**Velammal College of Engineering and Technology, Madurai**

**An Autonomous Institution**

**Department of Computer Science and Engineering**

**21CS205 Object oriented programming lab**

**Exercise No 4**

Abstract class & Interface

Team 1

1. Define an abstract class “car” with members reg\_no, model, reg\_date. Define two subclasses of this class – “transportVehicles ” (validity\_no, start\_date, period) and “privateVehicle ” (owner\_name, owner\_address). Define appropriate constructors. Create n objects which could be of either transportVehicles or privateVehicle class by asking the user’s choice. Display details of all “privateVehicle” objects and all “transportVehicles” objects.
2. Create an interface “CreditCardInterface” with methods to viewCreditAmount, viewPin, changePin and payBalance. Create a class Customer (name, card number, pin, creditAmount – initialized to 0). Implement methods of the interface “CreditCardInterface” in Customer class. Create an array of customer objects and perform the following actions.

* Pay Balance
* Change Pin

Team **2**

1. Write an abstract class Shape with data members: numSides, Constructor to initialize numSides , Concrete (normal) method: get method for numSides , Abstract methods: getArea(), getPerimeter() . Derive a class Rectangle from shape with Data members: width, height .Derive another concrete subclass Triangle with Data members: width, height. In another class, write a main method to create objects for rectangle and triangle and access methods in it.
2. Create an interface Resizable that has a method resize which resizes the shape by a factor x. Create a class rectangle that implements resizable and has methods to print the area and perimeter of rectangle. Create a main method which creates the rectangle object with length =10 breadth=5, print the area and perimeter. Resize the rectangle by 5 then print the area and perimeter. Create another class Circle which has methods to print area and perimeter. Resize the circle by 10 then print the area and perimeter.

Team **3**

1. Create an abstract class book which has variable title, author and price. It has an abstract method setdetails(), gettitle() which returns the title. Derive another class MyBookfrom Book class which implements setdetails method to set the title of book, author and price. Create 3 mybook objects in main method and then display the total price of these three books.
2. An interface called RegularPolygon with two abstract methods: getNumSides and getSideLength. • A class EquilateralTriangle that implements the interface, has getNumSides return 3 and getSideLength return an instance variable that is set by the constructor. • A class Square that implements the interface, has getNumSides return 4 and getSideLength return an instance variable that is set by the constructor. 2. Add a static totalSides method, that given a RegularPolygon[], returns the sum of the number of sides of all the elements. 3. Add two default methods: • getPerimeter (n \* length, where n is the number of sides) • getInteriorAngle ( (n-2)π/n in radians)

Team **4**

1. Create an abstract class Account with data members Account number, name, email. Create abstract methods double getBalance(), void deposit(int amount), void withdraw(int amount).Derive two subclasses currentAccount, SavingsAccount which implements these methods and also it should also override toString() method.
2. Create an interface CompareShapes which has abstract methods like double area(), double Perimeter() and int Compare(object o). Create a class Rectangle which implements area(), perimeter and compare methods. In the main method create 5 rectangle object and sort them based on their area using the compare method.

**Team 5**

1. Create an abstract class Person with the data members name, Aadhar number, abstract methods such as void getData() and void display() . Derive two classes Student and Faculty from person class which implements abstract methods. Apart from these student class have to display the marks secured and employee has to display the salary details
2. Create an interface printable which has an abstract method void calculateBill() and void display(). Create two classes SuperMarket and Restaurant which has to implement printable interfaces. In the Main method create objects for both the classes and print the bills for both the classes

**Team 6**

1. We have to calculate the percentage of marks obtained in three subjects (each out of 100) by student A and in four subjects (each out of 100) by student B. Create an abstract class 'Marks' with an abstract method 'getPercentage'. It is inherited by two other classes 'A' and 'B' each having a method with the same name which returns the percentage of the students. The constructor of student A takes the marks in three subjects as its parameters and the marks in four subjects as its parameters for student B. Create an object for eac of the two classes and print the percentage of marks for both the students.
2. Define an interface “QueueOperations” which declares methods for a static queue. Define a class “MyQueue” which contains an array and front and rear as data members and implements the above interface. Initialize the queue using a constructor. Write the code to perform operations on a queue object.

**Team 7**

1. Create an abstract class Employee with the data members name,age and hourRate. It has a concrete (normal) method toString() method and an abstract method double CalcSalary(double hours). Derive two classes manager and clerk which implements abstract method to calculate salary based on the hours. Create 2 Manager and 1 Clerk object and display all the details like name, age , hourRate and Salary.
2. Create an interface printable which has an abstract method void print().Create three classes Rectangle, SportsCar and Manager classes which implements printable. Create objects for Rectangle, SportsCar and Manager in Main method. The rectangle object should print the length and breadth alongwith the area, Sportcar should print the brandname, Model and price, Manager object should print the name, age, EmployeID and salary details

**Team 8**

1. Create an abstract class person which has the data members name, gender, Aadhar number and abstract methods void getinformation(), void CalculateTax(double income). Derive another class Employee which has to implement the abstract methods. Tax has to be calculated based on the criteria

|  |  |  |
| --- | --- | --- |
| Income | Tax Percentage | |
| Male | Female |
| >=190000 | NIL | NIL |
| >=200000 | 10% | NIL |
| >=500000 | 20% | 10% |
| <500000 | 25% | 20% |

1. Create a Java console application using interface concepts for abstract data type
2. Stack. Implement Stack operations PUSH, POP and Display using Array.