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Design and analysis of Algorithms.

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Question / Answer

Question : 1

Part : A

Q How would you be defining a Linked List?

Ans Definition

A linked list is a sequence of data structures, which are connected together via links.

Linked lists is a sequence of links which contains items. Each link contains a connection to another link.

OR:

It is a data structure consisting of a collection of nodes. Each node contains data and reference (in other words a link).

Explanation:-

Linked lists are among the simplest and most common data structures. They can be used to implement several other common abstract data types, including list, stacks, queues though it is not uncommon to implement those data structures directly without using a linked list as the basis. "A linked list is a list whose elements may not occupy contiguous memory locations and whose elements are connected by means

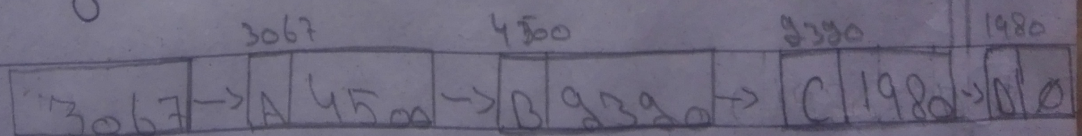
of links between them.

- * Each element of a linked list is called a node.
- * Each node has at least 2 fields
 - i) Info field: keeps data
 - ii) Link field: keeps address of link field to next node.
- * A pointer "Head" is used to keep the address of 1st node.

⇔ Part :: B ⇔

Q Design a diagrammatic:
one way linked list for
the given data;

Ans: One way linked List:
Diagram:-



- ① P ← get node (3067)
- ② Head ← P

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③ info (p) ← data
3067 ← A
4500 ← B
2320 ← C
1980 ← D

④ Link (p) ← ∅

~~(3067)~~ (4500) (2320) (1980)

⑤ q ← p (3067) (4500) (2320) (1980)

⑥ y, y, y, y, n.

⑦ p ← get node (4500) (2320) (1980)

⑧ Link (q) ← p (4500) (2320) (1980)

⑨ go to ③

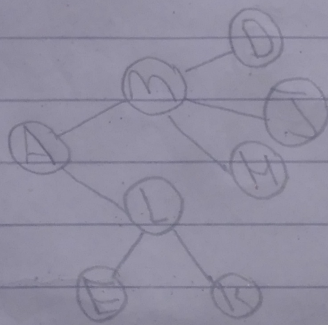
⑩ Exit.

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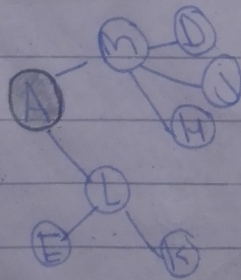
Question :: 2 ::>

Q Apply Depth-First Technique on the given tree.

Ans)



Step ①::

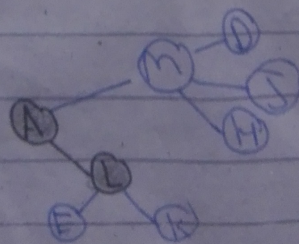


ALL

output Sequence:-

A,

Step ②::



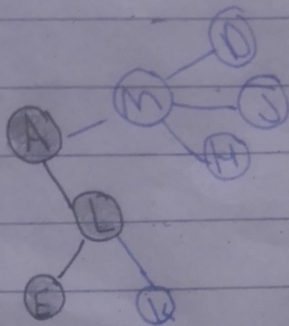
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A | L |

Output sequence:-

A, L

Step (iii)

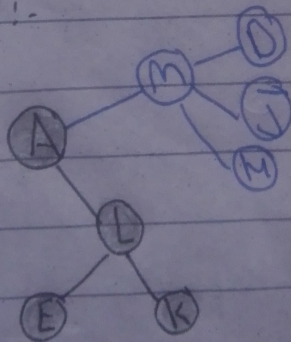


A | L | E

Output sequence:-

A, L, E

Step (iv):



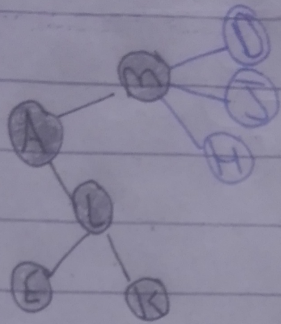
A | L | E | R

Output sequence:-

A, L, E, R

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Step (v)

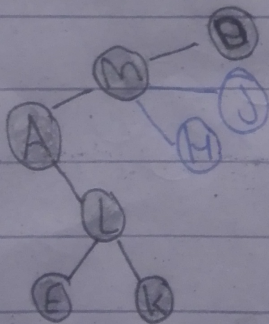


A | L | M

output sequence:

A, L, E, K, M

Step (vi)



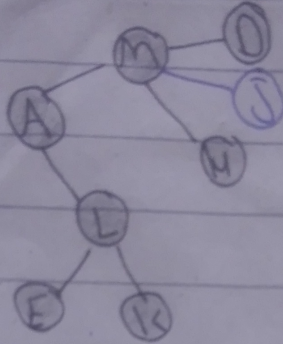
A | L | M | D

output sequence:

A, L, E, K, M, D

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Step (vii)

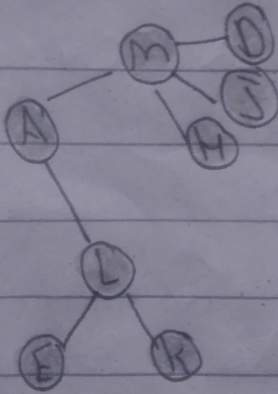


ALL | M | D | H

output sequence:

A, L, E, K, M, D, H

Step (viii)



ALL | M | J | H

output sequence

A, L, E, K, M, D, H, J

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← Question: →

Q) How would you be defining a Queue? Give some real life examples?

Ans) Queue:-

A sequential list in which elements are inserted from one end and are deleted / retrieved from other end is called Queue.

Explanation:->

Queue is an abstract data structure. A Queue is open at both its ends one end is used to insert data and the other is used to remove data.

Queue follows first-in-first-out methodology, i.e.

the data item stored first will be accessed first.

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- The End from where an element can be inserted is called Rear of the Queue.
- * The End from where an element can be deleted called Front of the Queue.

Memory representation of Queue.

- * A Linear array arr is used to represent a queue.
- * Two variables (behaving like pointers) F and R are used to denote Front and Rear of arr .

Real life examples:-

- (i) Auto mobiles waiting to pass through a signal make up a queue.
- (ii) People waiting to submit bills at a bank window.