

# 29 Lecture - CS301

## Important Subjective

- 1. What is a complete binary tree?**  
A complete binary tree is a binary tree in which all levels are completely filled, except possibly the last level, which is filled from left to right.
- 2. How can we determine the level of a node in a complete binary tree?**  
The level of a node in a complete binary tree can be determined by counting the number of edges from the root to the node.
- 3. What is the maximum number of nodes that a complete binary tree of height  $h$  can have?**  
The maximum number of nodes that a complete binary tree of height  $h$  can have is  $2^{(h+1)} - 1$ .
- 4. How can we check if a binary tree is complete or not?**  
We can check if a binary tree is complete or not by performing a level-order traversal and checking if any node is missing or if there are any nodes after the first null node encountered.
- 5. What is the height of a complete binary tree with  $n$  nodes?**  
The height of a complete binary tree with  $n$  nodes is  $\text{floor}(\log_2(n))$ .
- 6. How can we construct a complete binary tree from its array representation?**  
We can construct a complete binary tree from its array representation by starting at the root, then setting the left child to the next element in the array and the right child to the element after that. We can then recursively apply this process to each node in the tree.
- 7. What is the time complexity of finding the height of a complete binary tree?**  
The time complexity of finding the height of a complete binary tree is  $O(\log n)$ .
- 8. Can a complete binary tree be a balanced binary tree?**  
Yes, a complete binary tree can be a balanced binary tree if all levels have the maximum possible number of nodes.
- 9. What is the relationship between the height and number of nodes in a complete binary tree?**  
The relationship between the height and number of nodes in a complete binary tree is that the number of nodes is  $2^{(h+1)} - 1$ , where  $h$  is the height of the tree.
- 10. Can a binary tree with only one node be considered a complete binary tree?**  
Yes, a binary tree with only one node can be considered a complete binary tree as it satisfies the condition that all levels are completely filled.