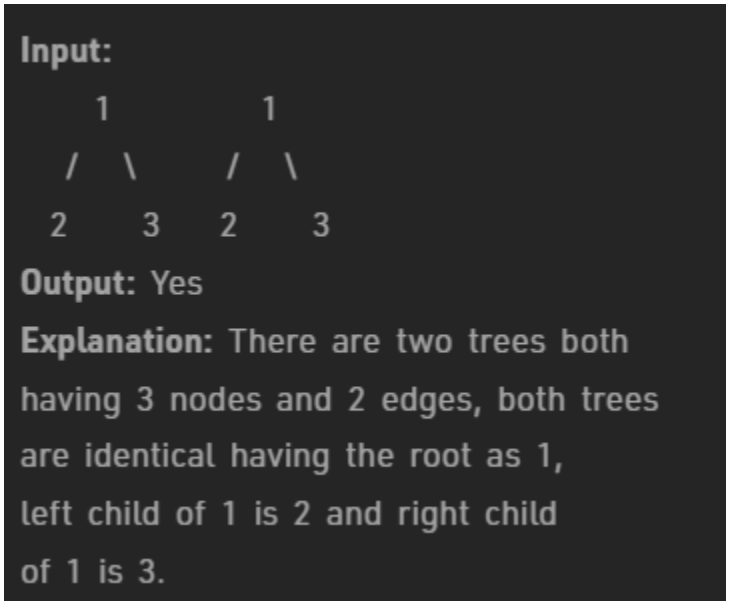
Bridge Course (Major Exam-Programming)
Computer Science and Engineering
MM: 60 (30 x 2) marks

Instruction:

1. Attempt any **two** questions.
2. Plagiarism is not allowed. Also copying code from the internet, use of chatgpt or any other source is not allowed. If found, you will be given zero marks.
3. Submit all code in a single zip file with your roll number as file name.
   Example: M23CSE001.zip
4. Inside the zip, every file should be named as illustrated below:
   a. <roll_number>_<question_number>.<file_type>
   b. Example: If your roll number is M23CSE001 and the solution is for question 1, then file name will be : M23CSE001_Q1.py
5. Include a readme file.
6. Submit a **report** of questions you have attempted, which include output screenshots and explanations if mentioned in the question.
7. You are only allowed to code in C, C++, and python.

Questions:

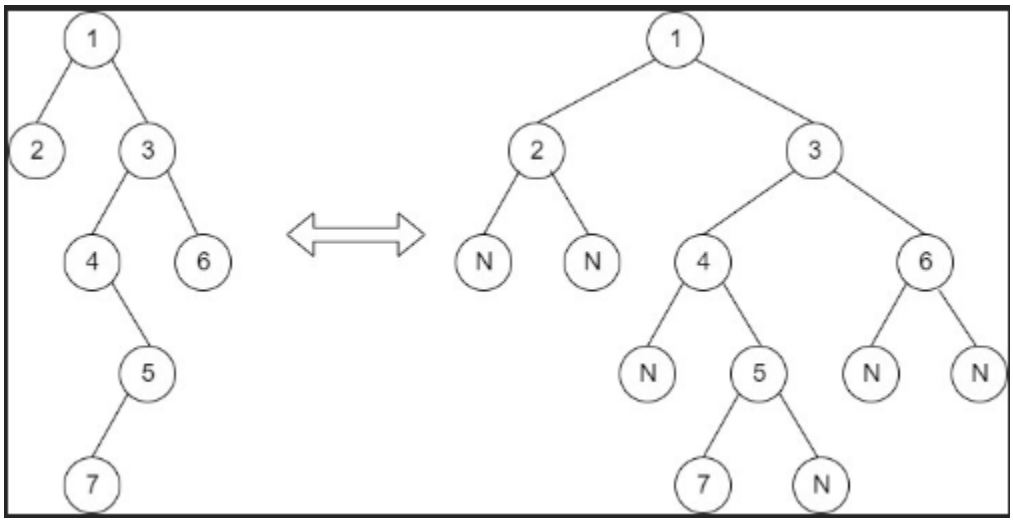
Q1. Given two binary trees, the task is to find if both of them are identical or not. Do a time complexity analysis for the same.



Input Format:
The tree in the input is given in the form of a string as described below.

The values in the string are in the order of level order traversal of the tree where numbers denote node values, and a character “N” denotes NULL child.

For example:



For the above tree, the string will be: 1 2 3 N N 4 6 N 5 N N 7 N

The input will contains two String in two separate lines denoting the tree.

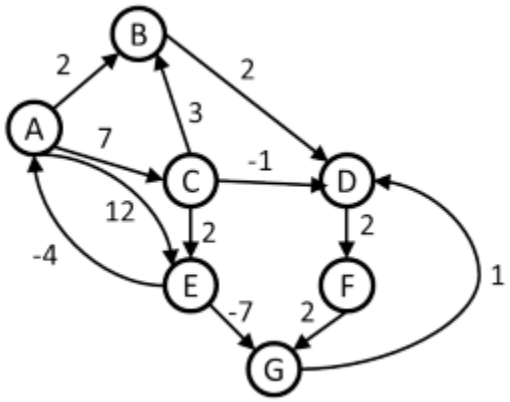
Example:

1 2 3
1 2 3

Output: yes

Q 2. Implement a quicksort algorithm and modify it using a randomized pivot selection strategy. Compare its average-case performance with the standard pivot selection strategy. Provide solution.

Q 3. Consider the following directed, weighted graph:



Even though the graph has negative weight edges, step through Dijkstra's algorithm to calculate supposedly shortest paths from A to every other vertex. Write a code for it, in which show your steps in the table. Cross out old values and write in new ones, from left to right within each cell, as the algorithm proceeds. Also list the vertices in the order which you marked them known.

Q4. The longest common subsequence (LCS) problem is to find the longest subsequence common to two given sequences. First sequence is 0, n, 2*n, 3*n , 4*n ....N, where n is prime number and N is the total length of sequence. Second sequence is generated by Fibonacci sequence F(m) = F(m-1) + F(m-2) with the initial conditions: F0 = 0 and F1 = 1, where m is the length of fibonacci sequence.

Example:

Input:
S1: 0, 3, 6, 9, 12
S2: 0, 1, 1, 2, 3, 5, 8, 13, 21

Output:
The longest common subsequence is [0,3], and its length is 2.