Reg. No.															

Question Paper Code	13718

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 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.	Which of the asymptotic notation is used to provide lower bound constraints? (a) x (b) Ω (c) Θ (d) None of the above	1	K1	CO1
2.	Which process helps to build a large and complicated program? (a) Abstraction (b) Mapping (c) Data Abstraction (d) Procedures	1	K1	CO1
3.	Which of the following is the limitation of the array? (a) Elements can be accessed from anywhere (b) The size of the array is fixed. (c) Indexing starts from Zero. (d) Memory waste if an array's elements are smaller than the size allotted to them	1	K1	CO2
4.	How many stacks are needed to implement a queue? Consider the situation where no other data structure, such as arrays or linked lists, is available to you. (a) 1 (b) 2 (c) 3 (d) 4	1	K1	CO2
5.	The maximum number of binary trees that can be formed with three unlabelled nodes are: (a) 1 (b) 5 (c) 4 (d) 3	1	K1	CO3
6.	B+ trees are preferred than binary trees in databases because (a) Disk capacities are greater than memory capacities (b) Disk access is much slower than memory access (c) Disk data transfer rates are much less than memory data transfer rates (d) Disks are more reliable than memory	1	K1	CO3
7.	How many undirected graphs (not necessarily connected) can be constructed out of a given set V= {V 1, V 2,…V n} of n vertices ? (a) n(n-l)/2 (b) 2^n (c) n! (d) 2^(n(n-1)/2)	1	K1	CO4
8.	The inorder and preorder traversal of a binary tree are d b e a f c g and a b d e c f g, respectively. The postorder traversal of the binary tree is: (a) d e b f g c a (b) e d b g f c a (c) e d b f g c a (d) d e f g b c a	1	K1	CO4
9.	Which of the following is not a stable sorting algorithm in its typical implementation? (a) Quick sort (b) Merge Sort (c) Selection sort (d) Bubble sort	1	K1	CO5
10.	In depth-first traversal of a graph G with n vertices, k edges are marked as tree edges. The number of connected components in G is (a) k (b) k+1 (c) n-k-1 (d) n-k	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Why do we need a data structures?	2	K1	CO1
12.	List the features of ADT.	2	K1	CO1
13.	Define doubly linked list.	2	K1	CO2
14.	List the Differences between arrays and lists.	2	K1	CO2
15.	Recall the steps to modify a node in linked lists.	2	K2	CO3
16.	What do you mean by a balanced tree?	2	K1	CO3

17.	Recall the properties of a binary tree.		*2*	*K1*	*CO4*
18.	Relate inorder traversal with preorder and postorder traversals.		*2*	*K2*	*CO4*
19.	Show how insertion is done in an insertion sort by using an array.		*2*	*K2*	*CO5*
20.	What do you mean by a hash table?		*2*	*K1*	*CO5*
21.	What are the advantages and disadvantages of a sequential file organization?		*2*	*K1*	*CO6*
22.	List the types of file organizations.		*2*	*K1*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Briefly explain about the various asymptotic notations with the help of a graph.	*11*	*K2*	*CO1*
		OR			
	b)	Explain the concept of data abstraction in the context of data structures. How does it differ from the concrete implementation of data structures?	*11*	*K2*	*CO1*
24.	a)	Explain the insertion operation in a singly linked list with an example. How nodes are inserted after a specified node.	*11*	*K2*	*CO2*
		OR			
	b)	With a suitable example, explain how deletion operation is performed in doubly linked list.	*11*	*K2*	*CO2*
25.	a)	Illustrate B+ trees with a suitable algorithm.	*11*	*K2*	*CO3*
		OR			
	b)	Show how to insert and delete an element into a binary search tree, and write down the code for the insertion routine with an example.	*11*	*K2*	*CO3*
26.	a)	Construct an expression tree for the expression (a+b*c) + ((d*e+f)*g). Give the outputs when you apply inorder, preorder and postorder traversals.	*11*	*K3*	*CO4*
		OR			
	b)	Make use of an example to show the differences between a directed graph and an undirected graph.	*11*	*K3*	*CO4*
27.	a)	Explain Breadth-First Search algorithm with an example.	*11*	*K2*	*CO5*
		OR			
	b)	Demonstrate Merge sort with a suitable example and find its time complexity.	*11*	*K2*	*CO5*
28.	a)	Summarize the following 1. Sequential access files organization. 2. Direct access files organization. 3. Indexed sequential access files organization.	*11*	*K2*	*CO6*
		OR			
	b)	Relate the advantages and disadvantages of hash tables with other data structures like arrays and linked lists.	*11*	*K2*	*CO6*