Ans1.

A linked list is a data structure where the objects are arranged in a linear order. Unlike an array, however, in which the linear order is determined by the array indices, the order in a linked list is determined by a pointer in each object.

Ans2.

* Singly linked lists.
* Doubly linked lists.
* Circular linked lists.
* Circular doubly linked lists.

Ans3.

Linked lists are linear data structures that hold data in individual objects called nodes. These nodes hold both the data and a reference to the next node in the list. Linked lists are often used because of their efficient insertion and deletion.

Ans4.

Advantages of Linked List over Array

1) Dynamic Data Structure:

* Linked List being a dynamic data structure can shrink and grow at the runtime by deallocating or allocating memory, so there is no need for an initial size in linked list.

![](https://blog.prepbytes.com/wp-content/uploads/2021/09/p\_1-1-2.png)

* Whereas an initial size has to be declared in an array, and the number of elements cannot exceed that size.

2) No Memory Wastage:

* As the size of a linked list can grow or shrink at runtime, so there is no memory wastage. Only the required memory is allocated.
* In arrays, we have to first initialize it with a size which we may or may not fully use; hence wastage of memory may occur.

3) Implementation:

* Some very helpful data structures like queues and stacks can be easily implemented using a Linked List.

4) Insertion and Deletion Operation:

* In a Linked List, insertion and deletion operations are quite easy, as there is no need to shift every element after insertion or deletion. Only the address present in the pointers needs to be updated.
* While in an array, we have to shift elements. Suppose we have an array that is sorted, and now we need to insert some element in the array in a sorted way. Let arr[]= [ 1, 3 , 5, 7, ….. ], and we have to insert 2. So, all the elements after 1 have to move by one place towards the right.

Let us also have a look at the disadvantages of Linked Lists.

Disadvantages of Linked List over Array

1) Memory Usage:

* The memory required by a linked list is more than the memory required by an array, as there is also a pointer field along with the data field in the linked list. The pointer field too requires memory to store the address of the next node.

2) Random Access:

* To access node an at index x in a linked list, we have to traverse through all the nodes before it. But in the case of an array, we can directly access an element at index x, using arr[x].

3) Reverse Traversal:

* In a singly linked list, reverse traversal is not possible, as every node stores only the address of the next node. In case of a doubly-linked list, reverse traversal is possible, but it consumes more memory, as we have to allocate extra memory to store the previous pointer.
* While in arrays, we can do a simple reverse traversal with the help of a for loop.

Ans 5.

Circular lists are used in applications where the entire list is accessed one-by-one in a loop. It is also used by the Operating system to share time for different users, generally uses a Round-Robin time-sharing mechanism. Multiplayer games use a circular list to swap between players in a loop

Ans6.

Circular linked list is a linked list where all nodes are connected to form a circle. There is no NULL at the end. A circular linked list can be a singly circular linked list or doubly circular linked list. Advantages of Circular Linked Lists: 1) Any node can be a starting point.