Paper id: 252262

Roll No: | | | | | | | | | | | | | |

BCA
(SEM II) THEORY EXAMINATION 2024-25
DATA STRUCTURE

TIME: 3 HRS **M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTIONA

1. Attempt *all* questions in brief. **02 x 7 = 14**

Q no.	Question	CO	Level
a.	Differentiate between linear and non-linear data structures.	1	K2
b.	What is a sparse matrix? Give an example.	1	K1
c.	What is over flow and under flow in the context of queues?	2	K1
d.	What is a threaded binary tree?	3	K1
e.	Convert the expression ((A+B)* (C-D))to a binary expression tree.	3	K3
f.	Construct a Max-Heap from the elements: [10,15,20,17, 8].	4	K3
g.	State the applications of B-Trees in databases.	5	K1

SECTIONB

2. Attempt any *three* of the following: **07 x 3 = 21**

Q no.	Question	CO	Level
a.	Describe stack operations with algorithms for push and pop. What are the applications of stacks?	1	K2
b.	What is the limitation of a linear queue implemented using arrays? How does the circular queue resolve this?	2	K2
c.	Discuss binary search tree. Construct a binary search tree using the following elements: 50, 30, 70, 20, 40, 60, 80. Perform in order traversal.	3	K3
d.	Explain the working of merge sort with suitable example. Provide its divide-and-conquer approach and discuss its time complexity in best, average, and worst cases.	4	K2
e.	What is a B-Tree? How is it different from a binary tree? Create a B-tree of order 3 using the keys: 10, 20, 5, 6, 12, 30, 7, 17.	5	K3

SECTIONC

3. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Convert the in fix expression A*(B+C)/D-E in to post fix and prefix Notation .Show all steps.	1	K3
b.	Write detailed notes on recursion. Explain Tower of Hanoi problem using Recursion.	1	K2

QP25EP1_290 | 09-Jul-2025 1:56:25 PM | 117.55.242.134

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4. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Differentiate between static and dynamic memory allocation. How is it Implemented using linked lists?	2	K2
b.	Given a linked list:10→20→30→40,insert 25 between 20 and 30. Write algorithm and show memory diagram.	2	K3

5. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Define binary tree. Discuss the properties of binary trees. Construct a binary tree from the following in order and preorder sequences: • Inorder: DB EA FC • Preorder: AB DECF	3	K3
b.	Create a hash table of size 10 using modulo division. Insert the following elements using linear probing: 23, 43, 13, 27, 98, 62.	3	K3

6. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Describe the binary search algorithm. How is it different from linear search? Discuss their time complexities.	4	K2
b.	Construct an AVL Tree by inserting:50,30,70,10,40,60,80. Show the Rotations performed to balance the tree.	4	K3

7. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Define graph, multi graph, and weighted graph with real-life examples. Differentiate between directed and undirected graphs with diagrams.	5	K2
b.	Differentiate between spanning tree and minimum spanning tree using suitable diagram. What is Kruskal's algorithm? Explain the step-by-step procedure used to construct a minimum spanning tree using example.	5	K2

QP25EP1_290 | 09-Jul-2025 1:56:25 PM | 117.55.242.134

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