

	<b>Program on Encapsulation: Write a program to demonstrate classes and objects</b>
2	<p>Enter an array (use Scanner) of distinct <b>n</b> integers (use command line argument) and a sum value. Print all triplets with a sum smaller than the given sum value.</p> <p><b>Example:</b>  Input : arr[] = {-2, 0, 1, 3}  sum = 2.  Output : (-2, 0, 1)  (-2, 0, 3)  Explanation : The two triplets have sum less than or equal to 2.</p>
2	Write a java program to keep a record of heights and weight of 10 different people, and find out the number of people whose weight is less than 50kg and height is more than 170cms.
	<b>Program on Encapsulation: Write a program to demonstrate constructor</b>
3	<p>Create a class 'Employee' with three data members which are name, age and Salary. The constructor of the class assigns default values name as "unknown", age as '0' and address as "not available". It has SetInfo method assigns name, age and Salary respectively. Print the name, age and Salary of 10 employees sorted according to their age.</p> <p>Hint - Use array of objects</p>
4	<p>A random number is generated between 0-1000 which is the cash inflow to the person playing the game. Two people play the game 5 times and the winner is the one whose total cash is maximum and the program displays the winner. Use the constructor to set the initial amount as zero.</p> <p>Hint - Use array of objects, import java.lang.Math; and use Math.random()</p>
	<b>Program on Polymorphism: Implement a Program to demonstrate method overloading</b>
5	A manufacturer is designing a rectangular box of various shapes. He has two assembly lines for the boxes. One is for the small boxes of size(L=2,B=6,H=3) in cm and big boxes of size (L=12.50,B=30.00,H=78.25) in cm. When the material is supplied to him, he decides on the capacity of the store which is 50,000 cubic cm which boxes to manufacture. He has to optimize the production to fit in the store everyday. Use method overloading to set the values of L,B and H.
	Find out the area of geometric shapes with the given input attributes like length, breadth, height, radius etc. Design a program using method overloading to print the area of square, rectangle, circle and triangle.

	<b>Program on Polymorphism: Implement a Program to demonstrate constructor overloading</b>
6	Write a java program consisting of a class named Complex to add two complex numbers by using add() method by passing the objects as parameter(Complex number 1 and Complex number 2) and display the result using method display(). Initialize the real and imaginary values of the Complex number by writing parameterized Constructor. Use default constructor to initialize default values to real and imaginary values to zero. Use this keyword.
7	<p>A class with name <i>LikesToDo</i> have constructors <i>LikesToDo(Girl object)</i>, <i>LikesToDo(Boy object)</i>, where <i>Boy</i> and <i>Girl</i> are the two different classes. Now, body of the functions:</p> <pre> LikesToDo(Girl object, number of books) { //variables String Go to school, Go to Library; if not reached maximum book limit then takes a book; else return an old book and get a new book; }  LikesToDo(Boy object) { //variables Sting Go to school, Go to the playground; If not raining then play outdoor games; else play indoor games; } </pre> <p>Use appropriate methods and constructor call.</p>
	<b>Program on Inheritance: Implement a Program to demonstrate single, multilevel Inheritance</b>
8	<p>To write a Java Program to create employee as a superclass and it include name and designation. The subclass Salaried is calculating salary on the basis of designation and experience.</p> <p>–if experience is less than five years and designation=clerk, then salary=20000+bonus where bonus=5000. If experience&gt;= 5 and designation=clerk, then salary= 30000+bonus, bonus= 10000.</p> <p>–If experience is more than or equal to 5 years and designation=manager then salary=35000+ bonus where bonus=15000. If experience&gt;= 5 and designation=manager, then salary= 40000+bonus, bonus= 30000.</p> <p>–Print employee name, designation, bonus and total salary. Use super().</p>
9	Write an inheritance hierarchy for classes Quadrilateral, Trapezoid, parallelogram, rectangle & Square. Use Quadrilateral as the super class of the hierarchy. Specify the instance variable and methods foreach class.

	The private instance variables of Quadrilateral should be the x-y coordinate pairs of the four end points of quadrilateral. Write a program that instantiates objects of your classes and outputs each object area( except quadrilateral).
	<b>Program on Polymorphism: Implement a Program to demonstrate method overriding</b>
10	<p>Write a Java program</p> <p>Superclass: class Info, with members as pid, branch, year;</p> <p>Display(): should display whether the branch is IT, Computer, Mech. year and pid</p> <p>class FE, char sub, int marks of 3 subjects, average . Display()</p> <p>class SE, char sub, int marks of 3 subjects, average. Display()</p> <p>class TE, char sub, int marks of 3 subjects, average. Display()</p> <p>The user should input id, branch, marks, and subject. O/p:Displays display id, year, subject, marks, average. The FE, SE, TE classes all extend class info.</p>
11	<p>A boy has his money deposited \$1000, \$1500 and \$2000 in banks-Bank A, Bank B and Bank C respectively. We have to print the money deposited by him in a particular bank.</p> <p>Create a class 'Bank' with a method 'getBalance' which returns 0. Make its three subclasses named 'BankA', 'BankB' and 'BankC' with a method with the same name 'getBalance' which returns the amount deposited in that particular bank. Call the method 'getBalance' by the object of each of the three banks.</p>
	<b>Program on Inheritance: Implement a Program to demonstrate multiple Inheritance</b>
12	<p>Write a program to maintain marks of student.</p> <p>i) Student is Abstract class and it has Roll no., Name, subjectmark attributes. Showstudentdata() is abstract method. Getstudentdata() is non abstract method.</p> <p>ii) ISport is an Interface, having attribute sportgracemarks=5. Showsportmark() is a method.</p> <p>iii) IExServiceMan is an Interface, having attribute ExServiceMangracemarks=10. ShowExServiceManmark() is a method.</p> <p>iv) Result is Class and it is inheriting Student, ISport, IExServiceMan. Totalmarks=subjectmark + sportgracemarks +ExServiceMangracemarks. Showresult() is method of Result class.</p>
13	<p>You are given an interface <i>Arithmetic</i> which contains a method signature <i>int divisor_sum(int n)</i>. You need to write a class called MyCalculator which implements the interface.</p> <p><i>divisorSum</i> function just takes an integer as input and return the sum of all its divisors. For example divisors of 6 are 1, 2, 3 and 6, so <i>divisor_sum</i> should return 12. The value of n will be at most 1000.</p>

14	<p>Anand and Krishna are playing a game. This game starts with two piles of n1 and n2 chips. They play alternatively.</p> <p>In his/her turn a person has to remove one of the piles and split the other pile into two piles, these two new piles need not be of the same size. The person who cannot make a move in his turn loses. Write a program to find the winner. Here interface Piles has SetPiles(int,int) to set the number of chips in each pile.</p> <p><b>Sample Input</b></p> <pre>31 92</pre> <p><b>Sample Output</b></p> <pre>Bob Alice</pre> <p><b>Explanation</b></p> <p>Test case 1:</p> <p>Initially, the piles are (3, 1).  Alice takes 1 and splits 3 into (1, 2).  Bob takes 1 and splits 2 into (1, 1).  Alice cannot make her move. Thus Bob wins.</p> <p>Test case 2:</p> <p>Initially, the piles are (9, 2).  Alice takes 9 and splits 2 into (1, 1).  Bob cannot make his move. Thus Alice wins.</p>
	<b>Program on Abstraction: Implement a Program to demonstrate Abstraction using abstract class</b>
15	<p>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 each of the two classes and print the percentage of marks for both the students</p>
16	<p>We have to calculate the area of a rectangle, a square and a circle. Create an abstract class 'Shape' with three abstract methods namely 'RectangleArea' taking two parameters, 'SquareArea' and 'CircleArea' taking one parameter each. The parameters of 'RectangleArea' are its length and breadth, that of 'SquareArea' is its side and that of 'CircleArea' is its radius. Now create another class 'Area' containing all the three methods 'RectangleArea', 'SquareArea' and 'CircleArea' for printing the area of rectangle, square and circle respectively. Create an object of class 'Area' and call all the three methods. your code check for 0, negative values and other error checks</p>
	<b>Exception handling</b>

17	<p>The GUI displays the account ID and the balance, and let the user deposit to or withdraw from the account. For each transaction, a message is displayed to indicate the status of the transaction: successful or failed. In case of failure, the failure reason is reported. The possible failure are negative-amount-exception (in both deposit and withdraw transaction) and insufficient-amount-exception ( in withdraw transaction).</p> <p>Account.java- private int id, private double balance, use constructor, int getId() ,void setBalance(double balance), double getBalance(), deposit an amount to this account- public void deposit(double amount), withdraw an amount from this account public void withdraw(double amount)</p> <p>AccountGUI.java(Main class), NegativeAmountException.java and InsufficientAmountException.java handle account transaction</p>
18	<p>Write a java program to throw an exception (checked) for an employee details. a) If an employee name is a number, a name exception must be thrown. b) If an employee age is greater than 50, an age exception must be thrown. c) Or else an object must be created for the entered employee details</p>
	<h2>Multithreading</h2>
19	<p>Write a program to create a new thread by extending a thread class</p> <ol style="list-style-type: none"> <li>1. get current thread name</li> <li>2. Set to highest priority to the newly created thread</li> <li>3. pause a thread for 1.5 seconds</li> <li>4. Check weather the thread is running state or not</li> <li>5. Check and make sure that your new thread completes before main thread completes</li> </ol>
20	<p>In a bank there are two operations performed as withdraw and deposit. Either deposit is done or withdraw is done. Initial amount is set to 2500 and amount should not go below 500 while withdrawing money i.e it gives message “less money”. Write code for five transactions using synchronized multithreading.</p>