AL-2001
Artificial Intelligence
Lab # 4

Objectives:

- List, Dictionary, Tuple, Set, File handling

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. First think about statement problems and then write your logic on Copy / Notebook.
2. Write **Your Name** and **Roll No** on your Paper/Sheet's first page.
3. Do not copy from any source otherwise you will be penalized with negative marks.
4. Complete your lab **within given Time Slot**.
5. Paste all your codes along with screenshots in a word file and renamed with your roll number.
6. Keep all your source files in your computer for verification. Do not overwrite a single source file for all programs.

Problems:

Note: Apply file handling for CRUD operations in all questions as guided in question 1.

Question 1: Customer Order Management

Scenario: You are developing a customer order management system for an e-commerce platform. Each order is represented as a tuple with order details (order_id, customer_name, product_name, quantity).

Hints:

Use a list of tuples to store multiple orders.

Create a program that allows users to add new orders (using tuples), update existing orders, and view order details.

Implement functions for calculating the total cost of each order and the total revenue for all orders.

Provide a feature to search for orders by customer name using sets to store customer names.

Add file handling to save and load orders to/from a text file for persistence.

File Handling Instructions:

When the program starts, load existing orders from a text file (if it exists).

After each order is added or updated, save the updated list of orders to the text file.

When the program is run again, load the orders from the text file to resume working with the existing data.

Here's a high-level overview of how you can incorporate file handling:

Create a function to load orders from a text file into your list of orders (a list of tuples).

Create a function to save the list of orders back to the text file.

Call the load function when the program starts to load existing orders.

Call the save function after adding or updating orders to persist the changes.

Question 2: Inventory Control System

Scenario: You are tasked with designing an inventory control system for a retail store. Each product is represented as a dictionary with product details (product_id, product_name, price, quantity).

Hints:

Use a dictionary to store product information (product_id as the key and product details as the value).

Develop a program that allows users to add new products (using dictionaries), update product information (e.g., price and quantity), and check product availability.

Implement a feature to calculate the total value of the inventory using product prices and quantities.

Provide options to generate sales reports, including sales revenue and profit margins, and use sets to store product IDs.

Question 3: Student Grade Management

Scenario: You are building a student grade management system for a school. Each student's grades are stored in a dictionary where the student's name is the key, and the value is a list of grades for different subjects.

Hints:

Use a dictionary where student names are keys, and the values are lists (representing grades for different subjects).

Create a program that allows users to add new students (using dictionary keys), update grades, and calculate average grades for each student (using lists for grades).

Implement a function to find and display students with the highest and lowest average grades.

Provide a feature to search for a student by name (using dictionary keys) and display their grade details (using lists).

Question 4: Employee Payroll System

Scenario: You are developing an employee payroll system for a company. Employee details are stored in a list of tuples with employee information (employee_id, employee_name, hourly_rate, hours_worked).

Hints:

Use a list of tuples to store employee details.

Develop a program that allows users to add new employees (using tuples), update their work hours, and calculate their weekly pay (using hourly_rate and hours_worked).

Implement a function to generate payroll reports, including the total payroll expense (summing weekly pay for all employees).

Use sets to store employee IDs and provide an option to search for an employee by ID (using sets).

Question 5: Recipe Book Application

Scenario: You are creating a recipe book application. Each recipe is stored as a dictionary with recipe details (recipe_id, recipe_name, ingredients (a list), instructions).

Hints:

Use a list of dictionaries to store multiple recipes.

Create a program that allows users to add new recipes (using dictionaries), update existing recipes, and view recipe details.

Implement a feature to search for recipes by ingredient (using lists for ingredients) and display matching recipes.

Provide an option to delete recipes from the recipe book using lists of recipe IDs.

Question 6: Library Catalog System

Scenario: You are tasked with building a library catalog system. Books are represented as dictionaries with book details (book_id, title, author, publication_year).

Hints:

Use a dictionary to store book information (book_id as the key and book details as the value).

Develop a program that allows users to add new books (using dictionaries), update book information, and search for books by title or author.

Implement a feature to keep track of the total number of books in the library (using dictionary keys) and generate a catalog report.

Provide options to borrow and return books, updating their availability status (using dictionary values).

You need to do your exercise within the given time.