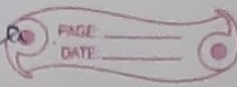200303108003

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Ch-1 Assignment.
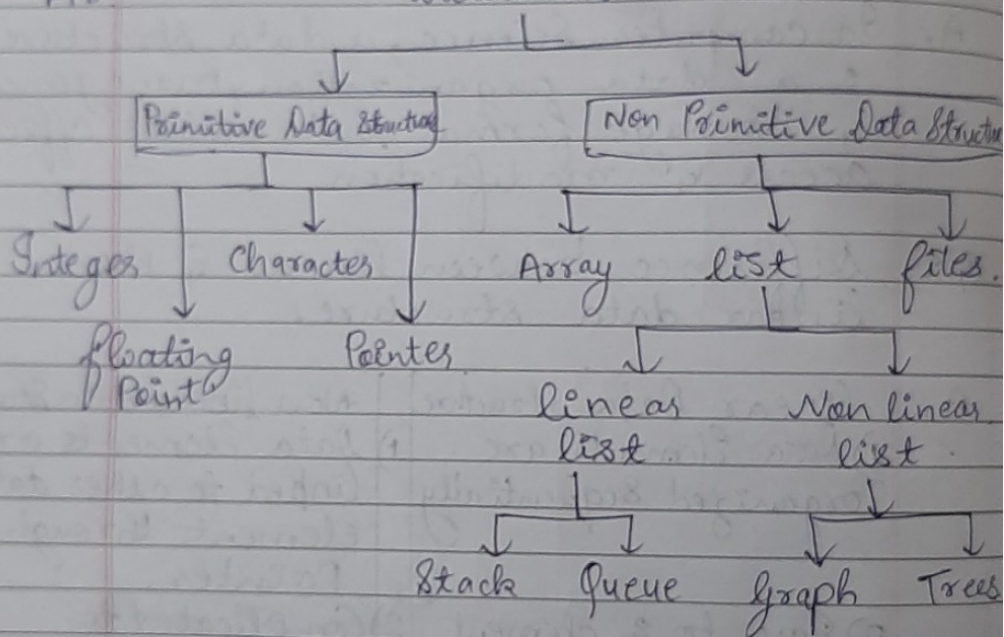
Q.1) What is Data Structure!

A. In computer Science, a data structure is a data organization, management & storage format that enables efficient access & modification.

Q.2) Difference between linear & Non linear data Structure.

A.

linear Data Structure	Non linear data Structure
1) Data Elements are organized Sequentially	1) Data Elements are linked to other data Element through Pointer.
2) Easy to implement	2) Complicated to implement.
3) Data Elements are transversed one after other.	3) Data Element cannot be transversed at one run.
4) Ex. arrays, linked list, Stack & Queues.	4) Ex. Multidimensional arrays, trees & graph.

Q.3) Explain in Detail classification of Data Structure.

A.
Data Structure.

```
                    Data Structure
                          |
         ┌────────────────┴────────────────┐
         ↓                                  ↓
  ┌──────────────────┐          ┌──────────────────────────┐
  │ Primitive Data Structure │  │ Non Primitive Data Structure │
  └──────────────────┘          └──────────────────────────┘
    │      │      │                │        │        │
    ↓      ↓      ↓                ↓        ↓        ↓
 Integer Character                Array    list     files.
    ↓      ↓                                |
 floating  Pointer              ┌───────────┴──────────┐
 Point                          ↓                      ↓
                             linear                Non linear
                             list                   list
                          ┌────┴────┐          ┌──────┴──────┐
                          ↓         ↓          ↓             ↓
                        Stack     Queue      Graph         Trees
```

→ Primitive data structure are basic structures and are directly operated upon by machine instruction.

• Integer :- allows all values without fraction part.

• float :- used for storing fractional number

- Character : used for characters value
- Pointer : holds memory address of another variable.

→ The Non-primitive data Structure emphasize on Structuring of group of homogeneous or heterogeous data items.

- linear data Structure :- Data is arranged in such a way that after one element we have just one more element that is , a single element is connected to just one more element after it.

- Stack :- Stack is ordered linear data Structure which is modified form of an array data Structure in which insertion & deletion operation are performed at one end only. last in first out (LIFO)

- Queue :- The data Structure which permits the insertion at one end & Deletion at another end, known as

Queue. first in first out (FIFO),

- If after one Element, we have connection to multiple elements then such data structure are called as non linear data structures.

✓ Tree: A tree can be defined as finite set of data items (nodes) in which data items are arranged in branches & sub branches according to Requirement.

✓ Graph: It is Collection of nodes (Information) & connecting edges (Logical Relation) b/w nodes.

2.4) Explain Binary Search with examples with time & space complexity analysis.

A. • Search a sorted array by repeatedly diving the search interval in half.

Eg. given arr = {45, 77, 89, 90, 94, 99, 100} & Key = 99 what are mid values in 1st & 2nd level of recursion

A. 1st level. $L = 0$, $H = 6$.

$$m = \frac{0+6}{2} = 3 \;.\; mkey = 9$$

2nd level. $L = 4$, $H = 6$.

$$m = \frac{10}{2} = 5$$

M. key $= 99$.