ANS-1. Data structures are the arrangement of memory blocksin the computer main memory (i.e. the RAM) to store a collection of data in such a way that the performing common and most frequent operations on them becomes easier and efficient.

ANS-2. Data structure is everywhere…..forget about programing.... taking example from real life…let me give you few examples:

**Queue**- You stand in a queue. First come first server or First In first Out (FIFO).

**Stack**: You take a dish from the pile of dishes in restaurant. The top dish which you take was the last entered when someone washed the dished and made the stack. Last In First Out (LIFO)

**Searching**: Suppose You search a word from dictionary where words are alphabetically sorted. You unknowingly use binary search. How? For example, let’s assume you are going to search the word “Queen”. You randomly open a page in the middle and the page is starting with word “K”. So you will go for next pages to search the word “Queen” as Q comes after K. Then you open another page from K page. Let’s say the word start from T. So you know “Queen” will be before that but ofcourse after K. That is how you search the word Queen and is called binary search.

**List**- Your family tree is a list structured as tree. If you don’t have any children yet, you are the leaf node.

**Graph**: You go to school or office every day. there are 5 roads that takes you to your school/office from home but you prefer to choose the shortest distance. How? Data structure

ANS-3. A) Array can’t be re-size after the allocation of memory but but Linked list an be incremented or decremented at runtime.

B) LinkList stores the data Dynamically but Array doesn’t.

C) execution time of insertion or deletion in Linklist is O(1) while in Array O(n)

ANS-4.

// A Singly linked list node

struct Node {

    int data;

    struct Node\* next;

};

ANS-5. Doubly linked list allows element two-way traversal and can be used to implement stacks as well as heaps and binary trees whereas Singly Linked list is generally used for implementation in stack.

ANS-6.

1) Array is collection of similar data type identified by an index array whereas stack is a linear data structure represents sequential collection of element in fixed order.

2) Array is a random access operation we can insert and delete at any position on the other hand stack work on LIFO manner (last in first out).

3) Array contain value that belongs to same data type but stack contain value that belongs to different data type.

4) Array can perform many operations like insert, delete, sorting etc. whereas stack can perform push, pop and peep operation.

ANS-7. Two Queues are needed. One stores data elements and another stores priority.

ANS-8. trees can be traversed in 2 different ways.

1. ***Depth First Traversal***: Traverse depth wise. It includes these three-
2. ***INORDER***
3. ***PREORDER***
4. ***POSTORDER***
5. ***Breath First Traversal:*** Traverse breadth wise.

ANS-9. Because the Binary Search Tree allows for fast retrieval of elements stored in the tree as each node key is thoroughly compared with the root node, which discards half of the tree.

ANS-10. Graphs are nothing but connected nodes(vertex). So any network related, routing, finding relation, path etc related real life applications use graphs.

Connecting with friends on social media, where each user is a vertex, and when users connect they create an edge.

Using GPS/Google Maps/Yahoo Maps, to find a route based on shortest route.

ANS-11. Yes, Binary search is possible on the linked list if the list is ordered and you know the count of elements in list. But While sorting the list, you can access a single element at a time through a pointer to that node i.e. either a previous node or next node. This increases the traversal steps per element in linked list just to find the middle element. This makes it slow and inefficient.

ANS-12. A memory leak will occur when a program allocates memory but doesn't release it properly. The application no longer has any reference to the memory location, but the operating system thinks that the memory is still allocated to the application, making it unavailable.

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 (Last In First Out) 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.

1) Many computer algorithms work best with stacks --- stacks are used for

a) remembering partially completed tasks, and  
b) undoing (backtracking from) an action.

2) Arithmetic expression evaluation

3) The Java compiler translates programs into postfix notation…which is done by stack.

4)  A good real-life example of a stack is the pile of dinner plates that you encounter when you eat at the local cafeteria: When you remove a plate from the pile, you take the plate on the top of the pile. But this is exactly the plate that was added ("inserted'') most recently to the pile by the dishwasher. If you want the plate at the bottom of the pile, you must remove all the plates on top of it to reach it.