Total number of printed pages: **UG/5th /UCSE504**

2023

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)	What do you mean by asymptotic notation? Explain in details.	9
	b)	What is 2D array? How to represents 2D array in memory?	6
	c)	Define Header linked list and Doubly linked list? What are the advantages?	5
2.		Write the algorithm for following operations of a single linked list. a. Insert a node in the front position. b. Count the number of node c. Delete the last node d. Delete a node whose key information is given.	20
3.	a)	Write algorithm for Push and Pop operation of STACK assuming represent it using linked list.	10
	b)	b. Consider a queue Q of size 7, initially it is empty. Show the output after each of the following operations i. Insert A, B, C, D ii. Delete iii. Insert E, F iv. Delete v. Delete vi. Insert G, H vii. Delete. viii. Insert I, J ix. Delete	10

		x. Delete	
4.	a)	Evaluate the following expression using stack: A= 2 + 5 * 4 - 3 ^ 2 /3 * 5 + 8 / 2	10
	b)	Write a recursive function to calculate factorial of an integer number.	5
	c)	Define following terminology with respect to Binary tree. Level, Height, Leaves, Complete binary tree, Full binary tree	5
5.	a)	What is Binary Search Tree (BST)? Construct a BST with following sequence of the elements: 40, 33, 50, 10. 37, 70, 80, 60, 55	8
	b)	What is AVL tree? Construct an AVL tree with the following sequence of elements: 11, 22, 33, 44, 22, 15, 25, 40, 30, 50, 46, 60, 56, 42.	12
6.	a)	Write an algorithm for binary search techniques. Analyse its complexity.	10
	b)	Write an algorithm for bubble sort techniques? Analyse its complexity.	10
7.	a)	Sort following sequence of elements using Quick sort techniques. What is its complexity? 50, 40, 30, 70, 35, 80, 70, 90, 55, 65, 60	10
	b)	Differentiate between DFS and BFS	6
	c)	What is spanning tree? What is minimum spanning tree?	4