Roll No							

End Semester Examination 2024

Name of the Course: BCA *Semester:* _II_

Name of the Paper: Introduction to Data Structures *Paper Code:* TBC201

Time: 3 Hour's Maximum Marks: 100

Note:

(i) All Questions are compulsory.

(ii) Answer any two sub questions among a, b and c in each main question.

(iii) Total marks in each main question are twenty.

(iv) Each question carries 10 marks.

Q1	**(10 X2 = 20 Marks)**	CO1
(a)	Define Algorithm and its characteristics. Develop an algorithm to linearly find an element in an array. Assume suitable algorithmic notations.	
(b)	What is recursion? Give and illustrate recursive algorithm to solve Tower of Hanoi problem with 3 disks.	
(c)	What is 2-D array? How it can be stored in memory? Given an array A[1…10][1…15] with a base address of 100 and the size of each element is 1 Byte in memory. Find the address of A[8][6] with the help of Row-major order and Column-major order.	
Q2	**(10 X2 = 20 Marks)**	CO2
(a)	Write a C Program to illustrate PUSH and POP operations over stack using linked list representation.	
(b)	Write a program in C to insert an element in circular queue represented using array. Also illustrate dry run that includes all cases.	
(c)	Write algorithm/function to convert infix expression to postfix. Convert **27 / (8 - 3) + 5 * (3 + 7) – 5** to postfix notation and then evaluate the equivalent postfix expression using tabular method (STACK).	
Q3	**(10 X2 = 20 Marks)**	CO3
(a)	What are the benefits of using 2-way linked list? Write a pseudo code to delete a node from doubly linked list.	
(b)	What are the advantages of circular linked list over singly linked list? Write pseudo code to add node at the end in circular linked list.	
(c)	Define the structure of a node in singly linked list. Assume that you have a single linked list, write a C function to count the nodes having data value as the prime number.	
Q4	**(10 X2 = 20 Marks)**	CO2 & CO4
(a)	Describe the steps to sort the following elements using Bubble sort in ascending order: **37, 35, 75, 26, 55, 36, 72, 57, 77, 63, 45, 10, 15.**	
(b)	Write the algorithm for insertion sort and explain with the help of an example?	
(c)	Write short notes on following. (i) Hash function and collision resolution techniques. (ii) Priority Queue and its applications. (iii) Double Ended Queue and its types.	
Q5	**(10 X2 = 20 Marks)**	CO5
(a)	Write an algorithm for pre-order traversal and post-order traversal in a Binary tree and explain with an example.	
(b)	If the in-order traversal of a binary tree is B, I, D, A, C, G, E, H, F and its post order traversal is I, D, B, G, C, H, F, E, A. Determine the binary tree.	
(c)	Given infix expression A-(B+C)+(B/D)*A+Z*U, Construct a binary tree.	