Institute for Advancing Intelligence, TCG CREST
(TCG Centres for Research and Education in Science and Technology)

Introduction to Programming and Data Structures, 2023-24, Semester-II
Assignment 06

Maximum Marks: **150** Submission Deadline: **2023-Nov-16**
Topic: AVL Tree

Assignment problem # AP0701

1. Implement the basic structure of an AVL tree, including nodes and necessary functions.
2. Implement the following AVL tree operations:
   - Insertion: Ensure the AVL property is maintained after each insertion.
   - Deletion: Ensure the AVL property is maintained after each deletion.
   - Searching: Implement a search function to find a specific key in the AVL tree.
3. Create a function to perform an in-order traversal of the AVL tree and print the elements in sorted order.
4. Test your AVL tree implementation with a variety of input cases, including:
   - Randomly generated data.
   - Data already sorted in ascending order.
   - Data already sorted in descending order.
   - A mix of insertions, deletions, and searches.

Submission Guidelines

1. Submit the C source code files (`.c`) containing your AVL tree implementation.
2. Include a `README` file explaining:
   - How to compile and run your program.
   - Describe the time and space complexity of your AVL tree operations.
   - Any additional features or optimizations you implemented.

Evaluation Criteria Your assignment will be evaluated based on the following criteria:

1. Correctness of AVL tree implementation and adherence to AVL tree properties.
2. Efficiency of operations (insertion, deletion, searching).
3. Robustness and handling of edge cases.
4. Clarity and organization of code.
5. Documentation and explanation provided in the `README` file.

Deadline The assignment is due by [insert deadline here]. Late submissions will be penalized.

Note Feel free to consult online resources, textbooks, and lecture materials while working on this assignment. However, make sure to provide proper citations for any external sources you use. Plagiarism will not be tolerated.

[80+90+30]