

BRAC University (Department of Computer Science and Engineering)

CSE 220 (Data Structure) for Fall 2024 Semester

Quiz 4

Student ID:

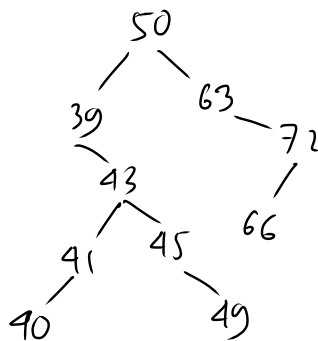
Section:

Name:

Full Marks: 15

Duration: 20 minutes

1. Insert the following values one by one in a BST and draw the resulting tree only. [3]
50, 63, 72, 39, 43, 45, 49, 66, 41, 40



$$\begin{aligned} 50 &= |4 - 3| = 1 \quad \checkmark \\ \rightarrow 39 &= |0 - 3| = 3 \\ \rightarrow 63 &= |0 - 2| = 2 \\ 43 &= |2 - 2| = 0 \end{aligned}$$

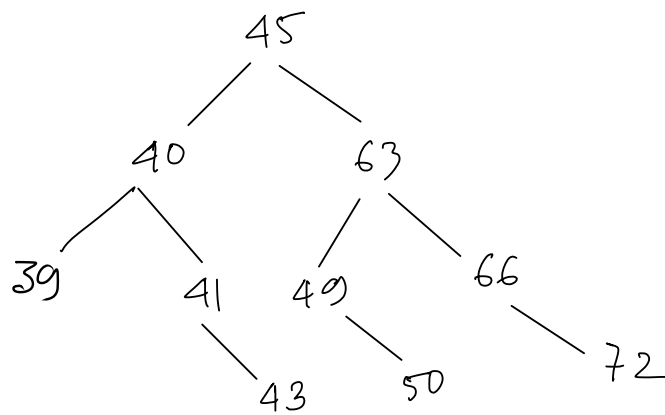
2. Identify the unbalanced nodes from the resulting tree with proper explanations. [2]

39 and 63 are the unbalanced nodes
because the height difference between right subtree and
left subtree is more than 1

3. Simulate and draw the balanced version of the tree in 1. (You need to show all intermediate steps to get full marks)

[4]

Inorder: 39, 40, 41, 43, 45, 49, 50, 63, 66, 72
0 1 2 3 4 5 6 7 8 9



4. Look at the following max_heap represented by an array.

N	13	5	8	2	2	6	-5	2	1	-1
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Draw the resulting heap (represented by array) when the following operations are done step by step on the given heap. **Show necessary intermediate steps.**

a. **Insert 20** (on given heap)

[3]

N	13	5	8	2	2	6	-5	2	1	-1	20
0	1	2	3	4	5	6	7	8	9	10	11

$$\frac{11}{2} = 5$$

N	13	5	8	2	20	6	-5	2	1	-1	2
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N	13	20	8	2	5	6	-5	2	1	-1	2
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$$\frac{5}{2} = 2$$

N	20	13	8	2	5	6	-5	2	1	-1	2
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$$\frac{2}{2} = 1$$

b. Delete (on the heap of 4.a)

[3]

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N	20	13	8	2	5	6	-5	2	1	-1	2
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N	2	13	8	2	5	6	-5	2	1	-1	20
0	1	2	3	4	5	6	7	8	9	10	

N	13	2	8	2	5	6	-5	2	1	-1	
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N	13	5	8	2	2	6	-5	2	1	-1	
0	1	2	3	4	5	6	7	8	9	10	

