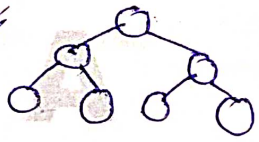
Q.26 How many distinct BSTs can be constructed 3 with distinct keys? $\frac{6C_3}{4} = \frac{6!}{4 \times 3! \times 3!} = 5$

(A) 4 (B) 5 (C) 6 (D) 9

[GATE 2008]

Q.27 What is the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0.

(A) 2 (B) 3 (C) 4 (D) 5



[GATE 2009]

Q.28 The worst case running time to search for an element in a balanced in a binary search tree with $n2^n$ elements is

$\log(n2^n) = \log n + n\log 2 = n$

(A) $\Theta(n \log n)$ (B) $\Theta(n2^n)$ (C) $\Theta(n)$ (D) $\Theta(\log n)$

Q.29 Which one of the following is the tightest upper bound that represents the time complexity of inserting an object into a binary search tree of n nodes?

(A) O(1) (B) O(Logn) (C) O(n) (D) O(nLogn)

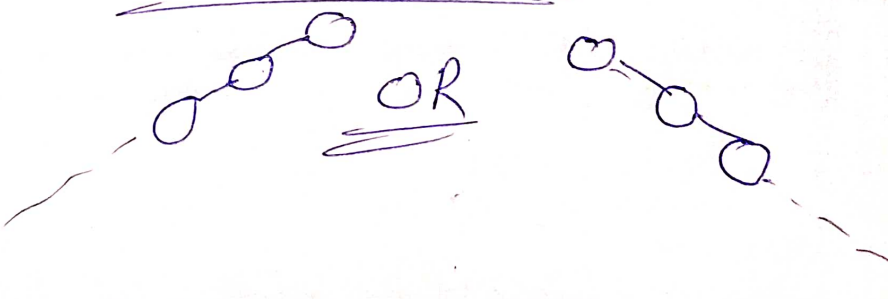
[GATE 2013]

Q.30 What are the worst-case complexities of insertion and deletion of a key in a binary tree?

(A) Θ(logn) for both insertion and deletion

(B) Θ(n) for both insertion and deletion → for Skewed Tree

(C) Θ(n) for insertion and Θ(logn) for deletion



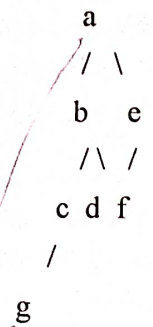
(D) $\Theta(\log n)$ for insertion and $\Theta(n)$ for deletion

[GATE 2015]

Q.31 The number of ways in which the numbers 1, 2, 3, 4, 5, 6, 7 can be inserted in an empty binary search tree, such that the resulting tree has height 6, is $2^6 = 64$ Ans

Note: The height of a tree with a single node is 0. means 7 levels **[GATE 2016]**

Q.32 Which of the following sequences denotes the post order traversal sequence of the given tree? → L_T, R_T, Root



(A) f e g c d b a

(B) g c b d a f e

(C) g c d b f e a

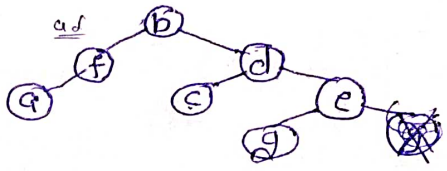
(D) f e d g c b a

[GATE 1996]

Q.33 Draw the binary tree with node labels *a, b, c, d, e, f* and *g* for which the inorder and postorder traversals result in the following sequences:

Inorder a f b c d g e

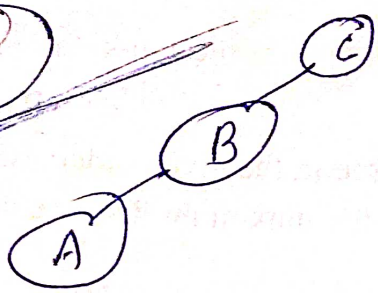
Postorder a f c g e d b

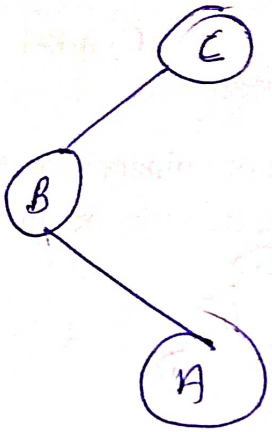


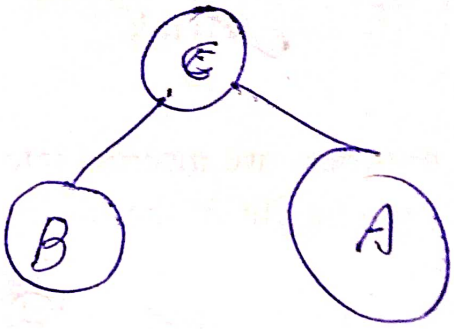
[GATE 1998]

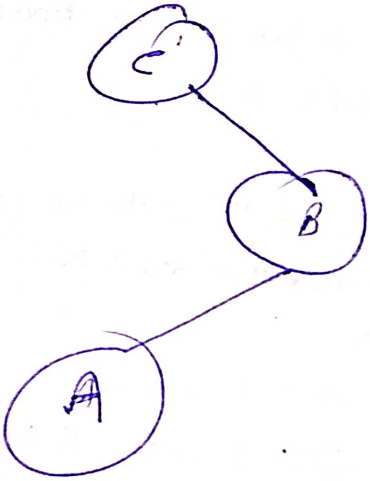
Q.34 Draw all binary trees having exactly three nodes labeled A, B and C on which preorder traversal gives the sequence C,B, A.

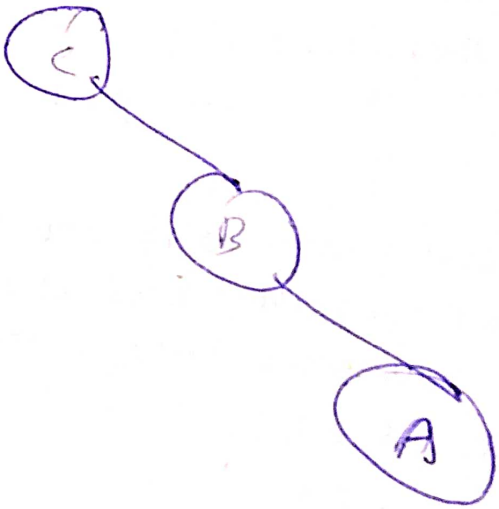
3q











5 Trees

Q.35 Consider the following C program segment

```
struct CellNode
{
  struct CelINode *leftchild;
  int element;
  struct CelINode *rightChild;
}

int Dosomething(struct CelINode *ptr)
{
   int value = 0;
   if (ptr != NULL)
   {
     if (ptr->leftChild != NULL)
       value = 1 + DoSomething(ptr->leftChild);
```

```
    if (ptr->rightChild != NULL)
      value = max(value, 1 + DoSomething(ptr->rightChild));
  }
  return (value);
}
```

The value returned by the function DoSomething when a pointer to the root of a non-empty tree is passed as argument is

(A) The number of leaf nodes in the tree

(B) The number of nodes in the tree

(C) The number of internal nodes in the tree

(D) The height of the tree

[GATE 2004]

Q.36 In a binary tree with n nodes, every node has an odd number of descendants. Every node is considered to be its own descendant. What is the number of nodes in the tree that have exactly one child?

(A) 0 (B) 1 (C) (n-1)/2 (D) n-1

[GATE 2010]

Q.37 We are given a set of n distinct elements and an unlabeled binary tree with n nodes. In how many ways can we populate the tree with the given set so that it becomes a binary search tree?

(A) 0 (B) 1 (C) n! (D) (1/(n+1)).2nCn

[GATE 2011]

Q.38 Consider the following New-order strategy for traversing a binary tree:

Visit the root;

Visit the right subtree using New-order

Visit the left subtree using New-order

The New-order traversal of the expression tree corresponding to the reverse polish expression **3 4 * 5 – 2 ^ 6 7 * 1 + –** is given by:

(A) + – 1 6 7 * 2 ^ 5 – 3 4 * (B) – + 1 * 6 7 ^ 2 – 5 * 3 4

(C) – + 1 * 7 6 ^ 2 – 5 * 4 3 (D) 1 7 6 * + 2 5 4 3 * – ^ –

[GATE 2016]

Q.39 Let T be a rooted binary tree whose vertices are labelled with symbols a, b, c, d, e, f, g, h, i, j, k. Suppose the in-order (visit left subtree, visit root, visit right subtree) and post-order (visit left subtree, visit right subtree, visit root) traversals of T produce the following sequences.

in-order: a, b, c, d, e, f, g, h, i, j, k

post-order: a, c, b, e, f, h, j, k, i, g, d

Same ⟹ 5 levels Ans

Q.40 Let T be a rooted binary tree whose vertices are labelled with symbols a, b, c, d, e, f, g, h, i, j, k. Suppose the in-order (visit left subtree, visit root, visit right subtree) and post-order (visit left subtree, visit right subtree, visit root) traversals of T produce the following sequences.

in-order: a, b, c, d, e, f, g, h, i, j, k

post-order: a, c, b, e, f, h, j, k, i, g, d

How many leaves does the tree have?

(A) THREE. (B) FOUR. (C) FIVE. (D) SIX.

(E) Cannot be determined uniquely from the given information.

[TIFR 2014]