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Avinashilingam Institute for Home Science and Higher Education for Women

Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore-641043, Tamil Nadu, India

Bachelor's Degree Examination - May 2025
II Semester

Class : I UG
Major : BCA

Time : 3 Hours
Max. Marks : 100

23BCAC03 Data Structures

Course Outcomes:

CO1. Analyzing the complexity of algorithms.
CO2. Applying linear and non-linear data structures to simple applications.
CO3. Application of appropriate sorting, searching and indexing techniques.
CO4. Ability to choose the appropriate file structures and access method in real time applications.
CO5. Formulate new solutions for programming problems.

10 x 1 = 10

Part A
Choose the Correct Answer

1. What is the Big-O notation used for? CO1K1
   a. Measuring the exact execution time of an algorithm
   b. Analyzing the upper bound of an algorithm's running time
   c. Representing the best-case scenario of an algorithm
   d. Finding the lower bound of an algorithm

2. What is the index of the first element in an array? CO1K2
   a. 0 b. 1 c. -1 d. n

3. Which of the following operations is NOT performed on a stack? CO2K3
   a. Push b. Pop c. Enqueue d. Peek

4. Which data structure is used to implement recursion? CO2K4
   a. Queue b. Stack c. Linked List d. Tree

5. What is a full binary tree? CO3K4
   a. Binary tree where every node has exactly two children
   b. Binary tree where all leaf nodes are at the same level
   c. A binary tree in which every node has 0 or 2 children
   d. A binary tree where all nodes have only one child

6. What is the minimum number of edges in a connected graph with n vertices? CO3K3
   a. n – 1 b. n c. n + 1 d. 2n

7. Which sorting algorithm is the fastest for large datasets? CO4K5
   a. Bubble Sort b. Selection Sort
   c. Merge Sort d. Insertion Sort

8. Which searching algorithm is the best choice for searching in a sorted array? CO4K4
   a. Linear Search b. Binary Search
   c. Jump Search d. Both B and C

9. What is the main disadvantage of sequential file organization? CO5K5
   a. High storage cost
   b. Slow retrieval for random access
   c. High maintenance cost
   d. Difficult to implement

10. What is a collision in hashing? CO5K6
   a. When two keys generate different hash values
   b. When two different hash functions are used
   c. When two keys produce the same hash value
   d. When a hash function is applied incorrectly

Part B

5 x 6 = 30

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Discuss on the Key points about algorithms with its important aspects.	CO1K1
(or)	
11.b. Discuss the advantages and disadvantages of using ordered lists.	CO1K2
12.a. Write down the Steps for Infix to Postfix Conversion.	CO2K3
(or)	
12.b. What is recursion? Explain with examples.	CO2K4
13.a. What is a threaded binary tree?	CO3K3
(or)	
13.b. What are the representations of a graph?	CO4K3
14.a. Explain Insertion Sort and demonstrate its working with an example.	CO4K5
(or)	
14.b. Explain the Sequential Search algorithm and its working with an example.	CO4K5
15.a. Explain on Indexed Sequential Access Method.	CO5K6
(or)	
15.b. Explain the concept of hashing and its significance in data storage and retrieval.	CO5K5

Part C

5 x 12 = 60

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. Clearly define time and space complexity. Explain with example what each term means and how they are measured using Big O notation.	CO1K1
(or)	
16.b. What is the representation of an array along with its types?	CO1K2
17.a. Difference Between Stack and Queue Data Structures. Explain their various operations.	CO2K4
(or)	
17.b. Define a Singly Linked List and explain its structure with a diagram. Write a C program to insert a node at the beginning, end, and a specific position in a singly linked list.	CO2K3
18.a. Define Binary Tree Traversal , explain how to perform In-order, Pre-order, and Post-order traversals with examples.	CO3K4
(or)	
18.b. Discuss and explain three real-world applications where graphs are used, with examples.	CO3K4
19.a. Explain the Quick Sort algorithm in detail, with a step-by-step working example Discuss the advantages and disadvantages.	CO4K5
(or)	
19.b. Derive and analyze the time complexity of Binary Search in the best, worst, and average cases, and explain why Binary Search is efficient with an example.	CO5K5
20.a. Explain on Sequential Organization. Describe its various Methods of Accessing Data in Sequential Files with its Operations.	CO5K6
(or)	
20.b. Discuss on Hash Tables and Hash Functions in detail.	CO5K5

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