Total number of printed pages: **UG/5th /UCSE519**

2024

Data structure and algorithm

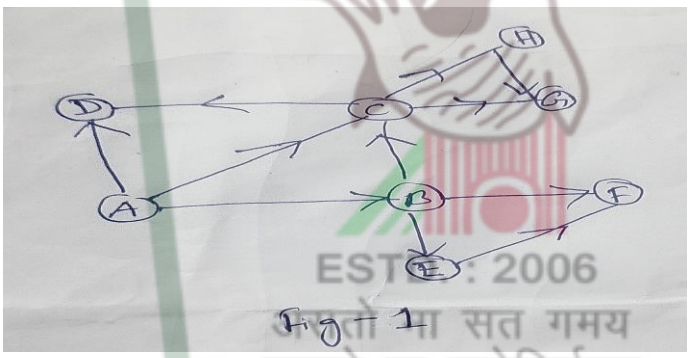
Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Write algorithms for Insert and Delete operation of **Queu**e representing it using array.	10
	b)	Evaluate the following infix expression using stack. Q= ((10-5)^2 + (5*4 /2)+ 8/4*6)	10
2.	a)	Write a recursive function to calculate factorial of a number.	6
	b)	Explain following terminology with respect to Binary tree with example. Level, Depth, Height, complete binary tree, Full binary tree.	3+4=7
	c)	Define Binary Search Tree? Explain how to delete a node from BST, which have exactly two children. Give example.	7
3.	a)	Explain the asymptotic notation in details.	8
	b)	Consider a 2D array A=3*4, which stores marks of the students. Assume that base address=500 and word per cell, w=4. Calculate the address of A[2][3] and A[3][3] representing the array in row major order.	8
	c)	Differentiate between grounded and circular header linked list with example.	4
4.	a)	Write the algorithms for following operations of a single linked list. a. Insert a node after a node whose key information is given. b. Count the number of node of non-zero information. c. Delete a node whose key information is given.	15

	b)	Explain Sequential representation and Linked list representation of a graph.	5
5.	a)	Define AVL search Tree? Explain different rotations of an AVL search tree. Draw an AVL search tree with following sequence of elements: 10, 5, 20, 40, 2, 7, 25, 22, 55, 12, 24, 46, 33, 66. 58	15
	b)	Write an algorithm for Binary Search technique.	5
6	a)	Write an algorithm for Quick sort technique? Explain its complexity in worst case and average case.	10
	b)	Sort following sequence of elements using bubble sort technique. Explain its complexity. 33, 44, 11, 22, 10, 15, 19, 17, 77, 66, 55, 27	10
7.	a)	Consider the following graph. Find the DFS and BFS traversal starting from node A.  Fig 1	7
	b)	What is spanning tree? What is minimum spanning tree? Differentiate between Prims and Kruskal algorithm.	6
	c)	Construct a Binary tree with following INORDER and PREORDER traversal. Preorder: A B D E F G C H I J K Inorder: D B E G F A C I K J H	7