Reg. No.															

Question Paper Code	14101

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Second Semester

Computer Science and Business Systems

24CBPC201 - DATA STRUCTURES AND ALGORITHMS

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

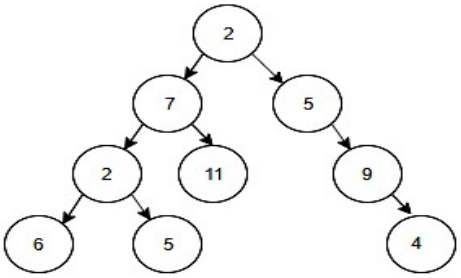
		Marks	K – Level	CO
1.	What is the space complexity of a recursive function with depth 'n' if each function call takes constant space? (a) O(1) (b) O(n) (c) O(n^2) (d) O(log n)	1	K1	CO1
2.	Recursion is a technique in which a function: (a) Calls itself (b) Calls another function (c) Never returns a value (d) Runs infinitely	1	K1	CO1
3.	In which traversal order are arithmetic expressions evaluated in postfix notation? (a) Left to Right (b) Right to Left (c) Top to Bottom (d) Bottom to Top	1	K1	CO2
4.	What is the function of the 'peek' operation in a stack? (a) Removes the top element (b) Returns the top element without removing it (c) Inserts an element (d) Returns the bottom element	1	K1	CO2
5.	Which of the following is true for a Binary Search Tree (BST)? (a) Left child is smaller than the root (b) Right child is larger than the root (c) Both a and b (d) None of the above	1	K1	CO3
6.	Which of the following is a non-linear data structure? (a) Stack (b) Queue (c) Tree (d) Linked List	1	K1	CO3
7.	What is the main purpose of graph traversal algorithms? (a) To find the shortest path (b) To explore all nodes in a graph (c) To sort the graph (d) To Merge the graph	1	K1	CO4
8.	What is the main advantage of Breadth-First Search (BFS)? (a) It uses less memory (b) It finds the shortest path in an unweighted graph (c) It is faster than DFS (d) It uses more memory	1	K1	CO4
9.	A max-heap satisfies which property? (a) Parent ≤ children (b) Parent ≥ children (c) Left child ≥ right child (d) Sorted order	1	K1	CO5
10.	Indexed Sequential Access Method (ISAM) combines features of: (a) Sequential and hashed files (b) Direct and indexed files (c) Sequential and indexed files (d) Hashed and direct files	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Define asymptotic notation.	2	K1	CO1
12.	What is the difference between best-case and worst-case complexity?	2	K1	CO1
13.	List any two applications of queue.	2	K1	CO2
14.	Define an arithmetic expression.	2	K1	CO2
15.	What are the steps to convert a general tree into a binary tree?	2	K1	CO3

16.	Write the Pre-order for the below tree.	2	K1	CO3



17.	What is Depth-First Search (DFS)?	2	K1	CO4
18.	What are the applications of graphs in real-world scenarios?	2	K1	CO4
19.	Define Binary search.	2	K1	CO5
20.	List two collision resolution methods in hashing.	2	K1	CO5
21.	What are the file access methods?	2	K1	CO6
22.	Define the term "key-to-address transformation" in direct files.	2	K1	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain the role of testing in programming and different types of testing.	11	K2	CO1
		OR			
	b)	Illustrate the concept of time complexity with different cases (best, worst, and average).	11	K2	CO1
24.	a)	Show how to convert an infix expression to a postfix expression with an example.	11	K2	CO2
		OR			
	b)	Compare singly, doubly, and circular linked lists.	11	K2	CO2
25.	a)	Construct a Binary Search Tree for the following elements 11,14,3,4,22,9,7,15,13.	11	K3	CO3
		OR			
	b)	Construct AVL tree for the following data 21,26,30,9,4,14,28,18,15,10,2,3,7.	11	K3	CO3
26.	a)	Explain the concept of cycles in a graph. How can they be detected using DFS?	11	K2	CO4
		OR			
	b)	Relate the applications of graphs in real-world scenarios such as social networks, GPS navigation, and network routing.	11	K2	CO4
27.	a)	Illustrate how Merge Sort divides and merges the array [38, 27, 43, 3, 9, 82, 10].	11	K2	CO5
		OR			
	b)	Demonstrate Quick Sort on [10, 7, 8, 9, 1]. Show all partitions.	11	K2	CO5
28.	a)	Compare static and dynamic hashing techniques with examples.	11	K2	CO6
		OR			
	b)	Relate an indexed sequential file for a student database. Explain index structure, primary, and overflow blocks.	11	K2	CO6