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Course/Year/Section: CpE 2-1

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Exercise: Trees

1.

- Each node in a tree has a parent-child relationship with the nodes connected to it.

- In a tree, the connections between vertices are unidirectional and they only go in one direction.

- A tree is a hierarchical data structure, thus, it has a root node at the top and branches down to leaf nodes.

2. A tree is a forest.

3. The root node.

4. The minimum number of nodes in a tree is 1.

5. Yes. A tree can have no subtrees at all as it contain root node only.

Short Quiz: Trees

6. Nodes 13, 16, and 60.
7. Node 7.
8. Node 23 has no sibling/s.
9. Nodes 4, 7, 12, and 22 are ancestors of Node 9.
10. Nodes 13, 16, 60, 21 and 23 are descendants of Node 16.
11. Nodes 1, 6, 9, 20, 21, and 23 are leaves.
12. Nodes 4, 12, 13, 16, 17, 22 and 60 are non-leaves.
13. Node 4 has a depth of 3.
14. Degree of the tree is 3.
15. Height of the tree is 4.
16. Weight of the tree is 6.
17. Yes, it is a binary tree.
18. Yes. A full binary tree can be a complete binary tree if it satisfies the condition that all levels of the tree are completely filled, except possibly the last level, and all nodes are as far left as possible.
19. Yes. It is possible for a complete binary tree to be a full binary tree if all the internal nodes have two children.
20. $\boldsymbol{n^h}$
21. $\boldsymbol{\log_n m}$
22. $\boldsymbol{2^h - 1}$
23. $\boldsymbol{n^{h+1} - 1}$