



PRACTICE SET

End Semester Examination, Fall -2025

Program: B.Tech

Semester: Third

Course: Data Structure & Algorithms

Course Code: 3PCCCS201

Course Outcomes	Description
CO1	Learn the basic types for data structure, implementation and application.
CO2	Know the strength and weakness of different data structures.
CO3	Use the appropriate data structure in context of solution of given problem.
CO4	Develop programming skills which require to solve given problem

UNIT-I
Section -A

1. Define data structure. Write a short note on complexity of algorithms. [CO1] [UNIT-I] [REMEMBER] [LOT]
2. Define time complexity and space complexity. [CO1] [UNIT-I] [REMEMBER] [LOT]
3. Explain the difference between best case and worst case analysis of an algorithm. [CO1] [UNIT-I] [UNDERSTAND] [LOT]
4. What is asymptotic notation? Provide examples. [CO1] [UNIT-I] [REMEMBER] [LOT]
5. Describe Big-O notation and Θ notation with an example. [CO1] [UNIT-I] [UNDERSTAND] [LOT]

Section -B

6. What is data structure? Explain various types of data structure in detail. [CO1] [UNIT-I] [UNDERSTAND] [LOT]
7. What is asymptotic notation? How does it measure algorithm complexity? [CO1] [UNIT-I] [ANALYSE] [HOT]
8. Write the algorithm of Binary search techniques and find the time complexity of binary search. [CO1] [UNIT-I] [UNDERSTAND] [LOT]
9. Write the algorithm of Linear Search Techniques and find the time complexity of linear search. [CO1] [UNIT-I] [UNDERSTAND] [LOT]

Section -C

10. What do you mean by complexity of an algorithm? Explain the meaning of worst case analysis and best case analysis with an example. [CO1] [UNIT-I] [ANALYSE] [HOT]

UNIT-II

Section -A

11. What is stack? Explain the operations on Stack. [CO2] [UNIT-II] [UNDERSTAND] [LOT]
12. Explain overflow and underflow conditions. [CO2] [UNIT-II] [UNDERSTAND] [LOT]
13. What is the Circle? What are its applications? [CO2] [UNIT-II] [REMEMBER] [LOT]
14. Distinguish between stack and queue. [CO2] [UNIT-II] [ANALYSE] [HOT]
15. How array and linked list differ from each other? [CO2] [UNIT-II] [UNDERSTAND] [LOT]
16. State the difference between array and linked list. [CO2] [UNIT-II] [UNDERSTAND] [LOT]

Section -B

17. Discuss and Solve the following : [CO2] [UNIT-II] [APPLY] [LOT]
- i. What do you understand by infix, postfix and prefix notation? Explain with examples.
 - ii. Convert the infix $(a+b)*(c+d)/f$ into postfix & prefix expression
18. What do you mean by Queue? Write an algorithm to insert and delete an element in the Queue using linked list. [CO2] [UNIT-II] [CREATE] [HOT]
19. Explain the difference between linear search and binary search with their time complexities. [CO2] [UNIT-II] [UNDERSTAND] [LOT]

Section –C

20. Define Stack. Demonstrate which operations can be performed on Stack? Explain in detail with suitable examples. [CO2] [UNIT-II] [ANALYSE] [HOT]
21. How can the queue be implemented using an array? Explain with suitable examples. Also elaborate on the type of operations that can be performed on queue. [CO2] [UNIT-II] [ANALYSE] [HOT]
22. Write an algorithm to insert an element in a queue. What is the difference between queue and circular queue? [CO2] [UNIT-II] [CREATE] [HOT]

UNIT-III

Section -A

23. Define a linked list and mention its types. [CO3] [UNIT-III] [UNDERSTAND] [LOT]
24. Apply an algorithm for traversing a linked list. [CO3] [UNIT-III] [APPLY] [LOT]
25. Explain the concept of a two-way linked list. [CO3] [UNIT-III] [UNDERSTAND] [LOT]
26. What is tree traversal? List the different types of tree traversals. [CO3] [UNIT-III] [REMEMBER] [LOT]
27. Define a binary tree and explain its properties. [CO3] [UNIT-III] [REMEMBER] [LOT]
28. Describe the process of insertion in a B-tree. [CO3] [UNIT-III] [UNDERSTAND] [LOT]
29. What is a B-tree? Explain with an example. [CO3] [UNIT-III] [UNDERSTAND] [LOT]
30. What are the key properties of B-trees? [CO3] [UNIT-III] [REMEMBER] [LOT]
31. What are the key properties of B+ trees? [CO3] [UNIT-III] [REMEMBER] [LOT]

Section -B

32. What do you mean by linked list? Write a function to insert and delete a node in the linked list. [CO3] [UNIT-III] [CREATE] [HOT]
33. Explain the process of traversal in binary trees with examples. [CO3] [UNIT-III] [UNDERSTAND] [LOT]
34. Explain the different methods of tree traversal (preorder, inorder, postorder) with detailed algorithms and examples. [CO3] [UNIT-III] [UNDERSTAND] [LOT]
35. Discuss the steps involved in inserting a node into a B-tree of order 4 with suitable example. [CO3] [UNIT-III] [UNDERSTAND] [LOT]

Section -C

36. Explain circular linked list with example. How do you implement linked list operation in singly linked list? Explain. [CO3] [UNIT-III] [CREATE] [HOT]
37. What is binary search tree? Write a program to implement insertion and deletion algorithms in binary search tree. [CO3] [UNIT-III] [CREATE] [HOT]

UNIT-IV

Section -A

38. Describe the process of Selection sorting. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]
39. State the advantages of using Heap Sort over Bubble Sort. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]
40. Explain the working of insertion sort with example. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]
41. Define graph. Differentiate between a directed and an undirected graph. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]

Section -B

42. Compare **Bubble Sort**, **Quick Sort**, and **Merge Sort** in terms of time and space complexity. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]
43. Explain the **Merge Sort** algorithm with an example and discuss its complexity. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]

Section -C

44. Describe the **Heap Sort** algorithm. Illustrate the process of heap creation and sorting with an example and find the time complexity of heap sort algorithm. [CO4] [UNIT-IV] [UNDERSTAND] [LOT]

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Summary Sheet

Course Outcomes (CO) Wise

CO	Q. No	Marks
CO1	1,2,3,4,5,6,7,8,9,10	85
CO2	11,12,13,14,15,16,17,18,19,20,21,2 2	120
CO3	23,24,25,26,27,28,29,30,31,32,33,3 4,35,36,37	125
CO4	38,39,40,41,42,43,44	80
Total		410

Unit Wise

Unit	Q. No	Marks
Unit 1	1,2,3,4,5,6,7,8,9,10	85
Unit 2	11,12,13,14,15,16,17,18,19,20,21,2 2	120
Unit 3	23,24,25,26,27,28,29,30,31,32,33,3 4,35,36,37	125
Unit 4	38,39,40,41,42,43,44	80
Total		410

Blooms Taxonomy Level (BTL) Wise

BTL	Q. No	Marks
LOT	1,2,3,4,5,6,8,9,11,12,13,14,1 5,16,17,19,23,24,25,26,27,28 ,29,30,31,33,34,35,38,39,40, 41,42,43,44	290
HOT	7,10,18,20,21,22,32,36,37	120
Total		410

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Disclaimer: -This is a Practice Set. The Question in End term examination will differ from the Practice Set. This Practice Set is meant for practice only.