

Reg.No:

--	--	--	--	--	--	--



SNS College of Technology, Coimbatore-35.

(Autonomous)

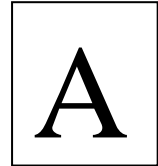
B.E/B.Tech- Internal Assessment -I

Academic Year 2023-2024(ODD)

Third Semester

19ITT201- Data Structures

Answer Key



Time: 1<sup>1/2</sup> Hours

Maximum Marks: 50

Answer All Questions

PART-A (5 x 2 = 10 Marks)

1. Define Data Structure and ADT. CO1 Und

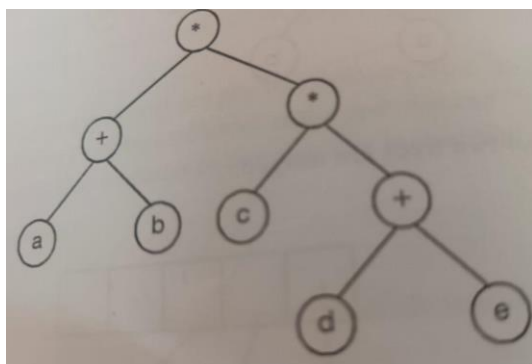
**Data Structure:** A data structure is a specialized format for organizing, processing, retrieving and storing data.

**ADT :** An ADT is a mathematical model of a data structure that specifies the type of data stored, the operations supported on them, and the types of parameters of the operations.

2. Illustrate the difference between Singly Linked list and Doubly Linked list. CO1 Ana

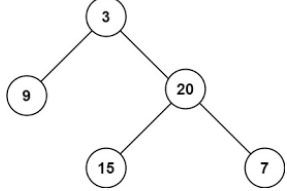
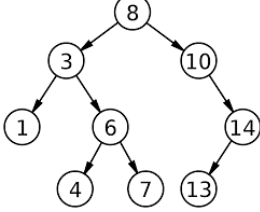
Singly linked list (SLL)	Doubly linked list (DLL)
SLL nodes contains 2 field -data field and next link field.	DLL nodes contains 3 fields -data field, a previous link field and a next link field.
The SLL occupies less memory than DLL as it has only 2 fields.	The DLL occupies more memory than SLL as it has 3 fields.
use singly linked list for the execution of stacks.	use a doubly linked list to execute heaps and stacks, binary trees.

3. What is meant by expression tree. Construct expression tree for **ab+cde+\*\***. CO1 Und  
Expression tree is the combination of Operand and operator.



4. Differentiate Binary tree with Binary Search tree with suitable example.

CO2 Ana

Binary tree	Binary Search tree
binary tree is a tree composed of nodes, each of which has at most, two children, referred to as left and right nodes.	Binary Search Tree is a Tree with minimum element in left subtree and Maximum element in right subtree.
	

5. Write down the four cases that causes AVL tree Imbalance.

CO2 Ana

1. An insertion into the left subtree of the left child of the node  $\alpha$
2. An insertion into the left subtree of the right child of the node  $\alpha$
3. An insertion into the Right subtree of the right child of the node  $\alpha$
4. An insertion into the Right subtree of the Left child of the node  $\alpha$

**PART-B (13 + 13 + 14 = 40 Marks)**

6. (a) Explain in detail about Singly linked list ADT with suitable routine.

13 CO1 Und

Ans:

- Introduction
- Basic Operations
  - Makeempty
  - Create
  - Insert
  - Delete
  - Find
- Example

(or)

(b) Explain in detail about different types of implementations in Stack ADT with suitable routines.

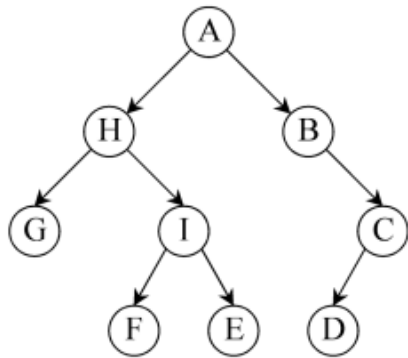
13 CO1 Und

Ans:

- Stack Definition
- Two Basic Operations
- Exceptional Conditions

- Implementation types
  - Array Implementation
  - Linked List Implementation

7. (a) Explain the various tree traversals techniques with appropriate routines and Traverse the given tree 13 CO1 App



Ans:

- Introduction
- Inorder (GHFIEADCB)
- Preorder (AHGIFEBDC)
- Postorder (GFEIHDCBA)

(or)

(b) Define binary search tree. Write a routine to insert and Delete an element in Binary search tree. 13 CO2 Ana

Ans:

- BST Definition
- Routine for Insertion with example
- Routine for Deletion with example ( 3 cases)

8. (a) Write the Routine to perform following operation

6 CO2 Ana

- i) 1. Single rotation with Left  
2. Single rotation with Right

Single rotation with left (Position  $K_2$ )

↳ position  $K_1$ ;

$K_1 = K_2 \rightarrow \text{left}$ ;

$K_2 \rightarrow \text{left} = K_1 \rightarrow \text{right}$ ;

$K_1 \rightarrow \text{right} = K_2$ ;

$K_2 \rightarrow \text{height} = \max(\text{height}(K_2 \rightarrow \text{left}), \text{height}(K_2 \rightarrow \text{right})) + 1$ ;

$K_1 \rightarrow \text{height} = \max(\text{height}(K_1 \rightarrow \text{left}), \text{height}(K_1 \rightarrow \text{right})) + 1$ ;

return  $K_1$ ;

3  
Procedure

Single rotation with right (Position  $K_1$ )

↳ position  $K_2$ ;

$K_2 = K_1 \rightarrow \text{right}$ ;

$K_1 \rightarrow \text{right} = K_2 \rightarrow \text{left}$

$K_2 \rightarrow \text{left} = K_1$ ;

$K_2 \rightarrow \text{height} = \max(\text{height}(K_2 \rightarrow \text{left}), \text{height}(K_2 \rightarrow \text{right})) + 1$ ;

$K_1 \rightarrow \text{height} = \max(\text{height}(K_1 \rightarrow \text{left}), \text{height}(K_1 \rightarrow \text{right})) + 1$ ;

return  $K_2$ ;

3

ii) Convert the following infix expression into postfix expression using Stack  $(a + b * c) + ((d * e + 1) * g)$  8 CO1 App

Ans:

➤  $abc*+de*lg*++$

(or)

(b) Draw the binary search tree for the given values 8, 5, 10, 15, 20, ,18 13 CO2 App and explain stepwise with routine to perform the following operations

(i) Find (ii) FindMin iii) FindMax

**Ans:**

- Routine for Find Operation
- Example
- Routine for Findmin Operation
- Example
- Routine for Findmax Operation
- Example

\*\*\*\*\*

(Note: Und-Understand Rem-Remember Cre - Create Ana-Analyze App-Apply)

**Prepared By**

**Verified By**

**HoD**