

**III SEMESTER EXAMINATION, 2023 – 24**  
**IInd yr B.Tech. – (Civil Engg/CS&E/AI&ML/EE/E&EE/IT)**  
**Data Structures and Algorithms**

Max Marks: 100

Duration: 3:00 hrs

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