

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025***Third Semester**Information Technology***CD3291 / UITT24301 - Data Structures and Algorithms***Regulations - 2021 & 2024**Duration : 3 Hrs**Maximum : 100 Marks***PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

<i>Q.No</i>	<i>Questions</i>	<i>BTL</i>	<i>CO</i>	<i>Marks</i>
1.	When do you use the concept of recursion?	L2	1	2
2.	Define abstract data type.	L1	1	2
3.	State the working principal of stack and queue data structure.	L1	2	2
4.	What is the difference between static and dynamic arrays?	L2	2	2
5.	What is the best-case time complexity of quick sort?	L1	3	2
6.	Define open addressing in hashing.	L1	3	2
7.	Write any two differences between BFS and DFS traversals.	L2	4	2
8.	Define a minimum spanning tree (MST).	L1	4	2
9.	Define a heap.	L1	5	2
10.	What is the use of disjoint set?	L2	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a i Compare and contrast divide and conquer with suitable example.	L2	1	8
	ii Discuss about asymptotic notations in data structure.	L2	1	8
	Or			
	b i Write the importance of recursive algorithm in python with suitable example.	L2	1	8
12.	ii Demonstrate the role of shallow and deep copying in data structures.	L2	1	8
	a i How insertion and deletion is performed on a list data structure using array-based implementation.	L2	2	8
	ii Write and explain algorithms for push and pop operations in a stack.	L2	2	8
	Or			
	b i Compare and contrast singly and doubly linked list with examples.	L2	2	10
	ii Write short notes on double ended queues.	L2	2	6

13.	a	i	Compare the time and space complexities of bubble sort, quick sort, merge sort and Heap sort algorithms.	L3	3	6
		ii	Explain linear probing and quadratic probing in hashing with examples	L3	3	10
	Or					
	b	i	Compare and contrast linear search and binary search with suitable example.	L3	3	6
		ii	Explain any two collision handling techniques with example.	L3	3	10
14.	a	i	Construct a binary search tree (BST) for the given sequence {50, 30, 20, 40, 70, 60, 80}.	L4	4	8
		ii	Under what circumstance do you perform single and double rotation in AVL trees. Give examples for each of the rotation.	L4	4	8
	Or					
	b	i	Construct an AVL tree by inserting the keys {10, 20, 30, 40, 50, 25} step by step.	L4	4	10
		ii	Analyze deletion operation in a BST with an example.	L4	4	6
15.	a	i	Explain Prim's algorithm for minimum spanning tree with an example.	L3	5	8
		ii	Describe topological ordering with an example.	L3	5	8
	Or					
	b	i	Give the adjacency list and adjacency matrix for the graph $G(V,E)$. Given the set of vertex $V=\{A,B,C,D\}$, and edges $E=\{(A,B),(A,C),(B,D),(C,D)\}$.	L3	5	8
		ii	Explain the greedy algorithm with an example.	L3	5	8