Complete Java Mastery Micro-Syllabus with Practice Questions

This document provides a complete roadmap for mastering Java, including syllabus details and extensive practice questions for each topic. Use this as your ultimate guide for learning Java from basics to advanced levels.

# 📌 Phase 1: Java Basics & Core Concepts (2-3 Weeks)

This phase covers Java fundamentals including syntax, control flow, and functions.

## Practice Questions:

* 1. Write a Java program to check whether a given number is even or odd.
* 2. Implement a Java program to swap two numbers without using a third variable.
* 3. Write a Java program to find the factorial of a number using recursion.
* 4. Create a Java program to check if a number is prime or not.
* 5. Write a program to print the Fibonacci series up to 'n' terms.

# 📌 Phase 2: Object-Oriented Programming (OOP) & Design Principles (2-3 Weeks)

Learn about classes, objects, inheritance, polymorphism, and design principles.

## Practice Questions:

* 1. Create a Java class called 'Car' with attributes like brand, model, and speed. Implement methods to accelerate and brake.
* 2. Implement a class hierarchy where 'Animal' is the superclass and 'Dog' and 'Cat' are subclasses with their own behaviors.
* 3. Write a program to demonstrate method overloading and method overriding in Java.
* 4. Create an interface 'Playable' with a method 'play()'. Implement this interface in two different classes, 'Guitar' and 'Piano'.
* 5. Design an Employee Management System with attributes like ID, name, salary, and department, following OOP principles.

# 📌 Phase 3: Java Collections Framework (JCF) (1-2 Weeks)

Understand Lists, Sets, Maps, and Queues with their real-world applications.

## Practice Questions:

* 1. Write a Java program to remove duplicates from an ArrayList.
* 2. Implement a custom LinkedList class with basic operations like add, remove, and search.
* 3. Use HashMap to count the occurrences of words in a given paragraph.
* 4. Write a Java program to implement a simple LRU Cache using LinkedHashMap.
* 5. Implement a priority queue using Java's PriorityQueue class.

# 📌 Phase 4: Exception Handling & File Handling (1-2 Weeks)

Handling errors and working with files in Java.

## Practice Questions:

* More practice questions will be added for this section.

# 📌 Phase 5: Multithreading & Concurrency (2-3 Weeks)

Learn about threads, synchronization, and concurrency.

## Practice Questions:

* More practice questions will be added for this section.

# 📌 Phase 6: Java Memory Management & JVM Internals (2-3 Weeks)

Understand JVM architecture and garbage collection.

## Practice Questions:

* More practice questions will be added for this section.

# 📌 Phase 7: Data Structures & Algorithms (DSA) in Java (4-6 Weeks)

Solve problems on arrays, linked lists, trees, graphs, and DP.

## Practice Questions:

* More practice questions will be added for this section.

# 📌 Phase 8: Java for Backend Development (Spring Boot) (3-4 Weeks)

Develop REST APIs and learn Spring Boot essentials.

## Practice Questions:

* More practice questions will be added for this section.

# 📌 Phase 9: Advanced Java & Performance Optimization (3-4 Weeks)

Optimize Java applications and use profiling tools.

## Practice Questions:

* More practice questions will be added for this section.

# 📌 Phase 10: Competitive Coding & System Design (Ongoing)

Practice system design and scalable architecture concepts.

## Practice Questions:

* More practice questions will be added for this section.