**Assignment 4**

1. **Explain the divide and conquer algorithm?**

Ans: Divide and Conquer is an algorithmic pattern. In algorithmic methods, the design is to take a dispute on a huge input, break the input into minor pieces, decide the problem on each of the small pieces, and then merge the piecewise solutions into a global solution. This mechanism of solving the problem is called the Divide & Conquer Strategy.

Divide and Conquer algorithm consists of a dispute using the following three steps.

1. **Divide** the original problem into a set of subproblems.
2. **Conquer:** Solve every subproblem individually, recursively.
3. **Combine:** Put together the solutions of the subproblems to get the solution to the whole problem.

2. **Explain Binary search?**

Ans: **Binary Search Approach:** Binary Search is a searching algorithm used in a sorted array by repeatedly dividing the search interval in half. The idea of binary search is to use the information that the array is sorted and reduce the time complexity to O(Log n). The basic steps to perform Binary Search are:

* Begin with an interval covering the whole array.
* If the value of the search key is less than the item in the middle of the interval, narrow the interval to the lower half.
* Otherwise, narrow it to the upper half.
* Repeatedly check until the value is found or the interval is empty.

**3. Mention the difference between list and tuple?**

Ans:

| SR.NO. | LIST | TUPLE |
| --- | --- | --- |
| 1 | Lists are mutable | Tuples are immutable |
| 2 | Implication of iterations is Time-consuming | The implication of iterations is comparatively Faster |
| 3 | The list is better for performing operations, such as insertion and deletion. | Tuple data type is appropriate for accessing the elements |
| 4 | Lists consume more memory | Tuple consume less memory as compared to the list |
| 5 | Lists have several built-in methods | Tuple does not have many built-in methods. |
| 6 | The unexpected changes and errors are more likely to occur | In tuple, it is hard to take place. |

4**. Explain how memory is managed in python?**

Ans: Memory allocation is an essential part of the memory management for a developer. This process basically allots free space in the computer's virtual memory, and there are two types of virtual memory works while executing programs.

* Static Memory Allocation
* Dynamic Memory Allocation

Static Memory Allocation -

Static memory allocation happens at the compile time. For example - In C/C++, we declare a static array with the fixed sizes. Memory is allocated at the time of compilation. However, we cannot use the memory again in the further program.

Dynamic Memory Allocation

Unlike static memory allocation, Dynamic memory allocates the memory at the runtime to the program. For example - In C/C++, there is a predefined size of the integer of float data type but there is no predefine size of the data types. Memory is allocated to the objects at the run time. We use the Heap for implement dynamic memory management. We can use the memory throughout the program.

5. **What is pickling and unpickling?**

Ans: In Python, **pickling** is the process by which Python objects are converted to byte streams. Pickling is about serializing the object structure in python.

Pickle module (imported using import pickle) accepts any python objects and converts it into a string represesntation and dumps it into a file using a dump() method, this process is known as pickling.

**Unpickling** is the process of retrieving original python objects from the stored string representation i.e from the pickle file. It is the process of converting a byte stream into the python object.

6. **Explain Searching algorithms?**

Ans: Searching Algorithms are designed to check for an element or retrieve an element from any data structure where it is stored. Based on the type of search operation, these algorithms are generally classified into two categories:

Sequential Search:

In this, the list or array is traversed sequentially and every element is checked. For example: Linear Search.

Interval Search:

These algorithms are specifically designed for searching in sorted data-structures. These type of searching algorithms are much more efficient than Linear Search as they repeatedly target the center of the search structure and divide the search space in half.