1. What are the OOP concepts in Python?

Class, Object, Data Encapsulation, Data Abstraction, Inheritance, Polymorphism.

2. What is a class?

Class is a collection of objects of similar type. Class is a user defined data type in Python.

Class is a combination of data members (variables) and member functions (methods).

Syntax: Class Classname:

Statements

3. What is an object?

Object is collection of number of entities that has state and behaviour and it may be any real world entity. Everything in python is an object.

Syntax: objectname=classname(arguments)

4. What is data encapsulation?

The wrapping up of data and function into a single unit is called data encapsulation. The advantage is information hiding.

5. What is data abstraction?

The data abstraction refers to the act of representing essential features without including the background details (or) any implementations.

6. What is inheritance?

Inheritance is a process by which the object of one class can acquires (or) inherits the properties of objects of another class.

The advantage of inheritance is Data reusability i.e. adding the additional features to the existing data without modifying it.

7. What is polymorphism?

It refers to the ability to take more than one form. In polymorphism, an operation may exhibit different behaviours at different instances.

8. What is a constructor?

A constructor is a special member function that gets called automatically when the object of a class is created.

Syntax: def __init__ (self):

#initializations

9. What is single inheritance?

In this type of Inheritance a single child class can acquires the properties from single parent class is called single Inheritance.

Syntax:

```
Class Baseclass:
    Body of Baseclass
Class derivedclass(baseclass):
    Body of derivedclass
```

10. What is multiple inheritance?

In this type , a single child class can acquires the properties from two or more parent classes is called multiple Inheritance.

Syntax:

```
class baseclass1:
    Body of baseclass1
class baseclass2:
    Body of baseclass2
Class derivedclass(baseclass1,baseclass2)
    Body of derivedclass
```

11. What is multi level inheritance?

In this type, a derived class can inherits or acquires the properties (or) attributes from another derived class.

Syntax:

Class baseclass:

```
    Body of baseclass
Class derivedclass1(baseclass):
    Body of derivedclass1
Class derivedclass2(derivedclass1):
    Body of derivedclass2
```

12. What is hierarchical inheritance?

In this type, multiple derived classes can inherits or acquires the properties from single base class.

Syntax:

```
Class baseclass:
        Body of baseclass
Class derivedclass1(baseclass):
        Body of derivedclass1
Class derivedclass2(baseclass):
        Body of derivedclass2
```

13. What is hybrid inheritance?

The combination of multilevel and multiple Inheritance is called hybrid inheritance.

Syntax:

```
Class baseclass1:
    Body of baseclass1
Class derivedclass1(baseclass1):
   Body of derivedclass1
Class baseclass2:
        Body of baseclass2
Class derivedclass2(derivedclass1,baseclass2):
```

Body of derivedclass2

14. What is an operator overloading?

Operator overloading: The + operator can take two inputs and gives us the result depending on what the inputs are.

15. What is function overloading?

Function overloading/method overloading: We can use the same function name to create functions that performs a different task is called function overloading.

16. What is method overriding?

In inheritance, the child class inherits or requires the methods and attributes from the parent class. Also it is possible to modify a method in a child class that it has inherited from the parent class. This process of re-implementing the method in a child class is known as method overriding.

17. What is abstract class in python?

Any class that contains abstract methods is called abstract class.

Syntax: from abc import ABC

#abc is the library where a class ABC is imported

ABC stands for abstract base class.

18. What is a data structure?

A logical or mathematical representation of data is known as data structure.

19. What is linear data structure?

The elements are accessed and stored in a sequential manner is called linear data structure.

Ex: Arrays, Lists, Stacks, Queues, Linked lists

20. What is non-linear data structure?

The elements are accessed and stored in a random order is called non-linear data structure.

Ex: Trees, Graphs

21. Define list?

List is a collection of mixed data types which is ordered and changeable.

List allows duplicate members.

List is written with square brackets.

22. Define tuple?

Tuple is a collection of mixed data types which is ordered and unchangeable.

Tuple allows duplicate members.

Tuples are written with rounded brackets.

23. Define set?

Set is a collection of mixed data types which are unordered and unindexed.

Set doesn't allow duplicate members.

Sets are written with curly brackets.

24. Define dictionary?

A dictionary is a collection of mixed data types which is unordered, changeable and indexed.

In python dictionaries are written with curly brackets, and they have keys and values.

25. What is searching?

The process of finding the location of a key element from a set of elements.

26. What is linear search?

Linear searching is a sequential searching algorithm where we start from one end and check every element within list until desired element is found.

27. What is binary search?

Binary searching is the fastest searching algorithm and it is based on divide and conquer method. In this approach finding the key element based on the middle element.

28. What is sorting?

Sorting is nothing but arranging the giving list of elements either in ascending order or descending order.

29. What is bubble sort?

It is the shortest and simplest sorting technique in python.

Bubble sort is a basic algorithm for arranging the set of numbers or other elements in the correct order.

30. What is selection sort?

Selection sort is a sorting algorithm that selects the smallest element from an unsorted list in each iteration and places that element at the beginning of the unsorted list.

31. What is insertion sort?

Insertion sort is a simple sorting algorithm that builds the final sorted array (or list) one item at a time by comparisons.

32. What is quick sort?

Quicksort is a highly efficient sorting technique that divides a large data array into smaller ones.

Quick sort is based on the principle of divide and conquer.

33. What is merge sort?

Merge sort is based on the principle of divide and conquer.

It combines two given sorted arrays into single sorted array.

34. What is linked list?

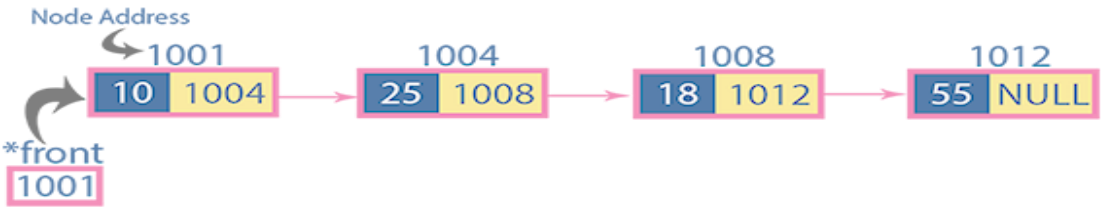
The linked list is a linear data structure that contains a sequence of elements (nodes) such that each element links to its next element in the sequence.

35. What is singly linked list?

In a singly linked list, each node links to only the next node in the sequence, i.e if we start traversing from the first node of the list, we can only move in one direction. Each element in a single linked list is called "Node".

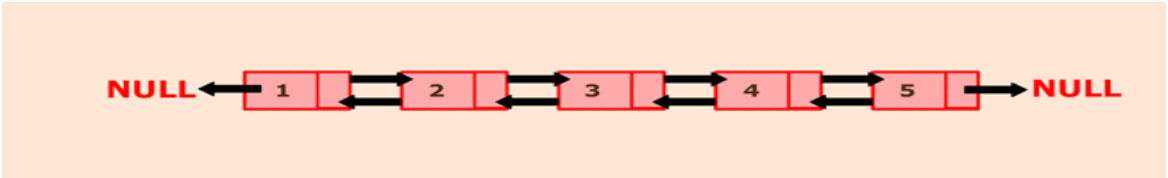
Every "Node" contains two fields, data field, and the next field.

Example



36. What is doubly linked list?

In doubly linked list each node contains three fields data field, address of previous node, address of next node.



37. What is circular linked list?

The circular linked list is the collection of nodes in which tail node also point back to head node.

38. What is a stack?

Stack is a linear data structure in which the insertion and deletion operations are performed at only one end. In a stack, adding and removing of elements are performed at a single position which is known as "top". That means, a new element is added at top of the stack and an element is removed from the top of the stack. In stack, the insertion (PUSH) and deletion (POP) operations are performed based on LIFO (Last In First Out) principle.

39. What is a queue?

Queue is a linear data structure in which the insertion and deletion operations are performed at two different ends. In a queue data structure, adding and removing elements are performed at two different positions. The insertion is performed at one end and deletion is performed at another end. In a queue data structure, the insertion operation is performed at a position which is known as 'rear' and the deletion operation is performed at a position which is

known as 'front'. In queue data structure, the insertion and deletion operations are performed based on FIFO (First In First Out) principle.

40. What is priority queue?

A priority queue is an abstract data type that behaves similarly to the normal queue except that each element has some priority, i.e., the element with the highest priority would come first in a priority queue. The priority of the elements in a priority queue will determine the order in which elements are removed from the priority queue.

41. What is a graph?

A graph is a non-linear data structure consisting of nodes and line joining the nodes (called edges).

42. What are the types of graphs?

- null graphs
- undirected graphs
- directed graphs
- cycle graph
- acyclic graphs
- weighted graphs
- un weighted graphs
- connected graphs
- disconnected graphs
- complete graphs
- multi graph

43. What is depth first search (DFS)?

DFS is an algorithm that is used to traverse a graph. The algorithm efficiently visits and marks all the key nodes in a graph in an accurate depth wise fashion. Stack data structure can be used to implement the DFS algorithm.

44. What is breadth first search (BFS)?

BFS is an algorithm that is used to traverse a graph .The algorithm efficiently visits and marks all the key nodes in a graph in an accurate breadth wise fashion. Queue data structure can be used to implement the BFS algorithm.

45. What is a tree?

A Tree is a non-linear data structure and a hierarchy consisting of a collection of nodes such that each node of the tree stores a value and a list of links to other nodes.

46. What is a binary tree?

A binary tree is a rooted tree that is also an ordered tree in which every node has at most two children.

47. What are the binary tree traversals?

Traversal is a common operation performed on data structures. It is the process in which each and every element present in a data structure is "visited" (or accessed) at least once. This may be done to display all of the elements or to perform an operation on all of the elements.There are 3 types of traversals.

1. In order

2. Pre order

3. Post order

48. What is binary search tree (BST)?

A binary search tree follows some order to arrange the elements. In a Binary search tree, the value of left node must be smaller than the parent node, and the value of right node must be greater than the parent node. This rule is applied recursively to the left and right sub trees of the root.

49. What is AVL tree?

AVL tree is a self-balancing binary search tree in which each node maintains extra information called a balance factor whose value is either -1, 0 or +1.

50. Write different types AVL Rotations?

There are basically four types of rotations which are as follows:

1. L L rotation: Inserted node is in the left subtree of left subtree of A
2. R R rotation : Inserted node is in the right subtree of right subtree of A
3. L R rotation : Inserted node is in the right subtree of left subtree of A
4. R L rotation : Inserted node is in the left subtree of right subtree of A