



**II Semester B.C.A. Examination, June/July 2025**  
**(SEP Scheme)**  
**24BCA21 : DATA STRUCTURES**

Time : 3 Hours

Max. Marks : 80

**Instruction : Answer all the Sections.**

**SECTION – A**

Answer any eight questions. Each question carries 2 marks.

**(8x2=16)**

1. What is non-primitive data structure ? Give an example.
2. What are asymptotic notations ? List out the types of asymptotic notations.
3. What are linear arrays ? Give an example.
4. What are the characteristics of linked list ?
5. Explain stack as ADT.
6. What is the difference between linear queue and circular queue ?
7. Define binary tree and binary search tree.
8. What is hashing ? What are its advantages ?
9. What is a sparse matrix ? Mention the types of sparse matrix.
10. Give an example for directed graph and undirected graph.

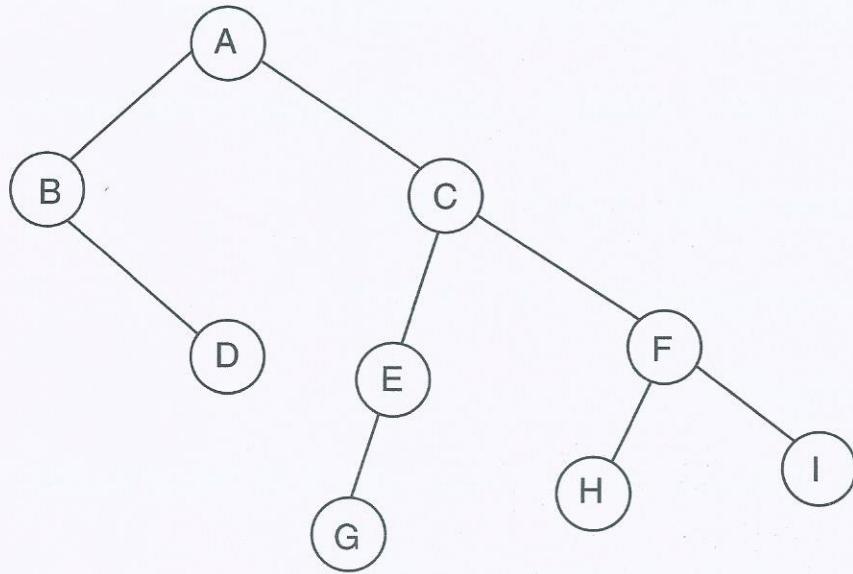


## SECTION – B

Answer any four questions. Each carries six marks.

(4x6=24)

11. Explain Abstract data type with examples. Why is it important ?
12. Write an algorithm to insert and delete an element in a linear array. Given the size of the array as 6 and the elements in array as {4, 6, 3, 2}, insert 9 at the end and delete 6 after the insertion.
13. Explain the working of Bubble sort and sort the following list of elements using bubble sort : {4, 3, 1, 9, 6, 7, 0}
14. Write algorithms for PUSH and POP operations on a stack using arrays.
15. Write Pre-Order, In-Order, Post-Order Traversal for the given tree.



16. Explain the types of queues with examples.

## SECTION – C

Answer any five questions. Each question carries eight marks.

(5x8=40)

17. a) Write an algorithm to convert infix expression to, post fix expression.  
Use your algorithm to convert the following into postfix expression :  
 $a + b/c * d + (e/f) - g$ .
- b) Explain the operations on string with example. (4+4)



18. a) Write an algorithm to insert a node at the specific position in a singly linked list.  
b) Explain the method of Memory Allocation for Linked Lists by the operating system. (4+4)
19. a) Explain Queue as ADT.  
b) Explain insert and delete operations in Deques. (4+4)
20. Consider the following B-tree of order 3.  
Insert 81, 7, 49, 61 and 30 to the B-tree. 8
21. a) Write an algorithm for breadth first search.  
b) Explain hash table as ADT. (4+4)
22. a) Write an algorithm for tower of Hanoi problem.  
b) Write an algorithm to evaluate the postfix expression  $\Rightarrow 10\ 5\ +\ 60\ 6\ /\ * 8\ -$ . (4+4)
23. a) Construct the BST for the following elements.  
20, 35, 15, 10, 45, 05, 50, 18. 5  
b) Define :  
i) Complete graph  
ii) Cyclic graph  
iii) Indegree and outdegree with example. 3