

Code: 23CS3201, 23IT3201, 23AM3201, 23DS3201

**I B.Tech - II Semester – Supplementary Examinations  
DECEMBER 2025****DATA STRUCTURES  
(Common for CSE, IT, AIML, DS)**

Duration: 3 hours

Max. Marks: 70

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- Note: 1. This question paper contains two Parts A and B.  
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.  
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.  
4. All parts of Question paper must be answered in one place.
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**PART – A**

1.a)	What is an Abstract Data Type (ADT)?
1.b)	Why is Binary Search more efficient than Linear Search?
1.c)	Differentiate between a singly linked list and a doubly linked list.
1.d)	Mention any two real-world applications of linked lists.
1.e)	What is the difference between a stack and a queue?
1.f)	What is the purpose of the stack in infix to postfix conversion?
1.g)	Give an example of how queues are used in operating systems.
1.h)	Differentiate between a circular queue and normal queue.
1.i)	What is the difference between chaining and open addressing?
1.j)	List two properties of a BST.

## PART – B

			Max. Marks
<b>UNIT-I</b>			
2	a)	Derive the worst-case time complexity of Selection Sort.	5 M
	b)	Sort the following array using Bubble Sort: [12, 5, 8, 19, 1] and explain each step.	5 M
<b>OR</b>			
3	a)	Illustrate the working of Insertion Sort with an example.	5 M
	b)	Analyze the space complexity of Bubble, Selection, and Insertion Sort.	5 M
<b>UNIT-II</b>			
4	a)	Explain the insertion and deletion operations in a singly linked list with diagrams.	5 M
	b)	Write an algorithm to delete a node from a doubly linked list and explain the process.	5 M
<b>OR</b>			
5	a)	Illustrate the working of a circular linked list with an example.	5 M
	b)	Critically evaluate scenarios where linked lists are preferable over arrays.	5 M
<b>UNIT-III</b>			
6	a)	Convert the infix expression $(A + B) * (C - D)$ to postfix using a stack and explain each step.	5 M

	b)	Write an algorithm for evaluating a postfix expression using a stack.	5 M
<b>OR</b>			
7	a)	Discuss the advantages and disadvantages of implementing stacks using arrays and linked lists.	5 M
	b)	Describe the implementation of a stack using an array and compare it with a linked list implementation.	5 M
<b>UNIT-IV</b>			
8	a)	Describe the implementation of a queue using an array and compare it with a linked list implementation.	5 M
	b)	Write an algorithm to implement a circular queue.	5 M
<b>OR</b>			
9	a)	Analyze the time complexity of various queue operations in both arrays and linked lists.	5 M
	b)	How does a circular queue overcome the limitations of a linear queue? Explain with an example.	5 M
<b>UNIT-V</b>			
10	a)	Explain the insertion operation in a Binary Search Tree (BST) with an example.	5 M
	b)	Compare and contrast open addressing and chaining for collision resolution.	5 M
<b>OR</b>			

11	a)	Illustrate the inorder, preorder and postorder traversal of a binary tree with an example.	5 M
	b)	Write an algorithm for linear probing and explain it with an example.	5 M