

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Third Semester

Information Technology

CD3291 - Data Structures and Algorithms

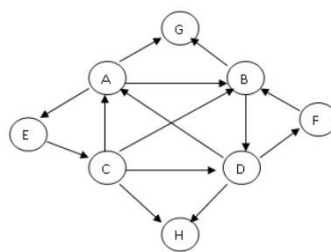
Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

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

Q.No	Questions	BLT	CO	Marks
1.	Define ADT. Give any two examples.	L1	1	2
2.	Outline the concepts of asymptotic notations and its properties.	L2	1	2
3.	List out the advantage of circular linked list.	L1	2	2
4.	What are priority queues? What are the ways to implement priority queue?	L2	2	2
5.	Which one is the best sorting method out of the following - insertion sort, quick sort and merge sort, Why?	L2	3	2
6.	Compare the working of linear with binary search techniques.	L2	3	2
7.	If the depth of the binary tree is k, the maximum number of nodes in the binary tree is $2^k - 1$. Justify.	L2	4	2
8.	What is a balance factor in AVL trees?	L2	4	2
9.	Illustrate the steps in the construction of adjacency matrix for the following graph.	L2	5	2



10.	Define topological sort.	L1	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 the feature and characteristics of object oriented programming with suitable example.	L2	1	10
	ii Write a python program to display Fibonacci sequence using recursion.	L2	1	6
	Or			
b	Illustrate briefly on Big oh notation, Omega notation and Theta notations. Depict the same graphically and explain.	L2	1	16

12. a i Analyze the process of convert an infix expression to a postfix expression. Trace the algorithm to convert the infix expression $(a+b)*c/d+e/f$ to a postfix expression. L4 2 10
- ii Write the function to examine whether the stack is full () or empty (). L4 2 6

Or

- b Write down the routine to implement the following operations on a doubly linked list: L4 2 16
- Insert a node at the beginning of the list
 - Insert a new node at the middle
 - Delete the last node and middle node
 - Count the number of nodes in the list

13. a i Write an algorithm for Merge sort. Sort the following list of numbers using the algorithm 79, 13, 14, 41, 78, 52, 76, 35. L4 3 8
- ii Write the algorithm for Quick Sort. Analyze the algorithm and its time complexity with an example. L4 3 8

Or

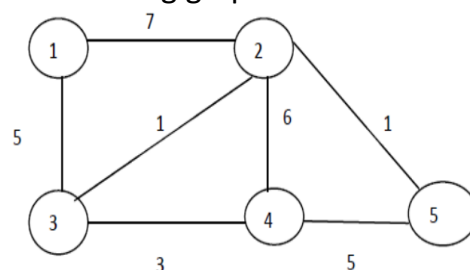
- b i Write the algorithm to implement binary search in a sorted array of numbers. L2 3 8
- ii Describe the Linear search algorithms to search the number 88 from the following array: 77, 33, 44, 11, 88, 22, 66, 55. L2 3 8

14. a Write an algorithm for inserting a given element into Binary Search Tree. Apply this algorithm to show the result of inserting 1, 3, 8, 2, 9, 5, 4, 6, 7, 10 into an initially empty binary search tree. Draw the binary search tree after deleting 8, 7, 5 in step by step. L3 4 16

Or

- b Perform the following operation: L3 4 16
- A) Insert the following sequence of elements into an AVL tree, starting with an empty tree: 30, 25, 10, 5, 7, 50, 42, 19, 15, 23, 22.
- B) Delete 15 from the above constructed AVL tree. Print the constructed AVL tree with the balance factor at each and every insertion and deletion of an element and provide the code for the same.

15. a Illustrate Prim's and Kruskal's algorithm to find the minimum spanning tree of the following graph and write the algorithms. L4 5 16



Or

- b Differentiate depth-first search and breadth-first search traversal of a graph with suitable examples. L4 5 16