + 1;
            System.out.println(j + " " + i);
        }
    }
    class inheritance
    {
        public static void main (String args[])
        {
            B obj = new B();
            obj.i=1;
            obj.j=2;
            obj.display();
        }
   }
```

(b) Write a java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape. 4

(c) Write a Java program using a do-while loop that asks the user to enter two numbers. The numbers should be added and the sum displayed. The loop should ask the user whether he or she wishes to perform the operation again. If so, the loop should repeat; otherwise, it should terminate. 5

5. (a) What are the differences between the local variable and the instance variable? Explain with proper examples. 6

6. (b) How can you return a value from a method? Show in an example. Can a method declare multiple return values? 6

(a) Find the output of the following program structure. 3

```
class Books
{
    String title;
    String author;
}
class BooksTestDrive {
    public static void main (String [] args)
    {
        Book [] myBooks = new Books [3];
        int x=0;
        myBooks [0].title="The Grapes of Java";
        myBooks [1].title="The Java Gatsby";
        myBooks [2].title="The Java Cookbook";
        myBooks [0].author="bob";
        myBooks [1].author="sue";
        myBooks [2].author="ian";
        while (x < 3){
           system.out.print (myBooks[x].title);
           system.out.print (" by ");
           system.out.println (myBooks[x].author);
           x = x + 1;
        }
    }
}
```

(b) What is a constructor and why it is necessary to declare in class? Explain different types of constructor with example.

(c) What are the differences between Inner class and Outer class? Explain with examples.

7. (a) Differentiate between static and final keywords in the java program.

(b) What is the output of the following code? And explain the output.

```
class exam{
      private exam(){}
      void msg(){
      System.out.println("How is exam going?");
      }
   }
public class Simple{
      public static void main(String args[]){
       exam scripts = new exam();
      }
   }
```