

## MCA-114: Object-Oriented Programming using Java- Laboratory

### Week 1 (To do some basic programs in JAVA)

**Program 1:** Write a Java program to display the message “This is my first java class”. Execute this program through the command line using javac and java.

**Program 2:** Write a Java program to display the message “This is just a test”. Pass these 5 strings as arguments in the main function while executing the program through cmd.

**Program 3:** Write a Java Program to make a frequency count of words in a given text entered by the user.

**Program 4:** Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer. (use Scanner class to read input).

**Program 5:** Write a Java program to multiply two given matrices.

**Program 6:** Write a Java program to find the Fibonacci series using recursive and non-recursive functions.

### Week 2 (To study Data types, Scope, and a lifetime of variables, operators, expressions, and control statements)

**Program 1:** Write a Java program to identify the symbols of expression given by the user is the operator or of which datatype.

**Program 2:** Write a Java program to make a class A in that class declare function add perform addition through main.

**Program 3:** Write a Java program to print prime numbers from 1 to 50 using *while* & *do-while* loops.

**Program 4:** Write a Java program to print the following structure using *for* loop.

```
*
* *
* * *
* * * *
* * * * *
* * * * *
* * * *
* * *
* *
*
```

**Program 5:** Write a Java program to find the factorial of given number using command line.

**Program 6:** Write a Java program to find the volume of the cuboid using *this* pointer.

**Program 7:** Write a Java program to swap the value of the speed of bikes by making class *bike* using call by value and call by reference

**Program 8:** Write a Java program to find whether the number is palindrome or not using recursion.

**Program 9:** Write a Java program to print all the substrings of the given string "CODING".

### **Week 3 (To study the Classes and Objects in OOPJ )**

**Program 1:** Write a Java program to create a class Rectangle with data members length and breadth. Create a method area () that finds the area of the rectangle. Use the constructor(s) to assign value to data members. Use "this" in a parameterized constructor.

**Program 2:** Print the sum, difference, and product of two complex numbers by creating a class named 'Complex' with separate methods for each operation whose real and imaginary parts are entered by the user.

**Program 3:** Write a Java program to create a class Box with data members length, breadth, and height. Create multiple constructors to assign values to objects in different ways. Use the overridden "equals" method to compare objects, if found equal then display the objects using overridden toString method.

### **Week 4 (To study inheritance in Java)**

**Program 1:** Write a Java program to identify the accessibility of a variable by means of different access specifiers within and outside the package.

**Program 2:** Write an employee class Marketer to accompany the other employees. Marketers make \$50,000 (\$10,000 more than general employees), and they have an additional method named advertise that prints "Act now, while supplies last!" Use the super keyword to interact with the Employee superclass as appropriate.

**Program 3:** Create a base class Person and two derived classes as Student and Teacher with their constructors and methods. Assume the student to be in the same package as that of Person and Teacher class to be in a different package.

The inheritance hierarchy would appear as follows:

- a) Add methods "get" the instance variables in the Person class. These would consist of: getName, getAge, getGender.
- b) Add methods to "set" and "get" the instance variables in the Student class. These would consist of: getIdNum, getGPA, setIdNum.
- c) Write a Teacher class that extends the parent class Person.

**Program 4:** Describe abstract class called Shape which has three subclasses say Triangle, Rectangle, Circle. Define one method area() in the abstract class and override this area() in these three subclasses to calculate for specific object i.e. area() of Triangle subclass should calculate area of triangle etc. Same should be for Rectangle and Circle.

**Program 5:** Assume that a bank maintains two kinds of accounts for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed.

Create a class Account that stores customer name, account number and type of account. From this derive the classes Curr-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:

- . Accept deposit from a customer and update the balance.
- . Display the balance.
- . Compute and deposit interest.
- . Permit withdrawal and update the balance.
- . Check for the minimum balance, impose penalty, if necessary and update the balance.

## **Week 5 (To study Interfaces and Exception Handling in Java)**

**Program 1:** Write a Java program to compute the area of circle and rectangle using Interfaces.

**Program 2:** Write a Java program that uses interface for the implementation of fixed-size and dynamic-size stacks (for dynamic stack size should be redefined as per the number of elements).

**Program 3:** Write a Java program for exception handling with StringIndexOutOfBoundsException exception.

- Create an object of the class having StringIndexOutOfBoundsException exception whenever an index is invoked of a string, which is not in the range.
- Each character of a string object is stored in a particular index starting from 0.
- To get a character present in a particular index of a string you can use a method charAt(int) of java.lang.String where int argument is the index.

**Program 4:** An array is declared with 5 elements. Then the code tries to access the 6th element of the array which throws an exception. Write the program for this.

**Program 5:** Write a suitable program for the following conditions:

- a) A try block followed by multiple catch blocks
- b) Catching multiple type of exceptions
- c) Using throws/throw keywords
- d) Using finally block
- e) Using try-with-resources
- f) User-defined exceptions

## **Week 6 (To study about Multi-Threading in Java)**

**Program 1:** Suppose there are 5 workers who carry out work at the same time. Develop a program that shows this scenario with the concept of multithreading.

**Program 2:** Write a Java program that creates three threads. The first thread displays “Good Morning” every second, the second thread displays “Hello” every two seconds, and the third thread displays “Welcome” every three seconds.

**Program 3:** Implement a class that checks whether a given number is prime using both the Thread class and Runnable interface.

**Program 4:** Write a Java program that correctly implements the producer-consumer problem using the concept of inter-thread communication.

## **Week 7 (To study Strings in Java)**

**Program 1:** Write a Java program to find whether a given string is palindrome or not.

**Program 2:** Write a method that will remove given character from the String.

**Program 3:** Write a Java program for sorting a given list of names.

**Program 4:** Write a Java program that computes your initials from your full name and displays them.

**Program 5:** An anagram is a word or a phrase made by transposing the letters of another word or phrase; for example, "parliament" is an anagram of "partial men," and "software" is an anagram of "swear oft." Write a program that figures out whether one string is an anagram of another string. The program should ignore white space and punctuation.

## **Week 8 (To study Event Handling & AWT in Java)**

**Program 1:** Write a Java program that handles all mouse events and shows the event name at the centre of the window when a mouse event is fired (Use Adapter classes). .

**Program 2:** Write a Java program for handling Key events.

**Program 3:** Write a java program that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with “STOP” or “READY” or ”GO” should appear above the buttons in selected color. Initially, there is no message shown.

## **Week 9 (To study Applets in Java)**

**Program1:** Write an applet to display a simple message on a colored background.

**Program2:** Write a Java application in which wherever the mouse will be clicked. it keeps printing the coordinates of the clicked.

**Program3:** Write an applet to display a moving banner showing the status of it.

**Program4:** Write an applet to draw a simple and beautiful landscape.

**Program5:** WAP to play audio in applet with appropriate requirements of AWT components.

**Program6:** WAP to have communication between two applets.

**Program7:** WAP to display clock in an applet.

## **Week 10 (To study Swing and JDBC in Java)**

**Program1:** Write a java programs to find factorial of a number. user is allowed to enter a number into the text field whose factorial is to be determined. On pressing the button the value of the text field is firstly converted into integer and then processed to find its factorial. The result will get display in another text field. (Hint: use swings)

**Program2:** Write a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - \* % operations. Add a text field to display the result.

**Program3:** Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.