Alright! Here's a **detailed study roadmap** with **in-depth topics and key questions** for **DSA**, **Python**, and **Java**—perfect for deep learning and interview prep. You can tick each off as you go.

## **🧠 Data Structures & Algorithms (DSA)**

### **📌 1. Arrays & Strings**

* **Concepts**: Sliding window, prefix sum, two pointers, hashing, sorting
* **Problems**:
  + Two Sum, Kadane’s Algorithm, Rotate Array
  + Longest Substring Without Repeating Characters
  + Merge Intervals, Pascal’s Triangle
  + Minimum Swaps, Dutch National Flag problem

### **📌 2. Linked List**

* **Concepts**: Singly, Doubly, Circular, Fast & Slow pointers
* **Problems**:
  + Reverse Linked List (iterative/recursive)
  + Detect Loop (Floyd’s Cycle)
  + Merge Two Sorted Lists
  + Intersection Point of Two Linked Lists
  + LRU Cache (LinkedList + HashMap)

### **📌 3. Stacks & Queues**

* **Concepts**: Stack using arrays/LL, queue, deque, monotonic stack
* **Problems**:
  + Next Greater Element
  + Min Stack / Max Stack
  + Valid Parentheses
  + Sliding Window Maximum
  + Implement Stack/Queue using Queues/Stacks

### **📌 4. Trees & BST**

* **Concepts**: Traversals (inorder, preorder, postorder), recursion, height/depth, LCA
* **Problems**:
  + Diameter of Binary Tree
  + Check if Balanced / Symmetric
  + Lowest Common Ancestor
  + Level Order Traversal, Zigzag Traversal
  + Convert Sorted Array to BST

### **📌 5. Heaps & Priority Queue**

* **Concepts**: Min/Max Heap, custom comparators
* **Problems**:
  + Kth Largest Element
  + Merge K Sorted Lists
  + Top K Frequent Elements
  + Median in a Stream

### **📌 6. Graphs**

* **Concepts**: DFS, BFS, Union-Find, Dijkstra, Topo sort
* **Problems**:
  + Detect Cycle in Graph
  + Number of Islands
  + Clone a Graph
  + Shortest Path in Grid
  + Course Schedule

### **📌 7. Dynamic Programming**

* **Concepts**: Memoization, Tabulation, State transitions
* **Problems**:
  + 0/1 Knapsack
  + Longest Common Subsequence
  + Longest Increasing Subsequence
  + Coin Change
  + House Robber

### **📌 8. Greedy Algorithms**

* **Concepts**: Activity Selection, Fractional Knapsack
* **Problems**:
  + N Meetings in One Room
  + Job Sequencing Problem
  + Huffman Encoding
  + Minimum Platforms

## **🐍 Python Programming**

### **📌 1. Core Basics**

* Syntax, Indentation, Variables, Comments
* Input/Output, Data Types
* Type Conversion

### **📌 2. Data Types & Collections**

* Lists, Tuples, Sets, Dictionaries
* Comprehensions (list/set/dict)
* Useful built-ins: zip(), enumerate(), map(), filter(), lambda

### **📌 3. Control Flow**

* if, else, elif, while, for, break, continue, pass

### **📌 4. Functions**

* def, arguments, return, recursion
* \*args, \*\*kwargs
* Scope: local, global, nonlocal

### **📌 5. Object-Oriented Programming**

* Classes, Objects
* Inheritance, Polymorphism, Encapsulation
* Magic methods (\_\_init\_\_, \_\_str\_\_, etc.)

### **📌 6. Error Handling**

* try, except, finally, raise
* Custom Exceptions

### **📌 7. File Handling**

* open(), read/write modes
* with context
* CSV/JSON parsing

### **📌 8. Advanced Topics**

* Generators, Iterators
* Decorators, Closures
* Regular Expressions

### **📌 9. Useful Libraries**

* requests (APIs)
* os, sys, time, datetime
* pandas, numpy, matplotlib (basics for data)

## **☕ Java Programming**

### **📌 1. Core Syntax**

* Variables, Data Types, Loops, Operators, Arrays

### **📌 2. OOP Concepts**

* Class, Object, Inheritance, Abstraction, Interface
* super, this, method overloading/overriding

### **📌 3. Exception Handling**

* try, catch, finally, throw, throws
* Custom Exceptions

### **📌 4. Java Collections Framework**

* List, Set, Map, Queue
* ArrayList vs LinkedList, HashMap vs TreeMap
* Iterators, Comparator, Comparable

### **📌 5. File I/O**

* FileReader, BufferedReader, Scanner
* Writing to files using FileWriter

### **📌 6. Multithreading**

* Thread class, Runnable interface
* Synchronization, wait/notify, ExecutorService

### **📌 7. Java 8 Features**

* Lambda Expressions
* Streams API
* Functional Interfaces
* Method References

### **📌 8. JDBC**

* Connecting Java to MySQL
* Connection, Statement, ResultSet

Let me know if you'd like:

* 📘 A printable PDF or doc version
* 🧩 Suggestions for **5 mini projects** (Python)
* 📚 Curated list of **LeetCode/Striver/Love Babbar** matching the above DSA topics

Ready to build that next-gen skillset 🔥💻