CSL203 - OBJECT ORIENTED PROGRAMMING LAB (IN JAVA)

Lab Cycle

A) Basic programs using datatypes, operators, and control statements in Java.

1. Write a Java Program to find the frequency of a given character in a string.
2. Write a Java program to multiply two given matrices.

B) Object Oriented Programming Concepts: Problem on the use of constructors, inheritance,method overloading & overriding, polymorphism and garbage collection:

3. Write a Java program which creates a class named 'Employee' having the following members: Name, Age, Phone number, Address, Salary. It also has a method named 'printSalary( )' which prints the salary of the Employee. Two classes 'Officer' and 'Manager' inherits the 'Employee' class. The 'Officer' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an officer and a manager by making an object of both of these classes and print the same. (Exercise to understand inheritance). **

4. Write a java program to create an abstract class named Shape that contains an empty
   method named numberOfSides( ). Provide three classes named Rectangle, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides( ) that shows the number of sides in the given geometrical structures. (Exercise to understand polymorphism). **.

C) Handling different types of files as well as input and output management methods:

5 Write a Java program that read from a file and write to file by handling all file related exceptions.

6. Write a Java program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util).

7. Create address book (name mob number)

You are tasked with creating a simple contact book application in Java. The application should be able to add new contacts, search for contacts by name, and display all contacts. The contacts should be stored in a text file named contacts.txt. Each contact should have a name and a phone number. A menu driven program.

1. Add a Contact:
   - Prompt the user to enter the name and phone number of a contact.
   - Write the contact details to the contacts.txt file in the format Name:PhoneNumber.

- Ensure that each contact is stored on a new line.

2. Search for a Contact:
   - Prompt the user to enter the name of the contact they want to search for.
   - Read the contacts from the contacts.txt file and search for the contact by name.
   - If the contact is found, display the contact's details. If not, display a message saying the contact was not found.
3. Display All Contacts:
   - Read all the contacts from the contacts.txt file and display them.
4. File Handling**:**
   - Implement the necessary try-catch blocks to handle IOException during file operations.
   - Ensure that the program does not terminate unexpectedly due to file handling errors.

D) Exception handling and multi-threading applications:

8. Write a Java program that reads an integer input from the user. The program should attempt to divide 100 by this integer and display the result. However, if the user enters a zero, the program should catch the ArithmeticException and display an appropriate error message. Additionally, if the user inputs a non-integer value, catch the InputMismatchException and display an error message.Regardless of whether an exception is thrown or not, the program should always print a message in the finally block that says "Execution completed."

9. Write a Java program that implements a multi-threaded program which has three threads. First thread generates a random integer every 1 second. If the value is even, second thread computes the square of the number and prints. If the value is odd the third thread will print the value of cube of the number.

E) **Graphics Programming:**

10. Write a java program that tracks mouse click,drag etc

11. Write a Java program that works as a simple calculator. Arrange Buttons for digits and the + - * % operations properly. Add a text field to display the result. Handle any possible exceptions like divide by zero. Use Java Swing.

12. . Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time. No light is on when the program starts.

13. Student database. You are tasked with creating a simple student database application using JDBC in Java. The application should allow users to perform the following operations on a students table in a database:

1. Add a Student Record:
    - Insert a new student record into the students table.
    - Each student record should have an ID (primary key), name, age, and major.
2. Update a Student Record:
    - Update the details (name, age, major) of an existing student based on their ID.
3. Delete a Student Record:
    - Delete a student record from the students table based on their ID.
4. Search for a Student Record:
    - Search for a student record by their ID and display the details if found.
5. Display All Student Records:
    - Retrieve and display all student records from the students table.

F) Standard Searching and Sorting Algorithms using data structures and algorithms learned from course **Data Structures**

14. Create singly linked list-add,delete,search
15. Write a Java program for the following: **
    1) Create a doubly linked list of elements.
    2) Delete a given element from the above list.
    3) Display the contents of the list after deletion.

16. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order