USN □□□□□□□□□□ [23TCSE206]

SECOND SEMESTER B.Tech EXAMINATION, MARCH-2024

DATA STRUCTURE USING JAVA

Time: 3 Hours Maximum **Marks: 100**

Instructions: **i.** Missing data may be suitably assumed.

ANSWER ALL QUESTIONS

PART-A **5 X 2=10**

1.	**a.**	Explain the concept of time complexity.	L-2	CO1	**02**
	b.	Describe where would you choose a stack over a queue, and vice versa.	L-2	CO2	**02**
	c.	Explain bubble sort briefly.	L-2	CO4	**02**
	d.	Define a hash table.	L-1	CO3	**02**
	e.	Describe the sequential access in file organization?	L-2	CO6	**02**
		PART-B	**6 X 5=30**		
2.	**a.**	Discuss the importance of asymptotic notations in analyzing algorithms.	L-2	CO1	**05**
		OR			
	b.	Differentiate between arrays and linked lists.	L-2	CO1	**05**
3.	**a.**	Explain the operations supported by a stack and their significance.	L-2	CO2	**05**
		OR			
	b.	Determine with example code in java the working of recursion and its advantages in problem-solving.	L-2	CO2	**05**
4.	**a.**	Compare linear search and binary search in terms of time complexity and application scenarios.	L-2	CO4	**05**
		OR			
	b.	Explain the concept of hashing functions and their role in data retrieval.	L-2	CO4	**05**
5.	**a.**	Explain the concept of binary search trees (BSTs) and their importance.	L-2	CO3	**05**
		OR			
	b.	Elaborate about AVL trees, and why are they used?	L-2	CO3	**05**
6.	**a.**	Explain the concept of relative files and their advantages over sequential and direct access files.	L-2	CO6	**05**
		OR			
	b.	Discuss the structure and functioning of indexed files, highlighting the role of indexing in data retrieval.	L-2	CO6	**05**

7.	**a.**	Discuss the working principle of insertion sort and its time complexity.	L-2	CO4	**05**
		OR			
	b.	How does a B+ tree index work, and why is it commonly used in database systems?	L-2	CO5	**05**
		PART-C	**6 X 10=60**		
8.	**a.**	List the advantages of using sets and maps in data structures. Differentiate between Arrays and Sets, Maps.	L-3	CO1	**10**
		OR			
	b.	Differentiate between arrays and linked lists. Describe the process of inserting an element into an array.	L-3	CO1	**10**
9.	**a.**	Compare and contrast the recursive approach with the iterative approach in problem-solving. Write code in java for both approaches.	L-3	CO2	**10**
		OR			
	b.	Investigate by what means do you decide when to use a stack, queue, or linked list for a specific problem.	L-3	CO2	**10**
10.	**a.**	Explain the radix sort algorithm and its suitability for sorting integers.	L-3	CO4	**10**
		OR			
	b.	Discuss collision resolution techniques in hash tables.	L-3	CO4	**10**
11.	**a.**	Describe the structure and operation of B-trees and B+ trees.	L-3	CO3	**10**
		OR			
	b.	Discuss the representations of graphs and compare breadth-first search (BFS) with depth-first search (DFS).	L-3	CO3	**10**
12.	**a.**	Explore the design and implementation of multi-indexed files, discussing strategies for managing multiple indices efficiently and ensuring data consistency.	L-3	CO5	**10**
		OR			
	b.	Evaluate the suitability of inverted files for information retrieval systems, considering factors such as indexing efficiency, query processing speed, and scalability.	L-3	CO5	**10**
13.	**a.**	Design an algorithm to solve the Tower of Hanoi problem using recursion.	L-3	CO2	**10**
		OR			
	b.	What is a binary tree? Discuss the insertion and deletion algorithms in binary search trees.	L-3	CO5	**10**