Indian Institute of technology, Guwahati

Department of Computer Science and Engineering

Data Structure Lab: (CS210)

Lab Test-1

Date: 21st August, 2017 **Total Marks: 20**

1. (a) Create a **threaded binary tree** using **linked list** with inputs given as below format: <**number1 L/R number2**>. You need to insert the number1 in L/R position of number2. All numbers are unique and non-negative. If L/R position of number2 is not available, give a warning as **"number1 is ignored"** without double quotes. Initially tree is empty, you need to make root node containing number1 of first tuple <number1 L/R number2> you encounter ignoring L/R and number2. **[10]**

   1 0 L 10: Initially tree is empty. So, node containing 0 will become root.
   2 1 L 0: insert 1 at the left of 0.
   3 2 R 0: insert 2 at the right of 0.
   4 3 L 0: Since left of 0 is not available, give warning "3 is ignored".
   5 4 L 2: Insert 4 at the left of 2.
   6 -1: end of insertion.

   Except for the first tuple, assume that number2 will always be existing member of tree.

   (b) Write a function for **Inorder** traversal using threaded binary tree without stack or recursion. **[10]**

   Input: sequence of <**number1 L/R number2**>
   Output: Inorder traversal

   Test1:
   1 L 100
   2 R 1
   3 L 1
   4 L 3
   5 L 4
   7 R 2
   -1
   Output:
   Inorder: 5 4 3 1 2 7

Test2:
1 L 0
2 R 1
3 L 1
4 L 2
6 R 2
7 L 3
8 R 3
9 L 3
10 L 4
-1

Output:
9 is ignored
Inorder: 7 3 8 1 10 4 2 6

Test3:
2 L 10
11 L 2
12 L 2
15 R 2
17 R 11
18 L 17
19 L 15
13 L 15
21 L 11
-1

Output:
12 is ignored
13 is ignored
Inorder: 21 11 18 17 2 19 15

Evaluation Criteria:
1. Do not use any global variable. Penalty: **-4.**
2. If you do not implement Threaded binary tree: **max 20%**
3. Partial marking will be decided by the TAs.