Government College of Engineering, Nagpur

Department of Computer Science & Engineering

Practical List (2022-23)

Subject –Object Oriented Programming in JAVA **IIIrd Semester**

1) Write a programs to find sum of digits of four digit number.

2) Create a student result database in Java. Calculate the grades of students. Decide criteria for best student and short-list students who satisfy the criteria.
   a) A student has a rollNo, name, marks in five courses and a grade. A student list has many students. If a student has grade equal or beyond 8, he is considered as a top band student.
   b) Create at least ten students. From these, find all such students which satisfy the criteria of top band student. Create a list of such students and display the students in the list.

3) A company has many employees. An employee has employee Id, basic salary, house rent allowance, dearness allowance, profession tax and total salary. An employee has an address. The address has apartment number, apartment name, road and PIN code.

   The total salary of an employee is the summation of basic salary, house rent allowance which is 20 percent of basic salary, dearness allowance which is 45 percent of basic salary. The take home salary is calculated after deducting profession tax from which is 7 percent of basic salary from the total salary.

   When an employee is appointed, he is assigned with an employee Id and basic salary. One can ask for total salary of the employee and take-home salary of the employee.

   Identify a class/classes from the above statement, identify the attributes, the data types, the behavior. Test your program for ten employees

   Display all the details of the employees as per id and as per pin code.

   Display takes home salary for all the employees; display the tax to be deducted across all employees.

4) A circle has a radius. Its area can be calculated. The area is a double number. Its perimeter can be calculated as $2\pi r$. The perimeter is a double number. Given two circles one can find out which is large and which is small.
   Create two circles c1 and c2 with radius as 10 and 7 respectively. Calculate the area and perimeter of each. Compare two circles with each other and display which is large and which is small.

5) Write a JAVA program to perform String operations using String/StringBuffer class
   a) Write a program that reads a word and then prints the first character, the last character, and the characters in the middle. For example, if the input is GCOEN ,the program prints G N COE.
   b) Write a program that reads a name (such as Ranbeer Rishi Kapoor) and then prints a monogram consisting of the initial letters of the first, middle, and lastname (such as RRK).

6) Reading material has title and price. A book is a reading material. It has ISBN number. A magazine is a reading material, it has month of issue. A CD is a reading material, it has duration in minutes. Represent the above description as a generalization, specialization tree. Identify the parent class, its attributes, child class and their attributes. Write all of them clearly.

7) A vehicle has engine no and chassis number. It can be locked, unlocked. Every vehicle is movable (interface). It can be started, stopped, turned, accelerated, turned, and decelerated. A car is a vehicle. It has steering. An airplane is a vehicle. It has wings. A boat is a vehicle. It has propeller.

8) Consider student data consist of fields such as roll number, name, and marks of various subjects. Write a program using inbuilt and user defined exceptions to avoid invalid entry.

9) Design a user defined abstract data type 'Complex' in Java. Write a program to perform arithmetic operations of two complex numbers.

A complex number has a real part and an imaginary part.

a) Given the values of real part and imaginary part of a complex number, the magnitude of the complex number can be calculated as square root of the sum of squares of real part and the imaginary part.
b) The argument of the complex number can be calculated as tan inverse of ratio of imaginary part(numerator) and real part(denominator)
c) The complex number can be added to another complex number and the answer of the addition is a complex number. When one adds two complex numbers, the real parts of each of the complex numbers is added which becomes a real part of the answer and imaginary part of each complex number is added together which becomes imaginary part of the answer. Both these results are real and imaginary parts for a complex number which is the answer of the addition complex conjugate of the complex number can be calculated by negating the imaginary part of the complex number
d) The complex number can be subtracted from another complex number and the answer of the subtraction is a complex number.
e) When one subtracts a complex number from the other, the real part one complex number is subtracted from the other and the result becomes a real part of the answer and imaginary part of one complex number is number is subtracted from the other and the result of subtraction becomes imaginary part of the answer. Both these results are real and imaginary parts for a complex number which is the answer of the subtraction.

Subject Teacher
Dr. Latesh Malik