AHMEDABAD UNIVERSITY
School of Engineering and Applied Science
2025-26 Monsoon

CSE605 Advanced Data Structures and Algorithms
End-Term Examination
Friday 02 January 2026. 15:00 – 16:00

Name:	**Roll no.**	**A**	**U**	**2**							**Marks** /25

Instructions:
1. All questions are compulsory.
2. Please write the answer in the space provided.

Enjoy solving the paper!

Section 1

1. How much time does locating the maximum element from a minheap take? (1 mark)

2. The postorder traversal of a binary tree is FEADGBC. It's preorder traversal is: (2 marks)

   A. CABFEDG

   B. CEAFBDG

   C. CAFEBDG

   D. CBDFEAG

3. The running time to remove the (a) first and (b) last element of a singly-linked list: (2 marks)

4. A data structure is required for storing a set of integers such that each of the following operations can be done in $O(\log n)$ time, where n is the number of elements in the set.
   I) Deletion of the smallest element
   II) Insertion of an element if it is not already present
   Which of the following data structure can be used for this purpose? (2 marks)

   A. A max heap can be used but not an AVL tree

   B. An AVL tree can be used but not a min heap

   C. Both AVL and min heap can be used

   D. Neither AVL tree nor max heap can be used

5. What is the worst case time complexity of inserting n elements into an empty linked list, if the linked list needs to be maintained in sorted order? (1 mark)

   A. $\Theta(n)$

   B. $\Theta(n \log n)$

   C. $\Theta(n^2)$

   D. $\Theta(n^3)$

6. Let $\mathcal{T}$ be a binary search tree containing numbers. When checking if a number k is present in $\mathcal{T}$, which of the following is not a valid sequence of numbers against which k can be compared? (2 marks)

   A. 61 30 37 32 34

   B. 61 75 64 61 62

   C. 61 30 37 39 34

   D. 61 75 67 72 69

Section 2

(Each question is worth 3 marks)

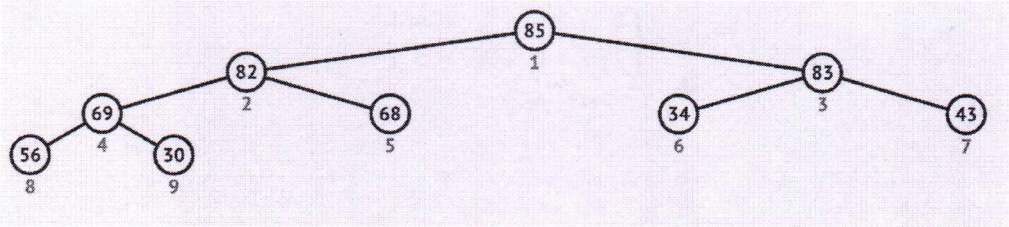
7. Write a recursive function to find the GCD of two numbers. (3 marks)

8. The following operations are made to an initially empty Binary Search Tree:

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insert 40,50,12, 70, 45, 32
remove 40
insert 10,60
remove 45
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What is the final root and leaf/leaves of the binary search tree? (3 marks)

9. Given the following max-heap: (3 marks)



(a) Draw the heap after 92 is inserted into the above.
(b) Draw the heap after 85 is deleted from the above.

10. Solve the following recurrence relations: (3 marks)

(a)

$$T(n) = \begin{cases} 1 & n = 1 \\ T(n-1) + 5 & n > 1 \end{cases}$$

(b)

$$T(n) = \begin{cases} c & n = 1 \\ T(n/2) + c & n > 1 \end{cases}$$

11. Consider the 2-3 tree in the figure below. Draw the tree after 32 is inserted into it. (3 marks)

