Name: M.N. KHAN
ID: 2216080041
8th Batch (EV)
CSE
Course: Data structure
Course code: CSI 217

Ans: to the: of: NO: 01

(a) A data structure is a specialized for arranging processing retrieving & storing data. There are several basic & advanced types of data structures, all designed to arrange data to suit a specific purpose.

Array Operators:

Array Operators means the plat form wich enables as to define array attributes - blob allributes that represent numeric arrays of by bit integer or Double values. The + operator returns the right hand array appended to the left-hand array. for keys that exist in both arrays the elements form the left-hand array will be array.

×

(b) Operation of data structure:

Data structure is the way of staring data in computess memory so that can be used eaglly & efficintly. There are different data structure used for the stonage of data.

Advantages: (1) The structure is a good solution for storing data on framework.

(2) Data structure make it easier for as to handle data.

(3) Data structure also old as in eficienfty. storing data on circby no that we can recover the data.

(4) Data structure are critical for planning com patating.

(5) As we have seen data structure are a nechanison for annaing data in to a specified structure.

(c) Array types:

An Computer science, array is a data type that represents a collection of elements, each selected by one or many in dices that can be computed at run time during program execution, such, a collection is Handly, collected or any variable or array value.

there are mayonly three types of Array:-

1. One - dimensional array (1-D arrays)
2. Two dimensional array (2D array)
3. Three - dimensional array.

Array Operator: The + Operator returns the right-hand array appended to the left hand array, for keys that could in both arrays, the elements from the left-hand array will, Array operator([]) you can used one of the following syntax variations of the array operator([]) to reference specific all variations, on element index number can also be provied as on expression that evaleates to an integer.

Ans: to the Q. No: 02

(a) Basic Operations On Stacks: There are basically three operations that can be performed on stacks. They are:

(1) Inserting an item into a stack (push)
(2) Deleting an item from the stack (pop)
(3) Displaying the contents of the stacks (peek or top)

Stack's Application: A stack can be used for evaluating expressions consisting of operands & operators.

(a) Evaluation of Arithmetic Expressions.
(b) Backtracking.
(c) Delimiter checking.
(d) Reverse a data.
(e) Processing function calls.

(b) A graph can be represented using data store structured - Ad jaccency matrix, Ad jaccency matrix can be thought of as a table & columns labels represented the nodes of a graph.

A graph is a non-live data structure consisting of vertices & edges. The vertices are something also refered to as nodes & the edges.

(c) Ans: The formula for calculating arithmetic mean is (sum of all observation)(Number of Observation).

For example the Arithmetic mean of set of numbers {10, 20, 30, 40} Can be found here,

$$\text{Arithmatics mean} = \left(\frac{10+20+30+40}{4}\right)$$

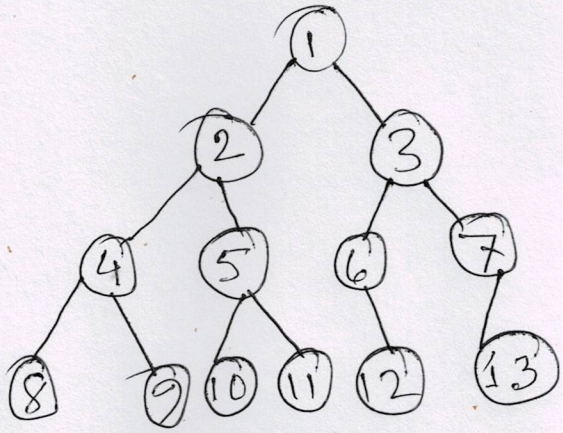
$$= \frac{100}{4} \quad 25$$

$$= 25$$

Ans.

Ans the Q. No: 03

(a) Ans: Define Binary tree: Binary tree is defined as a tree data structure where each node had atmost 2 children, since eatch element in a binary tree can have only 2 children, we typically name them the left & right child.



Binary tree representation: A binary tree is representation by a pointer to the topmost node (commonly Knowas the rod) of the tree. If the tree is empty, then the value of the root is null. Each node of a Binary the containg the fllowing part.

(1) Data (2) Pointer to left child.

(3) Pointer to right child.

Basic Operation on Binary tree:

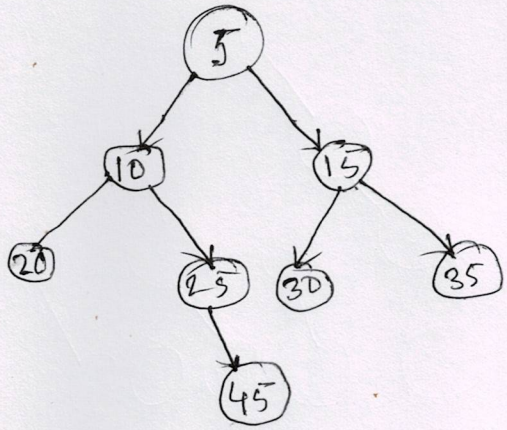
(1) Inserting an element (2) Removing an element

(3) Searching for an element (4) Traversing the tree.

Auxiliary Operation on Binary tree:

1. Finding the hight of the tree.
2. Find the level of a node the tree.
3. Finding the size of the tree.

Given nodes in a binary tree, find the distance between them,



→ Distance between (20, 45) = 3

→ Distance between (30, 35) = 2

→ Distance between (20, 35) = 4

Approch: (1) Distance (x, y) = Distance (root, x) + Distance (root, y) - 2 (Distance (root to LCA(x,y)))

(2) where LCA (x, y) = lowest common Ancestor of x, y

(3) In the above example if distance (20, 45) = 3

(4) Distance (root, 20) = 2

(5) Distance (root, 45) = 3

(6) LCA (20, 45) = 10

(7) Distance (root 10) = 1

(8) Distance (20, 45) = 2 + 3 - 2 * 1 = 3

→ Now the problem is reduced to How to find distance from root to any given node.

=> related problem:

→ Construct a binary tree from given inorder & depth First - search - (Hard)

→ Print All the nodes which are x distance from the left node (medium)

→ Reverse a linked list in group of given size k (medium)

→ Inorder successor in binary search tree using parent link (Hard)

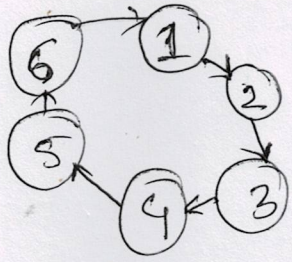
→ Back tracking - knight's tour problem (Hard)

→ Find the max element in a given Binary tree (Beginner)

→ Given the binary tree, print all the nodes that don't have sibling (Biginners)

→ lowest common Accestor in a Binary structure (medium)

(b) Ans: Graph: Graph is a data structure and non-linear data structures made up of a finite number of nodes or vertices & the edges that connect them. Graph in data structure are used to address real-world Problem in which it present the problem are as a network like telephone networks & social networks.



The Application of graph data structure is used in computer since mathmatics, physics & has many practical application in fiels such as computer networks, Artificial intelligence and logistics.

Application of Graph data structur:

Real-life Application of graph data structure in various are:—

* Computer science: Graph are used to model many problems & solutions in computer science, such as representing networks, web pate, & social media, connection graph algorithms are used in path finding data compression.

* Social network: Graph represent & analyze social network. such as the connection between individuals & group.

* Transportation: Graph can be used to model transportation system. such as roads & flights, & to find the shoest of quickest routes between location.

* Computer vision: Graph represent & analyze image & video, such as tracking objects.

* Telecommunication: