ARDHI UNIVERSITY

SCHOOL OF EARTH SCIENCES, REAL ESTATE, BUSINESS STUDIES AND INFORMATICS (SERBI)

DEPARTMENT OF COMPUTER SYSTEMS AND MATHEMATICS (CSM)

BSC. COMPUTER SYSTEMS AND NETWORKS (BSC. CSN 1)

DATA STRUCTURE AND ALGORITHMS (IS 122)

TASK: ASSIGNMENT 2

INSTRUCTOR: MR. NKOTAGU

GROUP NO. 07 MEMBERS

S/N	NAME	REGISTRATION NUMBER
1	HAITHAM MBAROUK ALI	30961/T.2023
2	VAILETH JOHN LUPEMBE	30278/T.2023
3	HABIRI JOSEPH	30348/T.2023
4	GRAYSON JORAM NGOWI	31520/T.2023
5	MORISI JONAS CHARLES	32262/T.2023
6	CAROLINE PAUL SHAYO	30694/T.2023
7	IBRAHIM MRISHO SULIMAN	28935/T.2022

1. Consider the following tree and write the sequence of nodes that will be visited using:
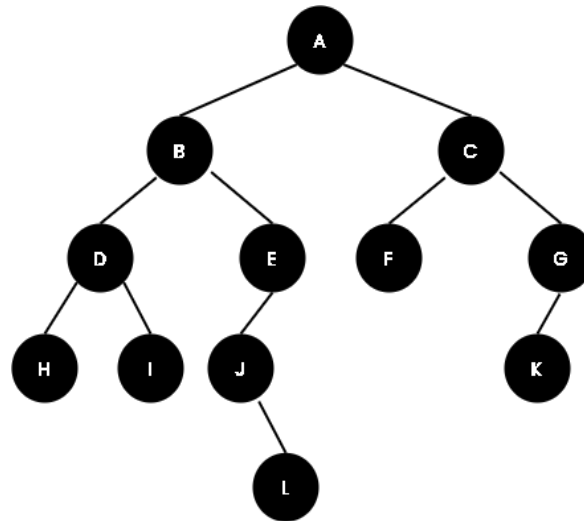
    i.   In-order Traversal

    Result: H, D, I, B, J, L, E, A, F, C, K, G

    ii.   Pre-order Traversal

    Result: A, B, D, H, I, E, J, L, C, F, G, K

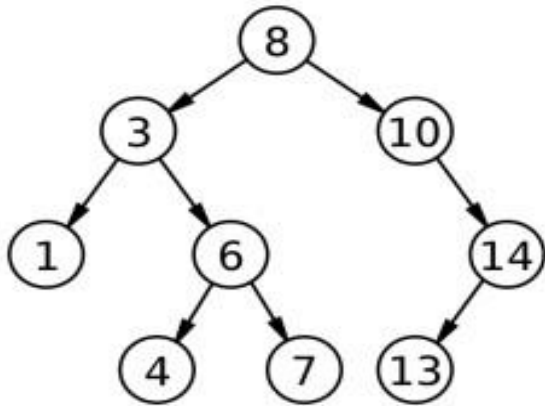   iii.   Post-order Traversal

    Result: 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

Answers

In-order traversal

Result: 1, 3, 4, 6, 7, 8, 10,13, 14

Pre order traversal

Result: 8, 3, 1, 6, 4, 7, 10, 14, 13

Post order traversal

Result: 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 inorder 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
   The pre-order traversal of a binary tree is A, B, E, C, D.
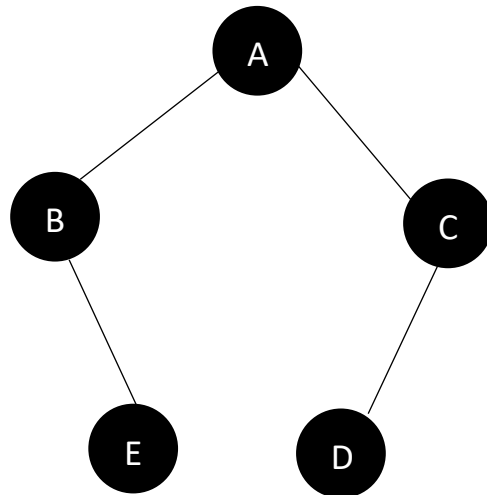   This indicate the Root is A

   But,

   in order traversal of the same binary tree is B, E, A, D, C

   left subtree (node before A) is B and E

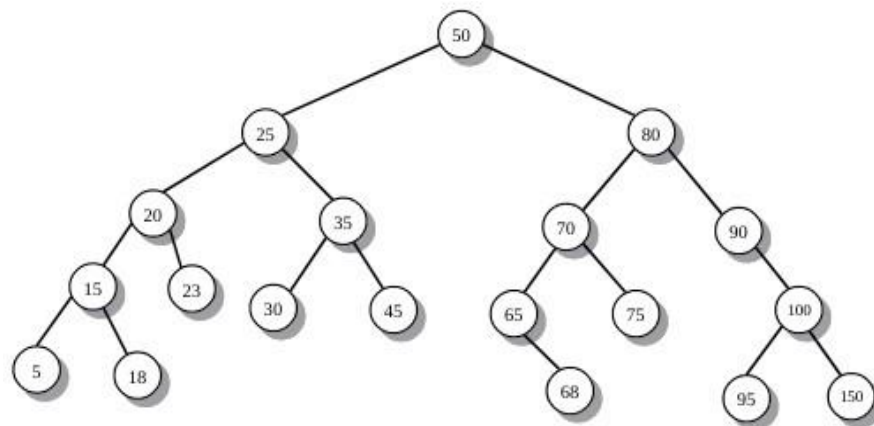   Right subtree (node after A) is Dand C

Tree

A - at level 0

B and C at level 1

D and E at level 2

Hence, the order sequence for binary tree is A at level 0, B, C, at level 1 and E, D at level 2

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?

Answers

a) In order traversal

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

Post order traversal

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

b) 65 would be parent node when 54 is inserted in the tree

c) 30 would be the parent node when 27 is inserted in the tree

d) 75 node will replace 70 node when it is deleted

e) 30 node will replace 25 node when it is deleted