Brac University(Department of Computer Science and Engineering)

CSE220: Data Structures

Lab Final Examination (CO4)

Summer 2023

Section: 03

Name: ID:

Time: 40 Min [Total Marks: 15]

Task 1: [10]

A Hashtable class is given in the colab file where the create_from_array() and print_hashtable() methods have been done for you. Complete the insert() and __hash_function() methods. Do not change the given code; implement only the required methods. [No need for a linked list here.]

a. insert() function: [4]
   You need to insert a string from the given strings array to the hashtable on the basis of its hash function. If you are wanting to add a string to an index of the hashtable where another string already exists, append the current string to that index in a nested list form.

b. __hash_function(): [6]
   The hash function takes a string, s, calculates its hash key and returns the key. The hash key can be calculated by summing the even digits present in the string and modding it by the length of the strings array. i.e. (sum of even digits)%len(strings)
   Ex: For ST1E82, the hash key is (8+2)%6 = 4
   You need to implement this method recursively.

Given	Sample Output
strings = ["ST1E82", "H2O", "X4Y5", "Z3A5", "E8I1", "U3O9"]	0 : ['Z3A5', 'U3O9'] 1 : None 2 : ['H2O', 'E8I1'] 3 : None 4 : ['ST1E82', 'X4Y5'] 5 : None
strings=["1ABCD43", "X26YZ3", "KL0", "Z3B5", "MB186", "WS63"]	0 : ['KL0', 'Z3B5', 'WS63'] 1 : None 2 : ['X26YZ3', 'MB186'] 3 : None 4 : ['1ABCD43'] 5 : None

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Task 2: [5]

A BTNode class, inorder() and tree_construction() functions are given in the same colab file. A tree has been constructed in the driver code. You need to implement the leaf_node function which takes the root of that tree as a parameter and prints the values of the leaf nodes of that tree.

Given	Sample Output
[None, 13, 22, 7, 10, 14, None, 15]	Given Tree Inorder Traversal: 10 22 14 13 7 15 Values of the leaf nodes of the tree: 10 14 15