

**Jadavpur University**  
Department of Computer Science & Engg  
MCA, 1<sup>st</sup> Year, 2<sup>nd</sup> Semester, 2021  
Data and File Structures, Class Test(S)

**Time: 1 hour**

**Maximum Marks: 30**

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**3 × 10 =30**

1. How do you find the complexity of an algorithm? What is the relation between the time and space complexities of an algorithm? Justify your answer with an example.
2. Compare two functions  $n^2$  and  $24 \times n$ , for various values of  $n$ . Determine when the second becomes more significant than the first.
3. What do you mean by Base case, Recursive case, and Tail Recursion?
4. Convert an infix expression to a postfix expression with the following infix expression as input  $A+B-C/D \times E \times F \times G/H$
5. Make a BST for the following sequence of numbers 45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48.
6. Taking a suitable example explains how a general tree can be represented as a Binary Tree.
7. How many different binary trees can be made from three nodes that contain the key values 1, 2 & 3?
8. Construct a binary tree whose nodes in inorder and preorder are given as follows: Inorder : 10, 15, 17, 18, 20, 25, 30, 35, 38, 40, 50  
Preorder: 20, 15, 10, 18, 17, 30, 25, 40, 35, 38, 50
9. What is a height-balanced tree? Explain how the height is balanced after the addition/deletion of nodes in it?
10. Sort the following array using the quick sort method.  
24, 56, 47, 35, 10, 90, 82, 31