

Indian Institute of Information Technology, Sri City, Chittoor

Mid Semester Examination – September 2021

Advanced Data Structures and Algorithms – Part B

SET - 3

Maximum Marks: 15

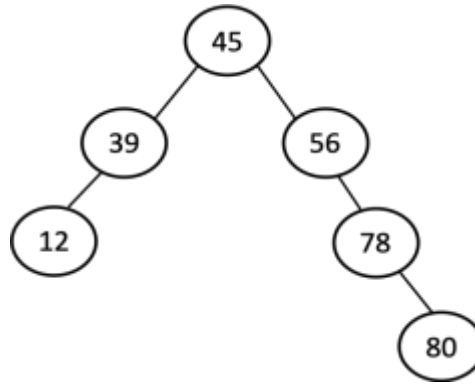
Time Duration: 70 min

Instructions

1. This is a **closed book online proctored** exam.
 - a. You should not refer to books, notes or online resources.
 - b. You should not discuss questions or answers with anyone (including outsiders)
 - c. You should have your camera and microphone **ON** at all times and no headphones
 2. Write the solutions clearly and legibly in A4 sheets, using pen (NOT pencil) and at the end of the exam you should submit the scanned copy of your solutions as explained by the faculty
 3. **The name of the scanned copy should be Roll No + ‘_’ + Set No.pdf (e.g. S20200010XYZ_Set3.pdf).**
 4. **Write your name, roll no. and set number on each page of the answer sheets.**
 5. **Answer questions in brief and to the point only.**
 6. Follow all other instructions given by the faculty during the exam
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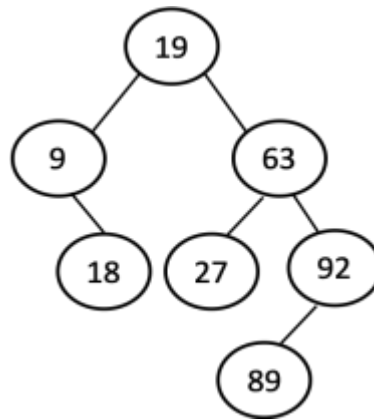
Descriptive Questions (5 marks each)

1.
 - a. Solve the following recurrence relation using the Iteration Methods [3]
$$T(n) = \begin{cases} T(n-5) + n^2 & \text{if } n > 5 \\ 1 & \text{if } n = 0 \end{cases}$$
 - b. Solve the following recurrence relation using the recursive tree method [2]
$$T(n) = T\left(\frac{n}{7}\right) + T\left(\frac{6n}{7}\right) + n$$
2. Draw the BST for the following operations.
 - a. Insert 55 into the given BST [1]



b. After insertion of 55, delete the node 45 and replace it with its in-order predecessor. [1]

3. To the given AVL Tree, insert 90 and calculate the balance factor of each and every node.



a. After insertion, draw the tree and denote the balance factor near the nodes. [1]

b. After insertion, if the tree is not balanced, rotate the tree as per the requirement and obtain a balanced AVL tree. [2]

4. Consider a 3-way search tree given below.

- Insert 23, 45, 67, 87, 54, 32 and 11 in the tree
- Delete 9, 36 and 54 from it

