Assignment -2

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Ans 1- Data Structure is way that specifies that how to organize and manipulate the data. It also defines the relationship between them.

Data Structure are Stack ,Queue ,LinkedList ,Arrays etc.

Ans 2- Compiler Design ,Operating system ,Database Management System ,Graphics ,Simulation ,Numerical Analysis ,Artificial Intelligence are some application of Data Structure.

Ans 3- a) The Size of LinkedList is incremented at runtime. But in Array it is not possible.

b) The number of elements in the linked list are limited to the available memory space while the number of elements in the array is limited to the size of an array.

c) LinkedList stores the elements dynamically while array stores statically.

Ans 4-

struct node

{

**int** data;

    struct node \*next;

};

struct node \*head, \*ptr;

ptr = (struct node \*)malloc(sizeof(struct node));

Ans 5- Doubly linkedlist is complex type of list. In this node contains the pointer on next node as well as previous node.

Ans 6- Stack is ordered list in which insertion and deletion are performed at the one end this is called top. It is recursive data structure having pointer on top. Stack follows LIFO that is element inserted first in the stack deleted will be in the last from the stack.

Ans 7- Two Queues are needed. One stores data elements and another stores priorities.

Ans 8- There are three type of traversal technique of tree.

1. Pre Order
2. In Order
3. Post Order

Ans 9- Binary Search tree is a data Structure which uses the concept of BST. It is having special quality that every node has at most two child and the left child of every node has value than node and right child has more value than node. Using this rule in BST is easy.

Ans 10- Graphs are used in circuit networks where points of connection are drawn as vertices and component wires become the edges of the graph.

Graphs are used in transport networks where stations are drawn as vertices and routes become the edges of the graph.

Graphs are used in maps that draw cities/states/regions as vertices and adjacency relations as edges.

Graphs are used in program flow analysis where procedures or modules are treated as vertices and calls to these procedures are drawn as edges of the graph.

Ans 11- Yes Binary Search is Possible on Sorted linked list, If the list is sorted and we know the count of sorted list. But we can access single element at a time through pointer if it previous element or next.

Ans 12-GNU malloc. Under Linux using GNU libc, the kernel and/or C run-time will sometimes detect memory allocation or usage errors without doing anything special in your code or using any external tool.

Ans 13- Binary Search Tree always having two child. Right Child will be always greater than left child.

Ans 14-**Stack**. Because of its LIFO property it remembers its 'caller' so knows whom to return when the function has to return. Recursion. makes use of system **stack** for storing the return addresses of the function calls.

Ans 15-The **stack** can be used to convert some infix expression into its postfix equivalent, or prefix equivalent. These postfix or prefix notations are used in computers to express some expressions

Ans 16- Question is Incomplete.

Ans 17-We follow this algorithm for sorting stack.

1. Create a temporary stack say **tmpStack**.
2. While input stack is NOT empty do this:
   * Pop an element from input stack call it **temp**
   * while temporary stack is NOT empty and top of temporary stack is greater than temp,  
     pop from temporary stack and push it to the input stack
   * push **temp** in temporary stack
3. The sorted numbers are in tmpStack

Ans 18- This will be two step process.

1. Pop the elements from the queue and insert into the stack. (Topmost element of the stack is the last element of the queue)
2. Pop the elements of the stack to insert back into the queue. (The last element is the first one to be inserted into the queue)

Ans 19- 1. Create an empty stack.

1. One by one dequeue items from given queue and push the dequeued items to stack.
2. Enqueue the contents of stack at the back of the queue
3. Dequeue (size-k) elements from the front and enque them one by one to the same queue

Ans 20- Calculate the length of Linked List. Let the length be len.  
2) Print the (len – n + 1)th node from the beginning of the Linked List

Ans 21- 1.Initialize three pointers prev as NULL, curr as head and next as NULL.

2.Iterate trough the linked list. In loop, do following.  
 Before changing next of current,  
store next node  
next = curr->next

Now change next of current  
 This is where actual reversing happens  
 curr->next = prev

Move prev and curr one step forward  
prev = curr  
curr = next

Ans 22-A solution can be provided using maps. The array element and its index are stored in two columns in the map and later the index is replaced by the element's rank.

* Elements in a map will be stored in sorted order, so on iterating it, the elements will be in an increasing order sequence.
* Assign values for each element in increasing order starting from 1 to n, incrementing by 1 for each element.

Ans 23-??

Ans 24-A simple solution is to sort the given array using a O(N log N) sorting algorithm like Merge sort, Heap sort etc and return the element at index k-1 in the sorted array.

Time Complexity of this solution is O(N Log N)

Ans 25 -1.We start the recursive function with the starting **vertex**.

2.For each node. Whenever we visited one **vertex** we mark it and go for all its unvisited adjacent **nodes**. If we found the destination **vertex** then **count** the **number** else we go for recursive call.

-Payal Jha