Institute of Computer Technology

B. Tech. Computer Science and Engineering

Semester: III

Sub: Object-Oriented Programming
Course Code: 2CSE303

Practical Number:7

Objective:

To learn about polymorphism (function overloading and overriding) concept in java.

Q1. Problem Definition:

Write an appropriate program of the following, by using polymorphism concept like function overloading concept.

1) Addition of two integer number.
2) Subtraction of one int number and one double number.
3) Multiplication of two double number.
4) Addition of two-character value.
5) Addition of two string value.

Code :

```
class operations {

    public int operation(int a, int b) {

        return a + b;

    }


    public double operation(int a, double b) {

        return a - b;

    }


    public double operation(double a, double b) {

        return a * b;

    }


    public int operation(char a, char b) {

        return a + b;
```

```
        }


    public String operation(String a, String b) {

        return a + b;

    }

}


public class Main {

    public static void main(String[] args) {

        operations op = new operations();


        System.out.println("Addition of two integers: " + op.operation(5, 10));

        System.out.println("Subtraction of int and double: " + op.operation(20, 5.5));

        System.out.println("Multiplication of two doubles: " + op.operation(2.5, 4.2));

        System.out.println("Addition of two characters: " + op.operation('A', 'B'));

        System.out.println("Addition of two strings: " + op.operation("Hello", " World"));

    }

}
```

Output :

Addition of two integers: 15

Subtraction of int and double: 14.5

Multiplication of two doubles: 10.5

Addition of two characters: 131

Addition of two strings: Hello World

Q2. Defination

   Complete the code for the object assigned to you to satisfy the following specifications.

 1) For the solving purpose of the given topic practical, you need to create minimum one class, rest as per your requirement you can take additional class also.

 2) Declare minimum three function with same name and different signature as per the relevant

3) practical topic gathered information. If you want more function, you can take it as per your requirement.
4) Minimum 1 constructor method should be available in the program, rest as per your requirement.
5) You must use access specifier for data member and member function in program.
6) Wherever is required to use character data member in class, instead of that use compulsorily string data member.
7) Take minimum 5 data record information from the user and display according to the choice of user category wise. (Minimum five different options should be there for displaying information, and if you want more as per program requirement you can add more choices).
8) Use all possible filter method from stored record information:

Code :

```java
import java.util.Scanner;


class librarybook {
    // Fields with access specifiers
    private int bookID;
    private char[] title = new char[30];
    private char[] author = new char[30];
    private char genre;
    private float price;


    // Constructor to initialize book details
    public librarybook(int bookID, char[] title, char[] author, char genre, float price) {
        this.bookID = bookID;
        this.title = title;
        this.author = author;
        this.genre = genre;
        this.price = price;
    }
```

```java
// Overloaded methods for different operations

// Function 1: Display book details
public void displayBook() {
    System.out.println("Book ID: " + bookID);
    System.out.print("Title: ");
    System.out.println(title);
    System.out.print("Author: ");
    System.out.println(author);
    System.out.println("Genre: " + genre);
    System.out.println("Price: " + price);
}


// Function 2: Display book by genre
public void displayByGenre(char genre) {
    if (this.genre == genre) {
        displayBook();
    }
}


// Function 3: Display book by price range
public void displayByPriceRange(float minPrice, float maxPrice) {
    if (this.price >= minPrice && this.price <= maxPrice) {
        displayBook();
    }
}


// Getter methods for filters (additional, if needed)
public char getGenre() {
    return genre;
}
```

```java
    public float getPrice() {

        return price;

    }

}


public class librarymanagement {

    public static void main(String[] args) {

        // Taking input for 5 books

        Scanner sc = new Scanner(System.in);

        librarybook[] books = new librarybook[5];


        for (int i = 0; i < 5; i++) {

            System.out.println("Enter details for Book " + (i + 1) + ":");

            System.out.print("Book ID: ");

            int bookID = sc.nextInt();

            sc.nextLine(); // consume the newline


            System.out.print("Title: ");

            String titleStr = sc.nextLine();

            char[] title = titleStr.toCharArray();


            System.out.print("Author: ");

            String authorStr = sc.nextLine();

            char[] author = authorStr.toCharArray();


            System.out.print("Genre (one character): ");

            char genre = sc.next().charAt(0);


            System.out.print("Price: ");

            float price = sc.nextFloat();
```

```java
    // Create new book object
    books[i] = new librarybook(bookID, title, author, genre, price);
}


// Menu for displaying books based on user choice
int choice;
do {
    System.out.println("\n--- Library Book Management Menu ---");
    System.out.println("1. Display All Books");
    System.out.println("2. Display Books by Genre");
    System.out.println("3. Display Books by Price Range");
    System.out.println("4. Exit");
    System.out.print("Enter your choice: ");
    choice = sc.nextInt();

    switch (choice) {
        case 1:
            // Display all books
            for (librarybook book : books) {
                book.displayBook();
            }
            break;


        case 2:
            // Display books by genre
            System.out.print("Enter genre to filter by (one character): ");
            char genre = sc.next().charAt(0);
            for (librarybook book : books) {
                book.displayByGenre(genre);
            }
```

```
                break;


            case 3:

                // Display books by price range

                System.out.print("Enter minimum price: ");

                float minPrice = sc.nextFloat();

                System.out.print("Enter maximum price: ");

                float maxPrice = sc.nextFloat();

                for (librarybook book : books) {

                    book.displayByPriceRange(minPrice, maxPrice);

                }

                break;


            case 4:

                System.out.println("Exiting...");

                break;


            default:

                System.out.println("Invalid choice. Please try again.");

        }

    } while (choice != 4);


    sc.close();

  }

}
```

Output :

Enter details for Book 1:

Book ID: 1

Title: The Lord of the Rings

Author: J. R. R. Tolkien

Genre (one character): Movie

Price: 1000

Enter details for Book 2:

Book ID: 2

Title: The Godfather

Author: Mario Puzo

Genre (one character): Drama

Price: 2000

Enter details for Book 3:

Book ID: 3

Title: The Shawshank Redemption

Author: Stephen King

Genre (one character): Novel

Price: 1500

Enter details for Book 4:

Book ID: 4

Title: Harry Potter

Author: J.K. Rowling

Genre (one character): Film

Price: 1600

Enter details for Book 5:

Book ID: 5

Title: To Kill a Mockingbird

Author: Harper Lee

Genre (one character): Movie

Price: 2100

--- Library Book Management Menu ---

1. Display All Books

2. Display Books by Genre

3. Display Books by Price Range

4. Exit

Enter your choice: 1

Book ID: 1

Title: The Lord of the Rings

Author: J. R. R. Tolkien

Genre: M

Price: 1000.0

Book ID: 2

Title: The Godfather

Author: Mario Puzo

Genre: D

Price: 2000.0

Book ID: 3

Title: The Shawshank Redemption

Author: Stephen King

Genre: N

Price: 1500.0

Book ID: 4

Title: Harry Potter

Author: J.K. Rowling

Genre: F

Price: 1600.0

Book ID: 5

Title: To Kill a Mockingbird

Author: Harper Lee

Genre: M

Price: 2100.0

--- Library Book Management Menu ---

1. Display All Books

2. Display Books by Genre

3. Display Books by Price Range

4. Exit

Enter your choice: 2

Enter genre to filter by (one character): Movie

Book ID: 1

Title: The Lord of the Rings

Author: J. R. R. Tolkien

Genre: M

Price: 1000.0

Book ID: 5

Title: To Kill a Mockingbird

Author: Harper Lee

Genre: M

Price: 2100.0

--- Library Book Management Menu ---

1. Display All Books

2. Display Books by Genre

3. Display Books by Price Range

4. Exit

Enter your choice: 3

Enter minimum price: 1000

Enter maximum price: 1500

Book ID: 1

Title: The Lord of the Rings

Author: J. R. R. Tolkien

Genre: M

Price: 1000.0

Book ID: 3

Title: The Shawshank Redemption

Author: Stephen King

Genre: N

Price: 1500.0

--- Library Book Management Menu ---

1. Display All Books

2. Display Books by Genre

3. Display Books by Price Range

4. Exit

Enter your choice: 4

Exiting...