Name:

Enrolment No:

UPES

End Semester Examination, May 2023

Course: Data Structures **Semester: 2nd**

Program: BCA **Time: 03 hrs.**

Course Code: CSBC1018 **Max. Marks: 100**

Instructions: All Questions are compulsory. Please attempt the questions in serial order.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Define and explain data structure and abstract data type (ADT) with suitable examples.	**4**	**CO1**

Q2	Find the worst-case time complexity of the following C function.
	int func(int n)
	{
	int i, j, k, p, q = 0;
	for (i = 1; i<n; ++i)
	{
	p = 0;
	for (j=n; j>1; j=j/2)
	++p;
	for (k=1; k<p; k=k*2)
	++q;
	}
	return q;
	}
		4	**CO1**

Q3	Write an algorithm or pseudocode or C code snippet to reverse a double linked list by changing node values. Example: Input: 1->2->3->4->5->6->7 Output: 7->6->5->4->3->2->1	**4**	**CO2**
Q4	Define extended binary tree, full binary tree, strictly binary tree, and complete binary tree.	**4**	**CO3**
Q5	Convert the following infix expression to its prefix form using stack A + B – C * D/E + F	**4**	**CO3**
	SECTION B **(4Qx10M= 40 Marks)**		
Q6	What are advantages and disadvantages of circular linked list over single linked list? Write an algorithm or pseudocode or C code snippet to convert a double linked list	**10**	**CO3**
Q7	Create a singly linked list using data fields 15, 20, 22, 58, 60. Search a node 22 from the SLL and show procedure step-by-step with the help of diagram from start to end.	**10**	**CO2**

Q8	Show the effect of PUSH and POP operation on to the stack of size 10. The stack contains 40, 30, 52, 86, 39, 45, 50 with 50 being at top of the stack. Show diagrammatically the effect of: (i) PUSH 59 (ii) PUSH 85 (iii) POP (iv) POP (v) PUSH 59 (vi) POP Sketch the final structure of stack after performing the above said operations	**10**	**CO2**
Q9	Sort the following numbers in ascending order using Bubble sort. Given numbers: 29, 35, 3, 8, 11, 15, 56, 12, 1, 4, 85, 5 & write the output after each interaction. **OR** Find the position of element 29 using binary search method in an array 'A' given below. Show each step. A = {11, 5, 21, 3, 29, 17, 2, 43}	**10**	**CO4**
SECTION-C (2Qx20M=40 Marks)			
Q10	What is the height balanced tree? Construct the AVL Tree for the given Sequence of elements 21, 26, 30, 9, 4, 14, 28, 18,15,10, 2, 3, 7	**20**	**CO4**
Q11	What are the advantages of the threaded Binary tree over binary tree? Explain the construction of threaded binary tree for 10, 20, 30, 40 and 50 **OR** Describe the doubly linked list with advantages and disadvantages. Write a C function to delete a node from a circular doubly linked list with the header node.	**20**	**CO4**