CP3161 DATA STRUCTURES AND ALGORITHMS LABORATORY

Lab 2 – Programs Date :22.7.26

1.A college stores student registration numbers in a Binary Search Tree.

The registration numbers are:

```
45, 23, 67, 12, 34, 56, 78, 29, 40
```

A new student with registration number **31** joins, and student **23** leaves the college.

Viva :

Analyze the BST after performing the insertion and deletion operations. Draw the final tree and explain how the deletion affects the tree structure.

2.An online shopping application stores product IDs in a BST.

```
50, 25, 75, 10, 35, 60, 90, 30, 40
```

During system maintenance:

- Insert Product ID **33**
- Delete Product ID **25**

Viva :

Analyze which node replaces the deleted node and justify why that node is selected according to BST deletion rules.

3.A hospital maintains patient IDs using a BST.

Patient IDs:

```
80, 45, 95, 30, 60, 85, 100, 50, 70
```

A doctor searches for patient ID **70**.

Viva: Trace the search path and analyze why BST searching requires fewer comparisons than a linear search in this scenario.

4.Books are arranged using ISBN numbers in a BST.

```
55, 35, 75, 20, 45, 65, 90, 40, 50
```

The librarian accidentally inserts **35** again.

Analyze what should happen if duplicate keys are not allowed.

Viva :Explain how the insertion algorithm handles this situation.