Unit I Lab Exercises II

MCA171 Python Programming

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1. (a) Develop a module called module_ListFunction that includes the following functions:

 i. A function to find the maximum value in a given list.

 ii. A function to find the minimum value in a given list.

 iii. A function to calculate the sum of all elements in a list.

 iv. A function to compute the average of the list.

 v. A function to determine the median of a list.

Additionally, create lists using Python comprehension for various scenarios and demonstrate the use of the module functions with these lists.

(b) Create another script named 'main_ListOpeartions.py' and Imports the 'module_ListFunction' to it.

(c) Demonstrate the execution of each function with suitable examples.

2. Write a Python program to create a module that performs various set operations.

 a. Write a function to add an element to a set, ensuring no errors if the element is already present.
 b. Write a function to remove an element from a set, ensuring no errors if the element is not present.
 c. Write a function to return the union and intersection of two sets, handling empty sets correctly.
 d. Write a function to return the difference S_1-S_2, handling empty sets correctly.
 e. Write a function to check if set S_1 is a subset of set S_2, handling empty sets correctly.
 f. Write a function to find the length of a set without using the len() function.
 g. Write a function to compute the symmetric difference of two sets.
 h. Write a function to compute the power set of a given set.
 i. Write a function to get all unique subsets of a given set.

Implement this module and demonstrate it by using adequate examples.

3. Write a program to create functions that can accept multiple dictionaries as arguments using '*args', and perform various operations on them.

(a) Write a function, say, 'merging_Dict(*args)' that takes multiple dictionaries and merge them.

(b) Write a function which can find common keys in multiple dictionaries.

(c) Create a function to invert a dictionary, swapping keys and values. If multiple keys have the same value, group these keys in a list in the inverted dictionary. Implement and demonstrate this with examples.

(d)Write a function to find common key-value pairs across multiple dictionaries.

4. Create a Python program to efficiently manage and handle a library's collection of books. Each book in the library is represented with the following attributes: title, author, publisher, volume, year of publication, and ISBN (International Standard Book Number).

Design and implement a module named LibraryManager.py that includes functions to manage books in the library. Collect data for 25 recently published books on topics such as Operating Systems, Data Structures, and Machine Learning using Python, published between 2020 and 2024. Store this information in a dictionary where the key is the ISBN, and the value is another dictionary containing the book details.

Within the LibraryManager.py module, create functions to:

- Add a book to the library.

- Remove a book from the library by its ISBN.

- Retrieve and display the details of a book using its ISBN.

- Search for books by title or author.

- List all books currently in the library.

- Update the details of an existing book.

- Check if a book is available in the library by its ISBN.

Demonstrate the functionality of your module by adding a few sample books, removing a book, retrieving the details of a book, searching for books, listing all books, updating book details, and checking the availability of a book.

5.Write a Python program to analyze and process weather data for New York City from 1st August to 10th July in 2024.

1. Each day's data includes:

    o Date

    o Maximum temperature (in Celsius)

    o Minimum temperature (in Celsius)

    o Humidity (in percentage)

    (Hint: Store the data in a list of dictionaries.)

2. Write a function to find the highest and lowest temperatures recorded during the week.

3. Write a function to determine the number of days with temperatures above 30°C.

4. Write a function to compute the average humidity over the specified period.