Sub Code: CST-003 **ROLL NO……..……..**

III SEMESTER EXAMINATION, 2023 – 24

IInd yr B.Tech. – (Civil Engg/CS&E/AI&ML/EE/E&EE/IT)

Data Structures and Algorithms

Duration: 3:00 hrs **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q 1.	Answer any four parts of the following. a) Differentiate linear search and binary search. b) Define Time-Space trade-off. c) Write an algorithm for Breadth First Search (BFS) traversal of a graph. d) Write advantages of AVL tree over Binary Search Tree (BST). e) Write short notes on min heap. f) Define best case, average case and worst case for analyzing the complexity of a program.	5x4=20
Q 2.	Answer any four parts of the following. a) List the advantages of doubly linked list over single linked list. b) What do you mean by Threaded Binary Tree? c) Explain Heap sort with example? d) Write short note on Priority Queue. e) Write an iterative function to search a key in Binary Search Tree (BST). f) Write different representations of graphs in the memory.	5x4=20
Q 3.	Answer any two parts of the following. a) What is Hashing? Explain division method to compute the hash function and also explain the collision resolution strategies used in hashing. b) Write a C program to insert a node at kth position in single linked list. c) Write algorithms of insertion sort. Implement the same on the following numbers.- **13, 16, 10, 11, 4, 12, 6, 7**. also calculate its time complexity	10x2= 20
Q 4.	Answer any two parts of the following. a) Insert the following sequence of elements into an AVL tree, starting with empty tree **71,41,91,56,60,30,40,80,50,55** also find the minimum array size to represent this tree. b) If the in order of a binary tree **is B,I,D,A,C,G,E,H,F** and its post order is **I,D,B,G,C H,F,E,A** then draw a corresponding binary tree with neat and clear steps from above assumption. c) What is circular Queue? Write a C code to insert an element in circular queue?	10x2= 20
Q 5.	Answer any two parts of the following. a) What do you mean by stack? Explain all stack operations with example? b) What is B-Tree? Write the various properties of B- Tree. Show the results of inserting the keys **F, S, Q, K ,C, L, H, T, V, W, M, R, N, P, A, B** in order into a empty B-Tree of order 5. c) How to represent the polynomial using linked list? Write a C program to add two polynomials using linked list.	10x2= 20

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