# Hibernia College Section 8

3.1 Properties of Trees

3.1.1 Recursive Construction of all trees.

3.1.2 The number of edges in a tree

3.1.3 Spanning Trees

3.2 Rooted Trees

3.2.1 Binary Trees

3.3 Binary Search Trees

## End of Chapter Questions

**Question 1**

Let G be a graph. What two properties must G satisfy in order to be a tree?

**Question 4**

Let T be a rooted tree with root r. Explain how the nodes of T are partitioned into levels.

What does it mean to say that T has height h?

What does it mean to say that a node of v is an external node?

**Question 5**

A Ternary Tree is a rooted Tree in which internal node has exactly three children.Draw a ternary tree of height 2 in which each external node lies on level 2. Let T be a ternary tree of height h in which all external nodes like on level h.

Determine the number of nodes on level i for all integers i 0<i<h

**Question 7**

Design a binary search tree for an

**Question 8**

A mail order company has 5 million records on its database.

Calculate the maximum number of comparisons that would need to bemade to match a target with any record on the database.

## Past Paper Exam Questions

A tree has vertex set V(T) and edge set E(T) where

V(T) = {v1,v2,v3,v4,v5}

E(T) = {v1v2,v2v3,v3v4,v2v5}

Draw this tree

Construct a tree with 6 vertices which is not isomorphic to any tree thay you have constructed previously.

A ternary tree is a rooted tree in which each internal node has exactly three children.

Let Q be a ternary tree of height h≤10 in which all external nodes lie on level h.

* Determine the number of nodes on level 4 and level 10.
* Find an expression in terms of Σ and k for the number of internal nodes on a tree.
* What is the smallest possible height of a tree if it has 1000 internal nodes?

Question 8

1) Draw this tree

2) Construct all the isomorphic tress with 6 vertices which can be obtained by attaching a new vertex of degree one to a vertex of T.

3) Explain briefly why the tree obtained in (ii) is not isomorphic to each other.

4) Construct a tree with 6 vertices which is not isomorphic to any tree you constructed in (ii)

Part b

Determine the number of nodes on level 5 and level 10

Find an expression in terms of Σ and h for the number of internal nodes in such a tree.

What is the smallest possible height of such a tree if there are at least 900 internal nodes.