CHRIST (Deemed to be University)
Department of Computer Science
Master of Artificial Intelligence and Machine Learning

Course: MAI271 – JAVA Programming
Exercise No: LAB Exercise – 7
Date: 14 – 12 – 2024
Duration: 2 Hrs

Question (10 Marks)

Amazon is building a menu-driven application to manage customer data and process orders efficiently. As part of this system, developers are required to implement the following key components in Java:

Classes to Implement

1. **Customer Class**:
    - Manage customer details, including registration and updates.
2. **Product Class**:
    - Represent products, with methods to add and update product details in the catalog.
3. **Order Class**:
    - Facilitate order placement, modification, and retrieval of order history.

Data Structures to Use

1. **ArrayList**:
    - Store dynamic lists of customers, products, and orders. This structure should support adding and removing elements flexibly.
2. **HashMap**:
    - Implement fast retrieval for customers and products using unique IDs.
3. **HashSet**:
    - Ensure only unique products are associated with each customer, avoiding duplicates.
4. **TreeSet**:
    - Implement sorting for customers or products.

Task: Use the Comparator Interface

Developers must use the **Comparator** interface to enable custom sorting in the TreeSet. For example:

- Sort products by price, name, or other attributes as required.
- Sort orders by delivery date or customers by loyalty points.

Implementation Requirements

- Define the necessary classes (Customer, Product, and Order) with relevant attributes and methods.
- Use appropriate data structures (ArrayList, HashMap, HashSet, TreeSet) for efficient data management.
- Implement custom sorting logic by creating classes that implement the Comparator interface.
- Demonstrate the use of TreeSet with the custom sorting logic applied.

Evaluation Rubrics:

Implementation of ArrayList:2 Marks

Implementation of HashMap:3 Marks

Implementation of HashSet and TreeSet:3 Marks

Comparator Interface:2 Marks

Total:10 Marks

General Instruction:

1. Ensure that your code includes relevant comments to enhance readability and understanding. Subsequently, upload your code to GitHub for version control and collaborative access.
2. Include descriptive comments within the code, explaining its functionality and logic. 3. In the Google Classroom submission, include the GitHub URL where your code is hosted.
4. Attach a PDF document named "your_register_number_exercise_No.pdf" to the submission.The PDF document should include screenshots of the code and the output screen.
5. Upload the answer document&GitHub URL in Google Classroom on or before the deadline mentioned.Evaluation will not be considered for late submission