PVP 23

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

I B.Tech - II Semester – Regular / Supplementary Examinations
MAY 2025

DATA STRUCTURES
(Common for CSE, IT, AIML, DS)

Duration: 3 hours Max. Marks: 70

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.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	Define a linear data structure.	L1	CO1
1.b)	State the worst-case time complexity of Bubble Sort.	L1	CO1
1.c)	How is the last node of a circular linked list identified?	L2	CO1
1.d)	Why does a doubly linked list require more memory than a singly linked list?	L2	CO1
1.e)	Why is stack implementation using linked lists more memory-efficient than arrays?	L2	CO1
1.f)	Give an example of a balanced and an unbalanced parenthesis expression.	L2	CO1
1.g)	What are the basic operations performed on a queue?	L1	CO1

1.h)	What problem does a circular queue solve that a simple queue does not?	L2	CO1
1.i)	What is the base condition for a recursive tree traversal function?	L2	CO1
1.j)	What is a binary search tree (BST)?	L1	CO1

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Describe the importance of analyzing time and space complexities in algorithm design.	L2	CO1	5 M
	b)	Explain Abstract Data Types (ADTs) with an example.	L2	CO1	5 M
OR					
3	a)	Compare and contrast Linear and Binary Search with suitable examples.	L2	CO2	5 M
	b)	Write and explain the algorithm for Binary Search.	L3	CO2	5 M
UNIT-II					
4	a)	Describe the structure of a doubly linked list and compare it with a singly linked list.	L2	CO1	5 M
	b)	Compare arrays and linked lists based on memory usage, access time, and operations.	L2	CO3	5 M
OR					

5	a)	Develop an algorithm to reverse a singly linked list and explain it.	L3	CO3	5 M
	b)	Explain how linked lists are used in dynamic memory allocation.	L2	CO3	5 M
UNIT-III					
6	a)	Explain the push and pop operations in a stack with an example.	L3	CO2	5 M
	b)	Convert the following infix expression to postfix expression. $a + b * c/(d * e + f\hat{}g) - h * k$	L3	CO4	5 M
OR					
7	a)	How does a stack help in checking balanced parentheses? Explain with an example.	L3	CO3	5 M
	b)	Construct a C/C++/Python program to implement a stack using an array.	L3	CO3	5 M
UNIT-IV					
8	a)	Explain the enqueue and dequeue operations in a queue with an example.	L2	CO3	5 M
	b)	Illustrate the working of a circular queue with an example.	L3	CO3	5 M
OR					
9	a)	Analyze the time complexity of various queue operations in both array and linked list implementation.	L4	CO4	5 M
	b)	Develop pseudo codes for enqueue, dequeue operations in a queue with linked list implementation.	L3	CO3	5 M

UNIT-V					
10	a)	Compare binary trees and binary search trees with respect to structure and operations.	L4	CO4	5 M
	b)	Explain the concept of hashing and its importance in data structures.	L2	CO3	5 M
OR					
11	a)	How does recursion help in tree traversal? Explain with an example.	L2	CO3	5 M
	b)	Illustrate different collision resolution techniques in hashing with proper examples.	L4	CO4	5 M