**ARDHI UNIVERSITY**

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**SCHOOL OF EARTH SCIENCE, REAL ESTATE, BUSINESS STUDIES AND INFORMATICS**

**DEPARTMENT OF COMPUTER SYSTEMS AND MATHEMATICS**

**BSC. COMPUTER SYSTEMS AND NETWORKS**

**IS 122; DATA STRACTURE AND ALGORITHM**

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**PREPARED BY GROUP 10**

**SUBMITTED TO DR NKOTAGU**

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**ASSIGNMENT:**

1. Consider the following tree and write the sequence of nodes that will be visited using:

i. In-order Traversal

ii. Pre-order Traversal

iii. Post-order Traversal

solution

i. In-order Traversal

H 🡪 D 🡪 I 🡪 B **🡪** J 🡪 L 🡪 E 🡪 A 🡪 F 🡪 C 🡪 K 🡪 G

ii. Pre-order Traversal

A 🡪 B🡪D 🡪 H 🡪 I 🡪 E 🡪 J 🡪 L 🡪 C 🡪 F 🡪 G 🡪 K

iii. Post-order Traversal

H 🡪 I 🡪 D 🡪 L 🡪 J 🡪 E 🡪 B 🡪 F 🡪 K 🡪 G 🡪 C 🡪 A

2. Consider the binary tree shown below. For each of the traversals listed give the order in which

the nodes are visited

i. In-order Traversal

ii. Pre-order Traversal

iii. Post-order Traversal



solution

i. In-order Traversal

1 🡪 3 🡪 4 🡪 6 🡪 7🡪8 🡪 10 🡪 13 🡪 14

ii. Pre-order Traversal

8 🡪 3 🡪 1 🡪 6 🡪 4 🡪 7 🡪 10 🡪 14 🡪 13

iii. Post-order Traversal

1 🡪 4🡪 7 🡪 6 🡪 3 🡪 13 🡪 14 🡪 10 🡪 8

3. Consider the following scenario. The pre-order traversal of a binary tree is A, B, E, C, D. The in order

traversal of the same binary tree is B, E, A, D, C. What is the level order sequence for the binary tree? (Hint find out what is level order traversal before attempting this question)

solution

Level order traversal of a binary tree is a method of visiting all the nodes in the tree level by level, from left to right.

Given Traversals:

Pre-order: A, B, E, C, D

In-order: B, E, A, D, C

1. Left Subtree: B, E
2. Root: A
3. Right Subtree: D, C

number of level is 3

Level 1: A

Level 2: B, C

Level 3: E, D

the level of order sequence for the binary tree is

A🡪 B 🡪 C 🡪 D🡪 E

4. Consider the binary search tree below and answer the questions that follow



a) Write the in-order traversal, and post-order traversal of the given tree

b) If we insert the value 54 into this tree, which node becomes its parent?

c) If we insert the value 27 into this tree, which node becomes its parent?

d) If we delete node with value 70, which node should be its replacement node?

e) If we delete node with the value 25, which node should be its replacement node?

Solution

a) i. In-order Traversal

5🡪15🡪18🡪20🡪23🡪30🡪35🡪45🡪50🡪65🡪68🡪70🡪75🡪80🡪90🡪95🡪100🡪150

ii. Post-order Traversal

5🡪18🡪15🡪23🡪20🡪30🡪45🡪35🡪25🡪68🡪65🡪75🡪70🡪95🡪150🡪100🡪90🡪80🡪50

b) Node 65 become parent of 54

1. Start at the root (50).
2. Since 54 > 50, go to the right subtree (80).
3. Since 54 < 80, go to the left subtree (70).
4. Since 54 < 70, go to the left subtree (65).
5. Since 54 < 65, go to the left subtree (no left child of 65).

c) Node 30 become parent of 27

1. Start at the root (50).
2. Since 27 < 50, go to the left subtree (25).
3. Since 27 > 25, go to the right subtree (35).
4. Since 27 < 35, go to the left subtree (30).
5. Since 27 < 30, go to the left subtree (no left child of 30).

d) Node x should replace node 70

1. Find the node to be deleted (70).
2. The node 70 has two children. According to BST deletion rules, the replacement node will be the smallest node in the right subtree or the largest node in the left subtree.
3. The smallest node in the right subtree of 70 is 75.

e) Node 30 should replace node 25

1. Find the node to be deleted (25).
2. The node 25 has two children. According to BST deletion rules, the replacement node will be the smallest node in the right subtree or the largest node in the left subtree.
3. The smallest node in the right subtree of 25 is 30.