Data Structures and Algorithms

Lab 12 – Hashing

Exercises/Tasks:

1. Write a program to implement a hash function that calculates the hash value for a string input.

   Example: $hash(key) = sum(ASCII\ values\ of\ characters\ in\ key)\ \%\ tabelSize$

   Use a small hash table size (e.g., 10) and print the hash values for multiple string inputs.

2. Implement a hash table with a fixed size. Use the hash function from Task 1 to determine where to insert keys. If a collision occurs, display a message (but don't handle it yet).
   Example:
   - Insert keys: "apple", "orange", "banana", "grape".
   - Hash table size: 5.

3. Modify the hash table implementation to handle collisions using separate chaining (linked lists) or open addressing.

   Write functions to:
   - Insert a key into the hash table.
   - Search for a key in the hash table.
   - Delete a key from the hash table.

4. Write a program to count the frequency of words in a given text using a hash table.
   Example Input: "the cat sat on the mat"
   Output: {the: 2, cat: 1, sat: 1, on: 1, mat: 1}

5. Build a simplified version of a dictionary using a hash table where you can:
   - Add a word and its meaning.
   - Search for a word to get its meaning.
   - Delete a word from the dictionary.