PRESIDENCY UNIVERSITY
BENGALURU

School Of Computer Science and Engineering & Information Science

Summer term End-Term Examinations, August 2024

Odd Semester: 2023 - 24

Course Code: CSA2001

Course Name: Data Structures and Algorithms

Department: CSE & IS

Date: 5/08/2024

Time: 1:00 pm – 4:00 pm

Max Marks: 100

Weightage: 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Do not write anything on the question paper other than the roll number.

Q.No		Questions	Marks	CO	RBT
1	a.	What is data structure? Explain various types of data structures in detail.	4	CO1	L1
	b.	What is bubble sort? Explain the advantages and disadvantages of bubble sort.	6	CO1	L2
	c.	What is selection sort. Explain algorithm of selection sort with an example array.	10	CO1	L3

OR

Q.No		Questions	Marks	CO	RBT
2	a.	List out the areas in which data structures are applied extensively.	4	CO1	L1
	b.	Write a c program to extract a substring from the given string.	6	CO1	L2
	c.	What do you mean by the complexity of an algorithm? Explain the meaning of worst-case analysis and best-case analysis with an example.	10	CO1	L3

Q.No		Questions	Marks	CO	RBT
3	a.	Write and explain POP operation algorithm of a stack.	4	CO2	L1

	b.	Consider size of stack as 5.Apply following operation on stack and show the status of stack and top pointer after each operation . i) push a , b, c ii) pop iii) push e,f iv) pop v) push g h vi)push m vii)pop	6	CO2	L2
	c.	Convert the following infix expression to postfix using stack (A+B*C)/(D-E)+F	10	CO2	L3

<div align="center">OR</div>

4	a.	Write the algorithm for converting from infix to post-fix.	4	CO2	L1
	b.	Explain stack data structure and write an algorithm to push and pop an element to and from the stack.	6	CO2	L2
	c.	What are queues? Write down an algorithm for inserting and deleting elements from a queue implemented using arrays.	10	CO2	L3

5	a.	Differentiate between List and array in four points.	4	CO3	L1
	b.	Define linked list. Explain different types of linked list. Mention the advantage of linked list?	6	CO3	L2
	c.	What is a linked list? Give the data structure and write algorithms to (i) Delete an element. (ii) Count the number of elements.	10	CO3	L3

<div align="center">OR</div>

6	a.	Write down the steps to modify a node in linked lists.	4	CO3	L1
	b.	Write an algorithm to insert a node at the beginning of the list.	6	CO3	L2
	c.	Explain the insertion operation in linked list. How nodes are inserted after a specified node.	10	CO3	L3

7	a.	Define: binary tree, complete binary tree, strict binary tree.	4	CO4	L1
	b.	Construct binary search tree for following data: 6, 8, 33, 3, 40, 2, 9, 10, 22, 15, and 17. Consider 10 as root.	6	CO4	L2
	c.	Show the result of inserting 3,1,4,6,9,2,5,7 into an initially empty binary search tree. Also write down the result of 3 traversals on this binary search tree.	10	CO4	L3

<div align="center">OR</div>

8	a.	What is Binary search tree? Write the application areas that use a binary search tree.	4	CO4	L1
	b.	Write an algorithm for the following 1) In order tree traversal	6	CO4	L2

	2) Pre order tree traversal 3) Post order tree traversal				
	C. Given the following inorder and preorder traversal reconstruct a binary tree Inorder – D,G,B,E,A,F,I,C Preorder – A,B,D,E,H,C,F,I	10	CO4	L3

9	a. Write a C program to find the factorial of a given number.	4	CO1	L1
	b. Explain the classification of data structure and operations on data structures.	6	CO1	L2
	c. Why do we use asympatotic notation in the study of algorithm? Describe commonly used asymptotic notation and give their significance.	10	CO1	L3

<div align="center">OR</div>

10	a. List two sort methods. Give example of each.	4	CO2	L1
	b. Explain stack data structure and write algorithm to push and pop an element to and from the stack.	6	CO2	L2
	c. What are queues? Write down algorithm for inserting and deleting elements from a queue implemented using arrays.	10	CO2	L3