

Syllabus for Programming in Python recruitment test

IITM Online Degree Project

1. Python refresher
 - a. Types, expressions, strings, lists, tuples
 - b. Python memory model: names, mutable and immutable values
 - c. List operations: slices, list comprehension
2. Python libraries:
 - a. Numpy for numerical computing
 - b. Matplotlib for plotting
3. Basic algorithmic analysis
 - a. Input size, asymptotic complexity, $O()$ notation
4. Data structures
 - a. Arrays and lists
 - b. Stack, queues, heaps
5. Searching and Sorting
 - a. Binary Search
 - b. Insertion Sort, Selection Sort, Merge sort, Quicksort
 - c. Stable sorting
6. Graph algorithms
 - a. Examples, graph representation (adjacency matrix, adjacency list)
 - b. Breadth First Search (BFS), Depth First Search (DFS)
 - c. Shortest paths, spanning trees
 - d. Directed and undirected graphs, directed acyclic graphs
7. Divide and conquer algorithms
8. Abstract data types
 - a. Classes and objects in Python
 - b. "Linked" lists: find, insert, delete
 - c. Binary search trees: find, insert, delete
 - d. Height-balanced binary search trees.
9. Efficient evaluation of recursive definitions
 - a. memorization, dynamic programming: examples
10. Network Flows, Linear Programming (as generic models for algorithmic problems)