Object Oriented Programming in Java – Fundamentals of Java (OOP)

Question 1 – Basic output

Write Text-Based Application using Object-Oriented Approach to display your name.

Question 2 – Input & output I

Write a program that input, calculates and prints the product of three integers.

Question 3 – Input & output II

Write a program that converts a Fahrenheit degree to Celsius using the formula (input values):

$$celsius = \left(\frac{5}{9}\right)(fahrenheit - 32)$$

Question 4 – If condition

Write an application that inputs three integers from the user and displays the sum, average, product, smallest and largest of the numbers.

Question 5 - Loops

Write a Java application that allows the user to enter up to 20 integer grades into an array. Stop the loop by typing in -1. Your main method should call an Average method that returns the average of the grades. Use the DecimalFormat class to format the average to 2 decimal places.

Question 6 - OOP

Create a class called Date that includes three pieces of information as instance variables—a month (typeint), a day (typeint) and a year (typeint). Your class should have a constructor that initializes the three instance variables and assumes that the values provided are correct. Provide a set and a get method for each instance variable. Provide a method displayDate that displays the month, day and year separated by forward slashes(/). Write a test application named DateTest that demonstrates classDate's capabilities.

Question 7 - Inheritance

Create a new class called ‘Item’ with two protected instance variables (private variables), an integer variable called ‘location’, and a String variable called ‘description’.

Add a constructor method for the Item class that takes an integer and a String as arguments (in that order). The constructor should assign the value of these parameters to the corresponding instance variables. Add getter and setter methods for the location and description variables. Add another class called Monster and make the Monster class a sub-class of the Item class. Add a constructor method to the Monster class that takes an integer and a String argument just like the Item class constructor.

Use these arguments to call the Item super class constructor from within the Monster class constructor so that the instance variables in the superclass are instantiated correctly.Write a suitable main method in a different class and call all the methods.

Question 8 - Static

Create class SavingsAccount. Use a static variable annualInterestRate to store the annual interest rate for all account holders. Each object of the class contains a private instance variable savingsBalance indicating the amount the saver currently has ondeposit. Provide method calculateMonthlyInterest to calculate the monthly interest by multiplying the savingsBalance by annualInterestRate divided by 12 this interest should be added to savingsBalance. Provide a static method modifyInterestRate that sets the annualInterestRate to a new value.
Write a program to test class SavingsAccount. Instantiate two savingsAccount objects, saver1 and saver2, with balances of $2000.00 and $3000.00, respectively. Set annualInterestRate to 4%, then calculate the monthly interest and print the new balances for both savers. Then set the annualInterestRate to 5%, calculate the next month’s interest and print the new balances for both savers.

Question 9 - Inheritance

Create a super class called Car. The Car class has the following fields and methods.

◦ **int speed;**

◦ **double regularPrice;**

◦ **String color;**

◦ **double getSalePrice();**

◦

Create a sub class of Car class and name it as Truck. The Truck class has the following fields and methods.

int weight;

◦ **double getSalePrice();//Ifweight>2000,10%discount.Otherwise,20%discount.**

Create a subclass of Car class and name it as Ford. The Ford class has the following fields and methods

- **int year;**
- **int manufacturerDiscount;**
- **double getSalePrice();//FromthesalepricecomputedfromCarclass,subtractthemanufacturerDiscount.**

Create a subclass of Car class and name it as Sedan. The Sedan class has the following fields and methods.

- **int length;**
- **double getSalePrice();//Iflength>20feet,5%discount,Otherwise,10%discount.**

Create MyOwnAutoShop class which contains the main() method. Perform the following within the main() method

Create an instance of Sedan class and initialize all the fields with appropriate values. Use super(...) method in the constructor for initializing the fields of the superclass.

Create two instances of the Ford class and initialize all the fields with appropriate values. Use super(...) method in the constructor for initializing the fields of the super class.Create an instance of Car class and initialize all the fields with appropriate values. Display the sale prices of all instance.

Question 10 – abstract class and methods

Write a program to create a class named shape. In this class we have three sub classes circle, triangle and square each class has two member function named draw () and erase (). Create these using polymorphism concepts.

Write a program to give a simple example for abstract class.

Write a program suppose, it is required to build a project consisting of a number of classes, possibly using a large number of programmers. It is necessary to make sure that every class from which all other classes in the project will be inherited. Since any new classes in the project must inherit from the base class, programmers are not free to create a different interface. Therefore, it can be guaranteed that all the classes in the project will respond to the same debugging commands.

Question 11 - interface

Write a program to create interface A in this interface we have two method meth1 and meth2. Implements this interface in another class named MyClass.

Write a program to give example for multiple inheritance in Java.

Write a program to create interface named test. In this interface the member function is square. Implement this interface in arithmetic class.

Create one new class called ToTestInt in this class use the object of arithmetic class.

Question 12 – Exception Handling

Write a program for example of try and catch block. In this check whether the given array size is negative or not.

Write a program for example of multiple catch statements occurring in a program.

Write a program to illustrate sub class exception precedence over base class.

Write a program to illustrate usage of try/catch with finally clause.

Write a program to describe usage of throws clause.

Write a program for creation of user defined exception.

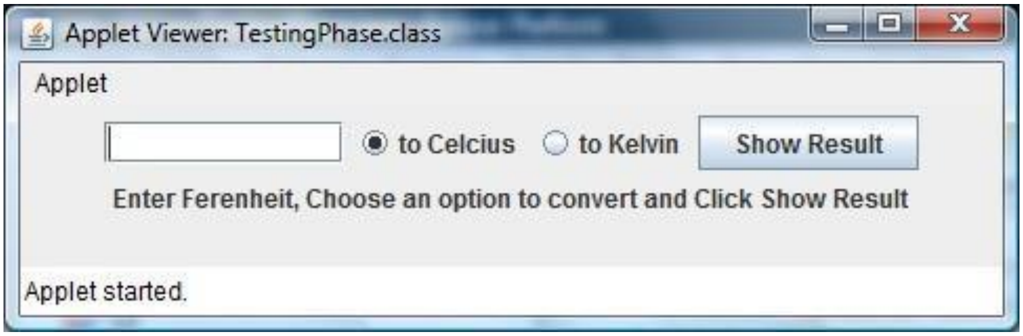
Question 13 - Threads

Write a program to illustrate creation of threads using runnable class.(start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).

Write a program to create a class MyThread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently.

Question 14 – GUI I

Design the following GUI and write required code for the conversion.

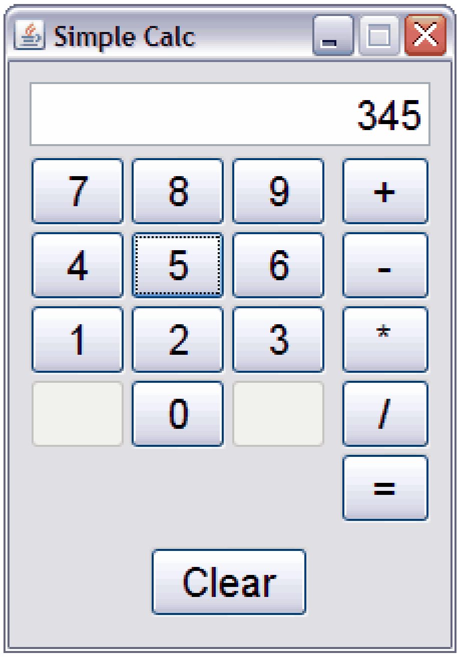

Applet Viewer: TestingPhase.class

Enter Ferenheit, Choose an option to convert and Click Show Result

Applet started.

Question 15 – GUI II

Design the following GUI and write required code for the basic calculations and operations.



Question 16 - JDBC

Create a MySql database named ‘Test’. In the database Test, create tables, ‘Login’ and ‘Student’ with following fields.

Login

User_Id(varchar), Password(varchar)

Student

Employee_Id(int), First_Name(varchar), Last_Name(varchar), Batch_Id(varchar).

Create the following forms using Swings and write necessary code to perform the following tasks.

1. Login form (Check the username and password. If it’s valid direct the user to next form 2.)
2. A form to perform insert, delete and update one record at a time. Include another button a load form 3.
3. Display all the records in table.

Note: When you run the application, initially it should display the login form.