

# Rajalakshmi Engineering College

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Batch: 2028

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## 2024\_28\_III\_OOPS Using Java Lab

### REC\_2028\_OOPS using Java\_Week 10\_MCQ

Attempt : 1

Total Mark : 15

Marks Obtained : 15

#### **Section 1 : MCQ**

1. What is the time complexity of retrieving an element from a HashSet?

*Answer*

O(1)

**Status :** Correct

**Marks :** 1/1

2. What will be the output of the following code?

```
import java.util.*;
class Main {
    public static void main(String[] args) {
        HashMap<String, Integer> map = new HashMap<>();
        map.put("X", 10);
        map.put("Y", 20);
```

```
        map.put("Z", 30);
        map.remove("Y");
        System.out.println(map);
    }
}
```

**Answer**

{X=10, Z=30}

**Status : Correct**

**Marks : 1/1**

3. What will happen if you add elements in descending order in a TreeSet?

**Answer**

They are sorted in ascending order

**Status : Correct**

**Marks : 1/1**

4. How does HashSet check for duplicate elements?

**Answer**

Using equals() and hashCode()

**Status : Correct**

**Marks : 1/1**

5. Which statement is true about HashSet and TreeSet?

**Answer**

TreeSet provides sorted elements

**Status : Correct**

**Marks : 1/1**

6. Which method removes all elements from a Set?

**Answer**

clear()

**Status : Correct**

**Marks : 1/1**

7. Which of the following allows null keys in Java?

**Answer**

HashMap

**Status : Correct**

**Marks : 1/1**

8. What happens if two keys have the same hash code in a HashMap?

**Answer**

A linked list is used to store values with the same hash

**Status : Correct**

**Marks : 1/1**

9. Which method retrieves the lowest key in a TreeMap?

**Answer**

firstKey()

**Status : Correct**

**Marks : 1/1**

10. Which of the following is true about HashMap?

**Answer**

It is not synchronized

**Status : Correct**

**Marks : 1/1**

11. What happens when you add duplicate elements to a HashSet?

**Answer**

The duplicate is ignored

**Status : Correct**

**Marks : 1/1**

12. What will be the output of the following code?

```
import java.util.*;
class Main {
    public static void main(String[] args) {
        HashMap<String, Integer> map = new HashMap<>();
        map.put("A", 1);
        map.put("B", 2);
        map.put("C", 3);
        System.out.println(map.containsKey("B"));
    }
}
```

*Answer*

true

**Status : Correct**

**Marks : 1/1**

13. What will happen if you add a null element to a TreeSet?

*Answer*

An exception occurs

**Status : Correct**

**Marks : 1/1**

14. Which of the following is true about TreeMap?

*Answer*

It maintains natural ordering

**Status : Correct**

**Marks : 1/1**

15. What will be the output of the following code?

```
import java.util.*;
class Main {
    public static void main(String[] args) {
        HashMap<String, String> map = new HashMap<>();
```



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```
map.put("A", "Apple");
map.put("B", "Banana");
map.put("C", "Cherry");
map.replace("B", "Blueberry");
System.out.println(map);
}
}
```

*Answer*

{A=Apple, B=Blueberry, C=Cherry}

*Status : Correct*

*Marks : 1/1*

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 10\_Q1

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : COD

##### 1. Problem Statement

A city traffic management system needs to track vehicles entering a toll booth. Each vehicle is uniquely identified by its registration number. The system should allow adding vehicles to a record, ensuring that no duplicate registration numbers exist. The vehicles should be stored in a HashSet, which does not guarantee any specific order.

Your task is to implement a program using a HashSet that allows adding vehicle details and displaying the records.

##### *Input Format*

The first line of input contains an integer N - the number of vehicles.

The next N lines contain details of each vehicle in the format: "RegNumber

OwnerName VehicleType"

1. RegNumber (String) - A unique registration number (Alphanumeric).
2. OwnerName (String) - The name of the vehicle owner.
3. VehicleType (String, Car, Bike, or Truck) - The type of vehicle.

If a vehicle with the same registration number is already present, ignore the duplicate entry.

#### ***Output Format***

The output prints the unique vehicle records in any order (since HashSet does not maintain order).

Output format: "RegNumber OwnerName VehicleType"

Refer to the sample output for formatting specifications.

#### ***Sample Test Case***

Input: 5

KA01AB1234 John Car  
MH02CD5678 Alice Bike  
DL03EF9012 Bob Truck  
TN04GH3456 Mike Car  
KA01AB1234 John Car

Output: TN04GH3456 Mike Car  
KA01AB1234 John Car  
MH02CD5678 Alice Bike  
DL03EF9012 Bob Truck

#### ***Answer***

```
import java.util.*;
```

```
class Vehicle {  
    String regNumber;  
    String ownerName;  
    String vehicleType;  
  
    Vehicle(String regNumber, String ownerName, String vehicleType) {  
        this.regNumber = regNumber;
```

```

        this.ownerName = ownerName;
        this.vehicleType = vehicleType;
    }

    @Override
    public boolean equals(Object o) {
        if (this == o) return true;
        if (!(o instanceof Vehicle)) return false;
        Vehicle v = (Vehicle) o;
        return regNumber.equals(v.regNumber);
    }

    @Override
    public int hashCode() {
        return regNumber.hashCode();
    }

    @Override
    public String toString() {
        return regNumber + " " + ownerName + " " + vehicleType;
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int N = Integer.parseInt(sc.nextLine());
        HashSet<Vehicle> vehicles = new HashSet<>();

        for (int i = 0; i < N; i++) {
            String[] details = sc.nextLine().split(" ");
            vehicles.add(new Vehicle(details[0], details[1], details[2]));
        }

        for (Vehicle v : vehicles) {
            System.out.println(v);
        }

        sc.close();
    }
}

```

**Status : Correct**

**Marks : 10/10**



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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 10\_Q2

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : COD

##### 1. Problem Statement

John is organizing a fruit festival, and the quantities of various fruits are stored in a HashMap where fruit names are keys and quantities are values.

Help him develop a program to find the total quantity of fruits for the festival by summing up the values in the HashMap.

##### *Input Format*

The input consists of fruit quantities in the format 'fruitName:quantity', where fruitName is the name of the fruit(a string), and quantity is a double value representing the quantity.

The input is terminated by entering "done".

##### *Output Format*

The output prints a double value, representing the sum of values in the HashMap, rounded off to two decimal places.

If the value is not numeric, print "Invalid input".

If any special characters other than ':' are entered, print "Invalid format".

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: Banana:15.2

Orange:56.3

Mango:47.3

done

Output: 118.80

### **Answer**

```
import java.util.*;
```

```
public class Main{
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        HashMap<String, Double> fruits = new HashMap<>();
        boolean invalidInput = false, invalidFormat = false;

        while (true) {
            String line = sc.nextLine().trim();
            if (line.equalsIgnoreCase("done"))
                break;

            if (!line.contains(":") || line.matches(".*[^a-zA-Z0-9:. ].*")) {
                invalidFormat = true;
                break;
            }

            String[] parts = line.split(":");
            if (parts.length != 2) {
                invalidFormat = true;
                break;
            }
        }
    }
}
```

```
    }

    String fruit = parts[0];
    String qtyStr = parts[1];

    try {
        double quantity = Double.parseDouble(qtyStr);
        fruits.put(fruit, quantity);
    } catch (NumberFormatException e) {
        invalidInput = true;
        break;
    }
}

if (invalidFormat) {
    System.out.println("Invalid format");
} else if (invalidInput) {
    System.out.println("Invalid input");
} else {
    double total = 0.0;
    for (double qty : fruits.values()) {
        total += qty;
    }
    System.out.printf("%.2f\n", total);
}

sc.close();
}
}
```

Status : Correct

Marks : 10/10

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 10\_Q3

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : COD

##### 1. Problem Statement

Priya is analyzing encrypted messages in a research project. She wants to analyze the frequency of each character in a given paragraph. The characters should be stored in a TreeMap so that the output is sorted in ascending order of characters automatically.

You are required to build a Java program that:

Uses a TreeMap<Character, Integer> to count how many times each character appears in the message.Ignores spaces and considers only alphabets (case-sensitive).Outputs the frequencies of characters in sorted order.

You must use a TreeMap in the class named MessageAnalyzer.

#### ***Input Format***

The first line of input contains an integer n, the number of lines in the message.

The next n lines each contain a string (the encrypted message line).

### ***Output Format***

The first line of output prints: "Character Frequency:"

Then print each character and its frequency in the format: "<character>: <count>"

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 2

Hello World

Java

Output: Character Frequency:

H: 1

J: 1

W: 1

a: 2

d: 1

e: 1

l: 3

o: 2

r: 1

v: 1

### ***Answer***

```
import java.util.*;

public class Main{
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = Integer.parseInt(sc.nextLine());
        TreeMap<Character, Integer> freqMap = new TreeMap<>();

        for (int i = 0; i < n; i++) {
            String line = sc.nextLine();
            for (char c : line.toCharArray()) {
```

```
        if (Character.isLetter(c)) {
            freqMap.put(c, freqMap.getOrDefault(c, 0) + 1);
        }
    }

System.out.println("Character Frequency:");
for (Map.Entry<Character, Integer> entry : freqMap.entrySet()) {
    System.out.println(entry.getKey() + ":" + entry.getValue());
}

sc.close();
}
}
```

**Status :** Correct

**Marks :** 10/10

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 10\_Q4

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : COD

##### 1. Problem Statement

In a ticket reservation system, you store the available seat numbers in a TreeSet. Users input their desired seat number, and the program checks whether the chosen seat is available.

Using a TreeSet ensures quick and efficient verification of seat availability, ensuring a smooth and organized ticket booking process.

##### *Input Format*

The first line of input contains a single integer n, representing the number of available seats.

The second line contains n space-separated integers, representing the available seat numbers.

The third line contains an integer m, representing the seat number that needs to be searched.

### ***Output Format***

The output displays "[m] is present!" if the given seat is available. Otherwise, it displays "[m] is not present!"

Refer to the sample output for the formatting specifications.

### ***Sample Test Case***

Input: 4

2 4 5 6

5

Output: 5 is present!

### ***Answer***

```
import java.util.*;

public class Main{
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        TreeSet<Integer> seats = new TreeSet<>();

        for (int i = 0; i < n; i++) {
            seats.add(sc.nextInt());
        }

        int m = sc.nextInt();

        if (seats.contains(m))
            System.out.println(m + " is present!");
        else
            System.out.println(m + " is not present!");

        sc.close();
    }
}
```

**Status : Correct**

**Marks : 10/10**



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## 2024\_28\_III\_OOPS Using Java Lab

### REC\_2028\_OOPS using Java\_Week 10\_PAH

Attempt : 1  
Total Mark : 30  
Marks Obtained : 30

#### Section 1 : Coding

##### 1. Problem Statement

A university maintains a list of student records and wants to store them in a sorted manner based on their GPA. If two students have the same GPA, they should be further sorted by their name in lexicographical order. Implement a program that uses a TreeSet to store student records and ensures unique student IDs.

##### *Input Format*

The first line contains an integer N - the number of students.

The next N lines contain details of each student in the format: "StudentID Name GPA"

- StudentID (Integer) - A unique identifier.
- Name (String) - The student's name (can contain spaces).

- GPA (Double) - The Grade Point Average.

### ***Output Format***

The output prints the list of students in ascending order of GPA.

If two students have the same GPA, sort them by name.

Print details in the format: "StudentID Name GPA" in the output, GPA is rounded to two decimal places.

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 5

101 John 8.5

102 Alice 9.1

103 Bob 8.5

104 Zoe 7.3

105 Charlie 9.1

Output: 104 Zoe 7.30

103 Bob 8.50

101 John 8.50

102 Alice 9.10

105 Charlie 9.10

### ***Answer***

```
import java.util.*;  
  
class Student implements Comparable<Student> {  
    int id;  
    String name;  
    double gpa;  
  
    Student(int id, String name, double gpa) {  
        this.id = id;  
        this.name = name;  
        this.gpa = gpa;  
    }  
}
```

```

@Override
public int compareTo(Student other) {
    if (Double.compare(this.gpa, other.gpa) != 0)
        return Double.compare(this.gpa, other.gpa);
    int nameCompare = this.name.compareTo(other.name);
    if (nameCompare != 0)
        return nameCompare;
    return Integer.compare(this.id, other.id);
}

@Override
public String toString() {
    return id + " " + name + " " + String.format("%.2f", gpa);
}
}

public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = Integer.parseInt(sc.nextLine());

        TreeSet<Student> students = new TreeSet<>();

        for (int i = 0; i < n; i++) {
            String[] parts = sc.nextLine().split(" ");
            int id = Integer.parseInt(parts[0]);
            double gpa = Double.parseDouble(parts[parts.length - 1]);
            StringBuilder nameBuilder = new StringBuilder();
            for (int j = 1; j < parts.length - 1; j++) {
                nameBuilder.append(parts[j]);
                if (j < parts.length - 2) nameBuilder.append(" ");
            }
            String name = nameBuilder.toString();
            students.add(new Student(id, name, gpa));
        }

        for (Student s : students) {
            System.out.println(s);
        }

        sc.close();
    }
}

```

}

**Status : Correct**

**Marks : 10/10**

## 2. Problem Statement

Riya is building a calendar event scheduler where each event is stored in chronological order using a TreeMap. The key represents the event time in 24-hour format (HH:MM), and the value is the event description.

She wants the system to:

Automatically sort events by time. Avoid duplicate time entries – if a duplicate time is entered, ignore the new entry. Print all scheduled events in order.

Implement this logic using a class named EventManager.

### ***Input Format***

The first line of the input contains an integer n, representing the number of events.

The next n lines each contain a string in the format: "HH:MM Description"

(Example: 09:00 TeamMeeting).

### ***Output Format***

The first line of the output prints "Scheduled Events:"

The next k lines print each event in the format: "HH:MM - Description"

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 5  
09:00 TeamMeeting  
13:30 LunchBreak

11:00 ProjectUpdate  
09:00 Standup  
15:00 ClientCall  
Output: Scheduled Events:  
09:00 - TeamMeeting  
11:00 - ProjectUpdate  
13:30 - LunchBreak  
15:00 - ClientCall

**Answer**

```
import java.util.*;  
  
public class Main {  
    public static void main(String[] args) {  
        Scanner sc = new Scanner(System.in);  
        int n = Integer.parseInt(sc.nextLine());  
        TreeMap<String, String> events = new TreeMap<>();  
  
        for (int i = 0; i < n; i++) {  
            String[] parts = sc.nextLine().split(" ");  
            String time = parts[0];  
            String description = parts[1];  
  
            if (!events.containsKey(time)) {  
                events.put(time, description);  
            }  
        }  
  
        System.out.println("Scheduled Events:");  
        for (Map.Entry<String, String> entry : events.entrySet()) {  
            System.out.println(entry.getKey() + " - " + entry.getValue());  
        }  
  
        sc.close();  
    }  
}
```

**Status :** Correct

**Marks :** 10/10

**3. Problem Statement**

Sarah is working on a spam detection system that analyzes incoming messages for unique patterns. Spammers often use repetitive character sequences, making it important to identify the first non-repeating character in a message.

Given a string, Sarah needs to determine the first character that appears only once. If all characters repeat, the system should return -1.

She decides to use a HashMap to efficiently track character frequencies and find the solution.

#### ***Input Format***

The first line contains an integer N representing , the length of the string.

The second line contains a string of N lowercase English letters (a-z).

#### ***Output Format***

The output prints a character representing the first non-repeating character. If none exist, print -1.

Refer to the sample output for formatting specifications.

#### ***Sample Test Case***

Input: 10

abacabadac

Output: d

#### ***Answer***

```
import java.util.*;

public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = Integer.parseInt(sc.nextLine().trim());
        String str = sc.nextLine().trim();

        HashMap<Character, Integer> freq = new HashMap<>();
```

```
for (char c : str.toCharArray()) {  
    freq.put(c, freq.getOrDefault(c, 0) + 1);  
}  
  
char result = '-';  
for (char c : str.toCharArray()) {  
    if (freq.get(c) == 1) {  
        result = c;  
        break;  
    }  
}  
  
if (result == '-') System.out.println(-1);  
else System.out.println(result);  
  
sc.close();  
}  
}
```

Status : Correct

Marks : 10/10

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## 2024\_28\_III\_OOPS Using Java Lab

### REC\_2028\_OOPS using Java\_Week 10\_CY

Attempt : 1

Total Mark : 40

Marks Obtained : 40

#### Section 1 : COD

##### 1. Problem Statement

Tony is an e-learning platform administrator, he oversees the user ratings for various online courses offered in the platform.

To enhance user experience, you should assist him in utilizing a HashMap to store course ratings given by learners. Regularly, he analyzes this data to identify the highest and lowest-rated courses, enabling targeted improvements and ensuring the quality of the educational content. This process assists in maintaining a competitive and engaging online learning environment for the users.

##### *Input Format*

The input consists of a string representing the course name followed by a double value representing the course's rating, in separate lines.

The input is terminated by entering "done".

### ***Output Format***

The first line of output prints the string "Highest Rated Course: " followed by the highest-rated course.

The second line prints the string "Lowest Rated Course: " followed by the lowest-rated courses.

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: DSA

4.0

OOPS

4.2

C

3.2

done

Output: Highest Rated Course: OOPS

Lowest Rated Course: C

### ***Answer***

```
import java.util.HashMap;
import java.util.Map;
import java.util.Scanner;

class CourseAnalyzer {
    public Map<String, String>
identifyHighestAndLowestRatedCourses(Map<String, Double> courseRatings) {
    Map<String, String> result = new HashMap<>();

    if (courseRatings.isEmpty()) {
        result.put("highest", "No courses");
        result.put("lowest", "No courses");
        return result;
    }
}
```

```

String highestCourse = "";
String lowestCourse = "";
double highestRating = Double.MIN_VALUE;
double lowestRating = Double.MAX_VALUE;

for (Map.Entry<String, Double> entry : courseRatings.entrySet()) {
    String course = entry.getKey();
    double rating = entry.getValue();

    if (rating > highestRating) {
        highestRating = rating;
        highestCourse = course;
    }
    if (rating < lowestRating) {
        lowestRating = rating;
        lowestCourse = course;
    }
}

result.put("highest", highestCourse);
result.put("lowest", lowestCourse);
return result;
}
}

```

```

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Map<String, Double> courseRatings = new HashMap<>();

        while (true) {
            String courseName = scanner.nextLine();
            if (courseName.equalsIgnoreCase("done")) {
                break;
            }
            double rating = Double.parseDouble(scanner.nextLine().trim());
            courseRatings.put(courseName, rating);
        }
    }
}

```

```

CourseAnalyzer analyzer = new CourseAnalyzer();
Map<String, String> result =
analyzer.identifyHighestAndLowestRatedCourses(courseRatings);

System.out.printf("Highest Rated Course: %s\n", result.get("highest"));
System.out.printf("Lowest Rated Course: %s", result.get("lowest"));

scanner.close();
}
}

```

**Status : Correct**

**Marks : 10/10**

## 2. Problem Statement

David is managing an employee database where each employee has a unique ID, name, and department. He wants to ensure that duplicate employee IDs are not added to the system. Implement a Java program that allows adding employees to the system, displaying all employees, and checking if an employee exists based on the given ID.

Implement a class EmployeeDatabase that contains a HashSet to store employee records. The Employee class should be a user-defined object containing employee details. The main class should handle user operations and interact with the EmployeeDatabase class.

### ***Input Format***

The first line contains an integer n representing the number of employees to be added.

The next n lines follow, each containing:

1. An integer employee\_id
2. A string name
3. A string department

The next line contains an integer m representing the number of queries.

The next m lines follow, each containing an employee ID to check for existence.

## ***Output Format***

The output prints a list of all employees added in the format:

"ID: <employee\_id>, Name: <name>, Department: <department>"

For each query, output "Employee exists" if the ID is found, otherwise "Employee not found".

Refer to the sample output for formatting specifications.

## ***Sample Test Case***

Input: 3  
101 John IT  
102 Alice HR  
103 Bob Finance  
2  
101  
104

Output: ID: 101, Name: John, Department: IT  
ID: 102, Name: Alice, Department: HR  
ID: 103, Name: Bob, Department: Finance  
Employee exists  
Employee not found

## ***Answer***

```
import java.util.*;  
  
class Employee {  
    int id;  
    String name;  
    String department;  
  
    public Employee(int id, String name, String department) {  
        this.id = id;  
        this.name = name;  
        this.department = department;  
    }  
  
    @Override
```

```

public String toString() {
    return "ID: " + id + ", Name: " + name + ", Department: " + department;
}

@Override
public boolean equals(Object obj) {
    if (this == obj)
        return true;
    if (!(obj instanceof Employee))
        return false;
    Employee other = (Employee) obj;
    return this.id == other.id;
}

@Override
public int hashCode() {
    return Objects.hash(id);
}
}

```

```

class EmployeeDatabase {
    private HashSet<Employee> employees = new HashSet<>();

    public void addEmployee(int id, String name, String department) {
        employees.add(new Employee(id, name, department));
    }

    public void displayEmployees() {
        for (Employee e : employees) {
            System.out.println(e);
        }
    }

    public boolean checkEmployee(int id) {
        for (Employee e : employees) {
            if (e.id == id)
                return true;
        }
        return false;
    }
}

```

```
}

class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        EmployeeDatabase db = new EmployeeDatabase();
        int n = sc.nextInt();
        for (int i = 0; i < n; i++) {
            int id = sc.nextInt();
            String name = sc.next();
            String department = sc.next();
            db.addEmployee(id, name, department);
        }
        db.displayEmployees();
        int m = sc.nextInt();
        for (int i = 0; i < m; i++) {
            int id = sc.nextInt();
            if (db.checkEmployee(id))
                System.out.println("Employee exists");
            else
                System.out.println("Employee not found");
        }
        sc.close();
    }
}
```

Status : Correct

Marks : 10/10

### 3. Problem Statement

The city library maintains a record of books available for lending. Each book is uniquely identified by its ISBN number, along with its title and author. The librarian wants to efficiently store and manage these records, ensuring books can be listed in the order they were added.

Your task is to implement a Library Management System using HashSet where:

The librarian adds books with ISBN, title, and author. The librarian can

remove books by providing an ISBN. Finally, the librarian displays the available books in the order they were added.

Implement a class Library that will handle these operations. The main function should manage user input and interact with the Library class accordingly.

#### ***Input Format***

The first line contains an integer n – the number of books to be added.

The next n lines contain three values: ISBN (integer), Title (string without spaces), and Author (string without spaces).

1. An integer employee\_id
2. A string title
3. A string author name

The next line contains an integer m – the number of books to be removed.

The next m lines follow, each contains an ISBN number to remove.

#### ***Output Format***

The output prints a list of books available in the library after performing all operations in the format:

"ISBN: <isbn>, Title: <title>, Author: <author>"

If no books remain, print: "No books available"

Refer to the sample output for formatting specifications.

#### ***Sample Test Case***

Input: 3  
1234 JavaCompleteGuide JohnDoe  
5678 PythonBasics JaneDoe  
9012 DataStructures AliceSmith  
1  
5679

Output: ISBN: 1234, Title: JavaCompleteGuide, Author: JohnDoe  
ISBN: 9012, Title: DataStructures, Author: AliceSmith  
ISBN: 5678, Title: PythonBasics, Author: JaneDoe

**Answer**

```
import java.util.*;  
  
class Book {  
    int isbn;  
    String title;  
    String author;  
  
    public Book(int isbn, String title, String author) {  
        this.isbn = isbn;  
        this.title = title;  
        this.author = author;  
    }  
  
    @Override  
    public String toString() {  
        return "ISBN: " + isbn + ", Title: " + title + ", Author: " + author;  
    }  
  
    @Override  
    public boolean equals(Object obj) {  
        if (this == obj)  
            return true;  
        if (!(obj instanceof Book))  
            return false;  
        Book other = (Book) obj;  
        return this.isbn == other.isbn;  
    }  
  
    @Override  
    public int hashCode() {  
        return Objects.hash(isbn);  
    }  
}  
  
class Library {  
    private LinkedHashSet<Book> books = new LinkedHashSet<>();
```

```

public void addBook(int isbn, String title, String author) {
    books.add(new Book(isbn, title, author));
}

public void removeBook(int isbn) {
    books.removeIf(book -> book.isbn == isbn);
}

public void displayBooks() {
    if (books.isEmpty()) {
        System.out.println("No books available");
    } else {
        for (Book book : books) {
            System.out.println(book);
        }
    }
}

class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        Library library = new Library();
        int n = sc.nextInt();
        for (int i = 0; i < n; i++) {
            int isbn = sc.nextInt();
            String title = sc.next();
            String author = sc.next();
            library.addBook(isbn, title, author);
        }
        int m = sc.nextInt();
        for (int i = 0; i < m; i++) {
            int isbn = sc.nextInt();
            library.removeBook(isbn);
        }
        library.displayBooks();
        sc.close();
    }
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement

A linguist named Meera is classifying a list of words based on their first character. She wants to store words grouped by their starting letter using a TreeMap so that the groups appear in sorted order of characters (i.e., 'a' to 'z'). For each letter, all words starting with that letter should be stored in the order they appear.

Implement the logic inside a class named WordClassifier using the `TreeMap<Character, List<String>>` collection.

##### ***Input Format***

The first line of the input contains an integer  $n$ , representing the number of words.

The next  $n$  lines each contain a word.

##### ***Output Format***

The first line of the output prints: "Grouped Words by Starting Letter:"

The next lines print each character key and its list of words in the format:

"letter: word1 word2 word3..."

..."

Refer to the sample output for formatting specifications.

##### ***Sample Test Case***

Input: 5

dog

deer

cat

cow

camel

Output: Grouped Words by Starting Letter:

c: cat cow camel

d: dog deer

**Answer**

```
import java.util.*;

class WordClassifier {
    private TreeMap<Character, List<String>> wordMap = new TreeMap<>();

    public void classifyWords(List<String> words) {
        for (String word : words) {
            char firstChar = word.charAt(0);
            wordMap.putIfAbsent(firstChar, new ArrayList<>());
            wordMap.get(firstChar).add(word);
        }

        System.out.println("Grouped Words by Starting Letter:");
        for (Map.Entry<Character, List<String>> entry : wordMap.entrySet()) {
            System.out.print(entry.getKey() + ": ");
            for (String w : entry.getValue()) {
                System.out.print(w + " ");
            }
            System.out.println();
        }
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = Integer.parseInt(sc.nextLine());

        List<String> words = new ArrayList<>();
        for (int i = 0; i < n; i++) {
            words.add(sc.nextLine());
        }

        WordClassifier classifier = new WordClassifier();
        classifier.classifyWords(words);
    }
}
```

**Status :** Correct

**Marks :** 10/10