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|  | **BAHRIA UNIVERSITY, (Karachi Campus)**  *Department of Software Engineering*  **Final Lab Exam**  **Semester Fall 2021** |  |

**Course Title:**  Data Structure & Algorithms **Course Code**: CSL-221

**Course Instructor:** Engr Laraib Siddiqui **Class**: BSE-3(B)

**Lab Instructor:** Engr. Ayesha Khan **Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Max. Marks: 1**5 Marks **CLO :** CLO-3 **\_\_\_\_\_\_\_\_\_**

**Time:**  3 hours **Date:** 20-1-2022

**Note:**

* Plagiarism is not allowed, if found you will get zero marks.
* Try to submit the task on LMS in given Time.
* Include your name or enrollment no on footer.
* Your File name should be in the given format:
  + [Class Section] [Complete Name] DSAFINAL
  + **i.e., BSE3A Usman Ali DSAFINAL**

**QUESTION 01: (5 Marks)**

After the situation prevailing across the globe many rules, regulations and SOPS have been introduced due to covid. Not only in big marts but small shops also are required to follow it. Example: whenever Ahmed visits Chase Value center, for payment of his goods he needs a receipt from Counter1.Then he proceeds towards Counter2 only along with receipt for payment. On Counter 2 only 5 persons at a time are allowed and then checkout.

* Create a function to generate receipt (like zain4235)
* Create a function to delete last enter customer due to time lapse.
* Create a function to search for the customer name start with S.
* Create a function to find very first customer and give him 10% discount..
* Display all customers receipt no to the Admin..

**Question 02:**  **(4 Marks)**

Consider a structure which is non linear but has some set of rules and regulations for implementation. It is the collection of nodes linked according to a pattern but in levels. Make sure no loop or cycle among nodes is involved.

Rule : In this structure left side nodes and right side nodes are arranged after comparison.

1. What data structure is it? (1 mark)
2. Implement it. (not dynamic implementation) (3 marks)

**Question 03: (6 marks)**

Consider there is a group of friends who went to Hawksbay recently. After coming back the all posted pictures on Facebook. Assume that they all liked each other’s pics in a following manner.

Note: Consider that each friend is represented by a no.

Diagram

Description automatically generated

1. Implement this structure. (2 marks)
2. Also apply the searching technique which searches horizontally among the adjacent nodes. (4 marks)

using System.Collections.Generic;

Dictionary<int, List<int>> friends = new Dictionary<int, List<int>>();

// Add edges between friends who liked each other's pictures

friends[1] = new List<int> { 2, 3 };

friends[2] = new List<int> { 1, 3 };

friends[3] = new List<int> { 1, 2, 4 };

friends[4] = new List<int> { 3 };

using System.Collections.Generic;

public HashSet<int> Search(Dictionary<int, List<int>> friends, int friend)

{

Queue<int> queue = new Queue<int>();

HashSet<int> visited = new HashSet<int>();

queue.Enqueue(friend);

visited.Add(friend);

while (queue.Count > 0)

{

int currentFriend = queue.Dequeue();

foreach (int neighbor in friends[currentFriend])

{

if (!visited.Contains(neighbor))

{

queue.Enqueue(neighbor);

visited.Add(neighbor);

}

}

}

return visited;

}