Birla Institute of Technology and Science-Pilani, Hyderabad Campus
First Semester 2020-2021
Lab Sheet-7
CS G526: Advanced Algorithms and Complexity
Date: 09/12/20

General Instructions: Argue logically. Write it in a manner that explains your logic very clearly. Do not miss steps in between.

Problem-1: **[30 pts]** Given a binary tree, write a program to check if it is BST or not. Assume that the tree is pointed to by the pointer to the root like the previous assignments. given the root pointer as input, your module should output "YES" if BST and "NO" otherwise.

Problem-2: **[30 pts]** Write a program to evaluate an arithmetic expression. The rank of the operators are the following: parenthesis operation > exponentiation > multiplication/division > addition/subtraction. For example $(2+3)\times 5$ should evaluate to 25 whereas $2+3\times 5$ should evaluate to 17. The input to your program should be an arithmetic expression as a string. The exponential is represented by the symbol $\hat{}$

Problem-3: **[30 pts]** Implement Dijkstras algorithm for Single source shortest path that runs in $O((|V|+|E|)\log|V|)$ where you should implement priority queue using a binary heap data structure.