Banarsidas Chandiwala Institute Of Information <u>Technology</u>



<u>Java</u> <u>Lab Manual</u>

Submitted to:-

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1. Write a Java program to print all odd numbers between 1 to 10.

Code:

```
public class OddNumber {

public static void main(String[] args) {

   System.out.println("Printing Odd Numbers between 1 and 10");

   for(int i=1; i<=10;i++){
      if(i%2!=0){
        System.out.println(i + " ");
      }
   }
}</pre>
```

Output:

```
Printing Odd Numbers between 1 and 10
1
3
5
7
9
BUILD SUCCESSFUL (total time: 1 second)
```

2. Write a Java program to find out factorial of a number through recursion.

```
import java.util.Scanner;

//program to calculate the factorial of a number using recursion
public class Factorial {
   static int fact(int n){
```

```
int ans = 1;
  if (n == 1){
    return 1;
}
```

```
ans = n * fact(n-1);
return ans;
}

public static void main(String[] args) {
    System.out.println("Enter a number for which you want Factorial");
    Scanner sc = new Scanner(System.in);
    int n = sc.nextInt();
    System.out.println(fact(n));
}
```

```
Enter a number for which you want Factorial
6
720
BUILD SUCCESSFUL (total time: 10 seconds)
```

3. Write a Java program to accept command line arguments & print them.

```
class CommandLine {
   public static void main(String[] args) {
```

```
for (String s: args) {
        System.out.println(s);
    }
}
```

4. Write a Java program to print fibonacci series.

Code:

```
import java.util.Scanner;
//program to print Fibonacci Series
public class Fibo {
  static void fib(int n){
    int a = 0, b = 1;
    System.out.print( a + " " + b + " ");
    for(int i = 1; i \le n; i++){
     int c = b;
     b = a + b;
     a = c;
      System.out.print(b +" ");
    }
  public static void main(String[] args) {
    System.out.println("Enter a number for the elements in fibonacci series: ");
    Scanner sc = new Scanner(System.in);
    int n = sc.nextInt();
    fib(n);
```

Output:

Enter a number for the elements in fibonacci series :

```
10
0 1 1 2 3 5 8 13 21 34 55 89
BUILD SUCCESSFUL (total time: 6 seconds)
```

5. Write a Java program that creates a class accounts with following details:

Instance variables: ac_no., name, ac_name, balance

Methods: withdrawal(), deposit(), display().use constructors to initialize members.

```
public class Accounts {
  private long ac_no;
  private String name, ac_name;
  private double balance;
  public Accounts(int n, String nm, String ac_nm, double bal) {
    ac_no = n;
    name = nm;
    ac_name = ac_nm;
    balance = bal;
    System.out.println("Account created!");
    this.display();
  public void deposit(double amount) {
    balance += amount;
    System.out.println("Amount deposited:"+ amount+ "\ntotal balance is:" + balance);
  public void withdrawal(double amount) {
    if( balance >= amount)
    balance -= amount;
    System.out.println("Amount withdrawn :"+ amount+ "\nTotal balance is:" + balance);
```

```
Account Number: 335567
Account Name: Savings
Holder Name: Ram
Balance: 10000.0
Amount withdrawn: 5000.0
Total balance is: 5000.0
Amount deposited: 2000.0
total balance is: 7000.0
Insuffecient Balance! Withdrawls amount: 8000.0 Total balance is: 7000.0
Account Number: 335567
Account Name: Savings
Holder Name: Ram
Balance: 7000.0
```

6. Write a Java program to implement constructor overloading.

Code:

```
class Student{
  int rollNo;
  String name;
  Student(int roll , String n){
   rollNo = roll;
   name = n;
    System.out.println("New Student Added with name: " + n + " Roll No:" + roll);
  Student(int roll){
   rollNo = roll;
   System.out.println("New Student Added with Roll No :" + roll);
  Student(){
    System.out.println("New Student Added");
public class ConstructorOverloading {
  public static void main(String[] args) {
    Student s1 = new Student();
    Student s2 = new Student(101);
    Student s3 = new Student(101,"Ram");
```

```
New Student Added
New Student Added with Roll No :101
New Student Added with name : Ram Roll No :101
BUILD SUCCESSFUL (total time: 1 second)
```

7. Write a Java program to count the no. of objects created in a program.

```
class Student{
  int rollNo;
  String name;
  static int students = 0;
  Student(int roll , String n){
  rollNo = roll;
  name = n;
  students ++;
  static int getTotalStudents(){
  return students;
public class ObjectCount {
    public static void main(String[] args) {
      Student s1 = new Student(101,"Tony");
      Student s2 = new Student(102,"Richard");
      Student s3 = new Student(103,"Peter");
System.out.println("Total no of objects of Student class = "+ Student.getTotalStudents());
    }
```

```
Total no of objects of Student class = 3
BUILD SUCCESSFUL (total time: 1 second)
```

8. Write a Java program to implement method over ridding & method overloading. Code:

```
//program to show Overloading and Overriding
class Rectangle{
 float length, breadth;
 public float getArea(){
 return length * breadth;
class Square extends Rectangle{
  float side;
 Square (float s){
 side = s;
  @Override
 public float getArea(){
  return side * side;
 public void display(){ //overloading display
   System.out.println("This is a square object");
 public void display(float s){ //overloading display
  System.out.println("This is a square object with side: "+s);
```

```
}

public class OverLoadingOverriding {
  public static void main(String[] args) {
    Square s1 = new Square(5);
    s1.display();
    s1.display(s1.side);
    System.out.println("Area : " +s1.getArea());
}

}
```

```
This is a square object
This is a square object with side : 5.0
Area : 25.0
BUILD SUCCESSFUL (total time: 1 second)
```

9. Create a class box having height, width, depth as the instance variables & calculate its volume. Implement constructor overloading in it. Create a subclass named box_new that has weight as an instance variable. Use super in the box_new class to initialize members of the base class.

```
public class Box {
    double height, width, depth;

Box(double h, double w, double d) {
    height = h;
    width = w;
    depth = d;
        System.out.println("Box Created with \n Height:" + height + "\n Width:" + width + "\n
    Depth:"+ depth);
    }

Box(double side) {
    height = width = depth = side;
    System.out.println("Box Created with Sides:" + side);
```

```
double volume() {
 return height * width * depth;
class BoxNew extends Box {
double weight;
 BoxNew(double h, double w, double d, double weight) {
 super(h, w, d);
 this.weight = weight;
  System.out.println(" Weight:"+ weight);
class Main{
 public static void main(String[] args) {
    Box b1 = new Box(3,4,4);
    Box b2 = new Box(5);
    System.out.println("Volume Of Box :" + b1.volume());
    BoxNew bn = new BoxNew(2, 3, 3, 7);
```

10. Write a Java program to implement run time polymorphism.

```
class Shape {
  void draw() {
    System.out.println("Drawing Shape");
  }
}
class Circle extends Shape {
  @Override
  void draw() {
```

```
System.out.println("Drawing Circle");
}
}
class Square extends Shape {
    @Override
    void draw() {
        System.out.println("Drawing Square");
    }
}
public class RuntimePolymorphism {
        public static void main(String[] args) {
        Shape s;
        s = new Circle();
        s.draw();
        s = new Square();
        s.draw();
}
```

```
Drawing Circle
Drawing Square
BUILD SUCCESSFUL (total time: 1 second)
```

11. Write a Java program to implement interface. Create an interface named shape having area () & perimeter () as its methods. Create three classes circle, rectangle & square that implement this interface.

```
interface Shape {
  double area();
  double perimeter();
```

```
class Circle implements Shape {
 double radius;
 final double PI = 3.147;
 Circle(double radius) {
 this.radius = radius;
 @Override
 public double area() {
 return PI * radius * radius;
 @Override
 public double perimeter() {
 return 2 * PI * radius;
class Rectangle implements Shape {
 double length, width;
 Rectangle(double length, double width) {
 this.length = length;
 this.width = width;
 @Override
 public double area() {
 return length * width;
 @Override
 public double perimeter() {
 return 2 * (length + width);
```

```
class Square implements Shape {
 double side;
 Square(double side) {
 this.side = side;
 }
 @Override
 public double area() {
 return side * side;
 }
 @Override
 public double perimeter() {
 return 4 * side;
class ImplementingInterface {
  public static void main(String[] args) {
    Rectangle rect = new Rectangle(4, 6);
    Square square = new Square(5);
    Circle circle = new Circle(4);
    System.out.println("Area of Rectangle" + rect.area());
    System.out.println("Perimeter of Rectangle" + rect.perimeter());
    System.out.println("Area of Square" + square.area());
    System.out.println("Perimeter of Square" + square.perimeter());
    System.out.println("Area of Circle" + circle.area());
    System.out.println("Perimeter of Circle" + circle.perimeter());
```

```
Area of Rectangle24.0
Perimeter of Rectangle20.0
Area of Square25.0
```

```
Perimeter of Square 20.0
Area of Circle 50.352
Perimeter of Circle 25.176
BUILD SUCCESSFUL (total time: 0 seconds)
```

12. Write a Java program to show multiple inheritance.

```
//program to use multiple inheritance using interfaces
interface area{
float getArea();
interface perimeter{
float getPerimeter();
class Square implements area, perimeter{
  float side;
  Square(float s){side = s;}
  @Override
  public float getArea(){
  return side*side;
  @Override
  public float getPerimeter(){
  return side * 4;
//not compulsary for the program , using lambda expressions
class Rectangle{
  float length, breadth;
```

```
area a = ()-> length* breadth;
perimeter p = ()-> (length + breadth) * 2;

}

public class MultipleInheritance {
  public static void main(String[] args) {
    Square s1 = new Square(5);
    System.out.println("Area : " +s1.getArea());
    System.out.println("Perimeter : " + s1.getPerimeter());
  }

}
```

```
Area : 25.0
Perimeter : 20.0
BUILD SUCCESSFUL (total time: 0 seconds)
```

13. Create a user defined exception named "nomatchexception" that is fired when the string entered by the user is not "india".

```
import java.util.Scanner;

class NoMatchFoundException extends Exception
{
  @Override
    public String toString(){
    return "NoMatchFoundException [The input is Not India]";
    }
}

public class NewException {
    public static void main(String[] args) {
        String s;
    }
}
```

```
System.out.println("Enter a Sring");
Scanner sc = new Scanner(System.in);
s= sc.nextLine();

if(! s.equalsIgnoreCase("India"))
{
    try {
        throw new NoMatchFoundException();
    } catch (NoMatchFoundException ex) {
        System.err.println(ex);
    }
}
```

```
Enter a Sring
Australia
NoMatchFoundException [The input is Not India]
BUILD SUCCESSFUL (total time: 11 seconds)
```

14. Write a Java program to show even & odd numbers by thread.

```
class OddThread extends Thread{
 @Override
 public void run(){
 for(int i = 1; i<= 10; i++)
    if(i % 2 != 0)
    {
     try {
       System.out.println("Odd Number : " + i);
        Thread.sleep(5);
      } catch (InterruptedException ex) {
        System.err.println(ex);
public class EvenOddThread {
 public static void main(String[] args) {
    EvenThread t1= new EvenThread();
    OddThread t2 = new OddThread();
   t1.start();
   t2.start();
```

```
Odd Number : 1
Even Number : 2
```

```
Odd Number : 3
Even Number : 4
Even Number : 6
Odd Number : 5
Odd Number : 7
Even Number : 8
Odd Number : 9
Even Number : 10
BUILD SUCCESSFUL (total time: 1 second)
```

15. Write a Java program to implement vector

[use: addelement(),elementat().removeelement(),size().]

Code:

```
import java.util.Vector;
public class VectorImplementation {
 public static void main(String[] args) {
 Vector<Integer> v = new Vector<>();
  // Adding elements to the vector
  v.addElement(10);
  v.addElement(20);
  v.addElement(30);
  v.addElement(40);
 System.out.println("Vector elements: " + v);
  // Accessing element at a particular index
  System.out.println("Element at index 2: " + v.elementAt(2));
  // Removing an element from the vector
  v.removeElement(30);
 System.out.println("Vector elements after removal: " + v);
  // Checking the size of the vector
 System.out.println("Size of the vector: " + v.size());
```

```
Vector elements: [10, 20, 30, 40]
Element at index 2: 30
Vector elements after removal: [10, 20, 40]
Size of the vector: 3
BUILD SUCCESSFUL (total time: 0 seconds)
```

16. Write a Java program to iterate through all elements in a array list, and retrieve an element (at a specified index)

```
import java.util.ArrayList;
import java.util.Iterator;
public class ArrayListIteration {
 public static void main(String[] args) {
  ArrayList<String> list = new ArrayList<>();
  // Adding elements to the ArrayList
  list.add("apple");
  list.add("banana");
  list.add("cherry");
  list.add("dates");
  System.out.println("ArrayList elements: " + list);
  // Iterating through the ArrayList using for-each loop
  System.out.println("Iterating through ArrayList using for-each loop:");
  for (String item : list) {
  System.out.println(item);
  // Iterating through the ArrayList using enhanced for loop
  System.out.println("\nIterating through ArrayList using enhanced for loop:");
  for (int i = 0; i < list.size(); i++) {
  System.out.println(list.get(i));
  // Iterating through the ArrayList using Iterator
  System.out.println("\nIterating through ArrayList using Iterator:");
  Iterator<String> iterator = list.iterator();
  while (iterator.hasNext()) {
```

```
System.out.println(iterator.next());
}

//accessing element at a given position.
System.out.println("Item at Index 0 : " + list.get(0));
System.out.println("Item at Index 0 : " + list.get(3));
}
}
```

```
ArrayList elements: [apple, banana, cherry, dates]
Iterating through ArrayList using for-each loop:
apple
banana
cherry
dates
Iterating through ArrayList using enhanced for loop:
apple
banana
cherry
dates
Iterating through ArrayList using Iterator:
apple
banana
cherry
dates
Item at Index 0 : apple
Item at Index 0 : dates
BUILD SUCCESSFUL (total time: 0 seconds)
```

17.Write a Java program to demonstrate the use of equals(), trim(), length(), substring(), compareto() of string class

```
public class StringMethods {
  public static void main(String[] args) {
```

```
String str1 = "Hello World";
String str2 = " Hello World ";
String str3 = "Hello";
String str4 = "WORLD";
// Demonstrating the use of equals() method
System.out.println("Using equals() method: ");
System.out.println(str1.equals(str2));
System.out.println(str1.equalsIgnoreCase(str4));
// Demonstrating the use of trim() method
System.out.println("\nUsing trim() method: ");
System.out.println(str2.trim());
//Using length() method
System.out.println("\nUsing length() method: ");
System.out.println(str1.length());
// using substring() method
System.out.println("\nUsing substring() method: ");
System.out.println(str1.substring(6));
System.out.println(str1.substring(0, 5));
//using compareTo() method
System.out.println("\nUsing compareTo() method: ");
System.out.println(str1.compareTo(str3));
System.out.println(str3.compareTo(str2));
```

```
Using equals() method:
false
false

Using trim() method:
Hello World

Using length() method:

11

Using substring() method:
```

```
World
Hello

Using compareTo() method:
6
40
BUILD SUCCESSFUL (total time: 0 seconds)
```

18.Write a Java program to demonstrate the use of equals() and == in Java

Code:

```
public class EqualAndEquals{
  public static void main(String[] args) {
    String str1 = "Hello";
    String str2 = new String("Hello");
    String str3 = "Hello";

    // using == operator
    System.out.println("Using == operator: ");
    System.out.println(str1 == str2);
    System.out.println(str1 == str3);

    // using equals() method
    System.out.println("\nUsing equals() method: ");
    System.out.println(str1.equals(str2));
    System.out.println(str1.equals(str3));
    }
}
```

```
Using == operator:
false
true

Using equals() method:
true
true
true
BUILD SUCCESSFUL (total time: 0 seconds)
```

19. Write a Java program to check a word contains the character 'g' in a given string.

Code:

```
public class WordContainsChar {
  public static void main(String[] args) {
    String str = "This is a sample string.";

    System.out.println("String : " + str);
    System.out.println("Contains 'g' : "+str.contains("g"));

}
```

Output:

```
String : This is a sample string.
Contains 'g' : true
BUILD SUCCESSFUL (total time: 0 seconds)
```

20.Write a java program to create a folder named "java.docx" in which you have to make a file as abc.java and other 3 text files as,total_char, total_lines and total_words. Read the data from the abc.java file and write the values to the 3 files respectively as per the name. eg: write the total no of words in the abc.java file in total_words.txt.

```
import java.io.File;
import java.io.FileInputStream;
import java.io.FileOutputStream;

public class FileHandlingProgram {

   public static void main(String[] args) {

     File dir = new File ("C://java.docx");
     File file = new File(dir , "abc.java");
     File total_chars = new File(dir , "total_char.txt");
     File total_lines = new File(dir , "total_lines.txt");
     File total_lines = new File(dir , "total_lines.txt");
```

```
// setting up the directory
if(! dir.exists()){
dir.mkdir();
  System.out.println("java.docx Folder created");
else{
  System.out.println("java.docx Folder Already Exist");
// setting up the files
if(! file.exists()){
file.createNewFile();
  System.out.println("temp.txt created");
else{
  System.out.println("temp.txt already exist");
total words.createNewFile();
total_chars.createNewFile();
total_lines.createNewFile();
//Setting Up Streams
FileInputStream fileReader = new FileInputStream(file);
FileOutputStream fileWriter = new FileOutputStream(file);
FileOutputStream writeCharCount = new FileOutputStream(total chars);
FileOutputStream writeLineCount = new FileOutputStream(total_lines);
FileOutputStream writeWordCount = new FileOutputStream(total_words);
String str = "class Test{n" +}
        "\n" +
            public static void main(String[] args) {\n" +
               System.out.println(\"Bye Mars!\");\n" +
             n'' +
        "}";
//writing in the file abc.java
fileWriter.write(str.getBytes());
```

```
//reading from the file
  String code = new String( fileReader.readAllBytes());
  //getting the lines using '\n' escape character
  Integer l = code.split("\n").length;
  String lines = l.toString();
  //getting the words using '\\s+' escape character s+ for ignoring exta spaces
  Integer w = code.split("\s+").length;
  String words = w.toString();
  Integer c = 0;
  //iterating through each word and counting the characters in them.
  //incrementing the character count through each word.
  for(String s: code.split("\\s+")){
    c += s.length();
  String chars = c.toString();
  //writing to values of lines, words and characters to the files.
    writeCharCount.write(chars.getBytes());
    writeLineCount.write(lines.getBytes());
    writeWordCount.write(words.getBytes());
    System.out.println("Data Inserted in the files");
    //closing the strams
    fileReader.close();
    fileWriter.close();
    writeCharCount.close();
    writeLineCount.close();
    writeWordCount.close();
catch(Exception e){
  System.err.println(e);
```

```
java.docx Folder created
temp.txt created
Data Inserted in the files
BUILD SUCCESSFUL (total time: 0 seconds)
```

21.write a java program to the website details like its ip address,port number ,protocols etc

Code:

```
import java.net.URL;
import java.net.InetAddress;
public class WebsiteInfo {
   public static void main(String[] args) {
      try {
        URL url = new URL("http://www.google.com/");
        InetAddress in = InetAddress.getByName("www.google.com");

        System.out.println("Port:" + url.getPort());
        System.out.println("Protocol:" + url.getProtocol());
        System.out.println("Host:" + url.getHost());
        System.out.println("Address:" + in.getHostAddress());

    } catch (Exception ex) {
        System.err.println(ex);
    }
}
```

```
Port :-1
Protocol :http
Host :www.google.com
Address :142.250.193.4
BUILD SUCCESSFUL (total time: 1 second)
```

22. write a java program to implement anonymous class

Code:

Output:

```
Implementing Anonymous Class
10
BUILD SUCCESSFUL (total time: 1 second)
```

23. Write a java program to implement lambda expression.

```
interface greet{
void msg();
}
interface draw{
    void drawing(String s);
}
public class LambdaExpression {
    public static void main(String[] args) {
```

```
//with no args
    greet g = () -> {System.out.println("Bye Mars!");};
    g.msg();

    //withs args
    draw d = (shape) -> System.out.println("Drawing " + shape);
    d.drawing("circle");
}
```

```
Bye Mars!
Drawing circle
BUILD SUCCESSFUL (total time: 1 second)
```

24. Write a java program to show database connectivity.

```
import java.sql.Connection;
import java.sql.DriverManager;

public class DatabaseConnection {
    public static Connection connect(){
        Connection conn =null;
        try
        {
            Class.forName("oracle.jdbc.driver.OracleDriver");
            conn = DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe", "system", "admin");
        }
        catch(Exception e){
            System.out.println("Exception in DatabaseConnection class connect() method");
        }
    return conn;
    }
    public static void main(String[] args) {
        Connection conn = DatabaseConnection.connect();
        if(conn != null){
            System.out.println("Connection Successful");
        }
        else{
            System.out.println("Connection Failed");
        }
    }
}
```

```
Connection Successful BUILD SUCCESSFUL (total time: 1 second)
```

25. Write a java program to perform basic sql commands such as create, insert, update, delete.

```
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.Statement;
import java.sql.ResultSet;
public class DatabaseConnection {
   public static Connection connect(){
      Connection conn =null;
        Class.forName("oracle.jdbc.driver.OracleDriver");
           conn = DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe", "system", "admin");
        catch(Exception e){
            System.out.println("Exception in DatabaseConnection class connect() method");
    return conn;
class Main{
   public static void main(String[] args) {
        Connection conn = DatabaseConnection.connect();
         Statement st = conn.createStatement();
        String createQuery = "create table users (userId number(5) ,uname varchar2(20))";
        st.executeUpdate(createQuery);
        System.out.println("table Created");
     String[] insertValues = { "Insert into users values(104,'Ram')",
                                "Insert into users values(103, 'Vishnu')"};
     for(String data : insertValues) {
     if(st.executeUpdate(data) > 0){
             System.out.println("Inserted");
            System.out.println("Not Inserted");
```

```
String updateQuery ="Update users set uname = 'Richard' where userId = 104";
 if(st.executeUpdate(updateQuery) > 0){
     System.out.println("Value updated");
    System.out.println("Not updated");
String deleteQuery ="Delete from users where userId = 104";
 if(st.executeUpdate(deleteQuery) > 0){
     System.out.println("Value Deleted");
    System.out.println("Not Deleted");
 String query = "Select * from users";
 ResultSet rs = st.executeQuery(query);
 while(rs.next()){
    System.out.print( "Id :"+ rs.getString(1) + " ");
     System.out.print("Name : " + rs.getString(2));
     System.out.println("");
 conn.close();
catch(Exception e)
    System.err.println(e);
```

```
table Created
Inserted
Inserted
Inserted
Value updated
Value Deleted
Id :102 Name : Krishna
Id :103 Name : Vishnu
BUILD SUCCESSFUL (total time: 0 seconds)
```