

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Second Semester

Artificial Intelligence and Data Science

AD3251 / UADT24201 - DATA STRUCTURES DESIGN

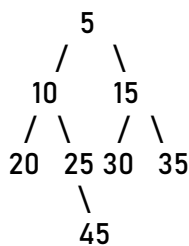
Regulations – 2021 & 2024

Duration : 3 Hrs

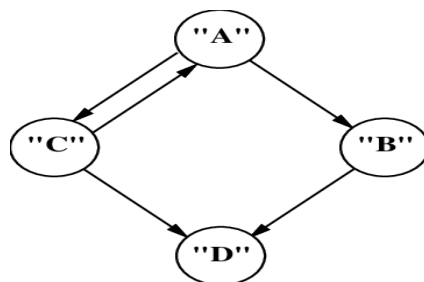
Maximum : 100 Marks

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BLT	CO	Marks
1.	Differentiate between shallow and deep copying in python.	L4	1	2
2.	Define time efficiency and space efficiency.	L1	1	2
3.	Identify the disadvantages of linked list over array.	L2	2	2
4.	How will you declare a node using structure for a doubly linked list?	L1	2	2
5.	Write the routine for linear search.	L1	3	2
6.	Sort the values using Bubble sort. 15,16,6,8,5	L2	3	2
7.	Calculate the degree, level, ancestor and sibling for the node 10 in the following binary tree.	L1	4	2



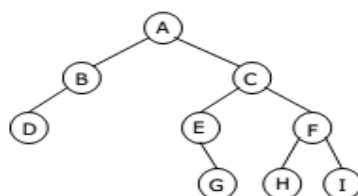
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| 8. | Specify the types of rotations in AVL tree. | L1 | 4 | 2 |
| 9. | Represent the given graph using adjacency matrix. | L2 | 5 | 2 |



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| 10. | Differentiate between DFS and BFS. | L4 | 5 | 2 |
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PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

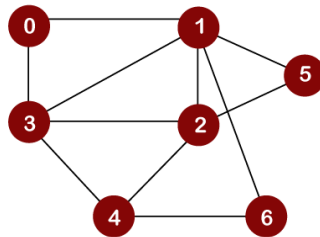
Q.No	Questions	BLT	CO	Marks
11.	a i Explain asymptotic notations with examples and neat sketch. ii Consider the following recursive algorithm for computing the sum of the first n cubes: $S(n)=1^3+2^3+3^3+....+n^3$ Algorithm $S(n)$ //Input: A positive integer n //Output: The sum of the first n cubes if $n = 1$ return 1 else return $S(n - 1) + n * n * n$ Set up and solve a recurrence relation for the number of times the algorithm's basic operation is executed. Or b i What is Inheritance in python? Explain with suitable examples. ii Consider the following recursive algorithm for computing the sum of n numbers. ALGORITHM Add(a,n) //Input : A positive integer n and an array $a[n]$ of n numbers //Output: The sum of the n given numbers if $n < 0$ return 0 else return Add($a,n-1$)+$a[n]$ Set up and solve a recurrence relation for the number of times the algorithm's basic operation is executed.	L2	1	10
		L2	1	6
		L2	1	10
		L2	1	6
12.	a Write procedures to perform the following operations in a Singly Linked List. Insert a node at middle Delete the first node Display the list Or b Explain a doubly linked list to perform the following operations and write the sample output. Insertion at end Delete at begin Display the list	L2	2	16
		L2	2	16
13.	a Apply the quick Sort to sort the list 44, 22, 33, 77, 11, 55, 66. Also write the algorithm. Or b Apply Merge Sort to sort the list 7,3,2,16,24,4,11,9,5. Also write the algorithm.	L3	3	16
		L3	3	16
14.	a i Construct a heap for the list 1, 8, 6, 5, 3, 7, 4 using the bottom-up algorithm. ii Find the Preorder, Postorder and Inorder tree traversals for the given tree.	L3	4	10
		L3	4	6



Or

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| b | i | Construct an AVL tree with the following elements.
21, 26, 30, 9, 4, 14, 28, 18, 29 Delete 30 and 21. | L3 | 4 | 10 |
| | ii | The inorder and preorder traversal of a binary tree are [d b e a f c g] and [a b d e c f g] respectively. Create a binary tree for the same. | L3 | 4 | 6 |

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| 15. | a | Perform BFS and DFS for the following graph and consider 0 as the source vertex. | L2 | 5 | 16 |
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Or

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| b | Perform topological sorting for the given graph: | L2 | 5 | 16 |
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