3rd Assignment

Data Structure and Algorithm (Java)

Deadline: 7th June 2025 **Marks: 20**

Important Instructions:

No late submissions allowed.

Submission through email is not permitted in any case.

Plagiarism will not be tolerated and will be graded as **ZERO.**

Make a Word document, add the executable against each problem statement, the output screenshot, and submit the document file on the portal before the deadline.

Scenario 1:

Scenario:

A university wants to store students' scores in a system where each student's roll number is unique. The roll number is the key, and the score is the value.

Tasks:

- Implement a BST to store student roll numbers and scores.
- Write methods to:
  - Insert new student data.
  - Search for a student by roll number.
  - Display all students in ascending order of roll numbers.
  - Find the student with the highest and lowest scores.

Scenario 2:

Scenario:

A hospital maintains patient records using unique patient IDs. The administrator wants a system to quickly insert, delete, and find patients.

Tasks:

- Implement a BST where each node contains the patient ID and name.
- Write methods to:
  - Insert new patients.
  - Delete a patient by ID.
  - Search for a patient.
  - Display patient IDs in sorted order.

Scenario 3:

Scenario:

A library uses a BST to store book details. Each book is identified by its ISBN number.

Tasks:

- Implement a BST with ISBN as the key and book title/author as the value.
- Write methods to:
    - Add a new book.
    - Remove a book by ISBN.
    - Search for a book by ISBN.
    - Print all books sorted by ISBN.

Scenario 4:

Scenario:

In a simulation of a packet routing system, a binary tree is used to model network paths. Each node represents a router.

Tasks:

- Implement a binary tree where nodes store router IDs.
- Perform:
    - Inorder traversal (to simulate data analysis).
    - Preorder traversal (to simulate initialization of routers).
    - Postorder traversal (to simulate shutdown sequence).

----------End of Assignment! ----------