

# Java Programming

## 1. Introduction to Java

- a) What is Java – History & Features
- b) Java Editions (SE, EE, ME) & JVM Architecture
- c) JDK, JRE & JVM
- d) Writing and Running Java Programs
- e) Compiling & Executing Java Programs

## 2. Java Fundamentals

- a) Structure of Java Program
- b) Data Types & Variables
- c) Operators & Expressions
- d) Keywords & Naming Conventions
- e) Input / Output Basics
- f) Type Casting & Type Conversion
- g) Decision Making (if, switch)
- h) Looping Structures (for, while, do-while)

## 3. Object-Oriented Programming Concepts

- a) Classes & Objects
- b) Memory Allocation for Objects
- c) Constructors (Default & Parameterized)
- d) Method Overloading & Overriding
- e) This Keyword, Super Keyword
- f) Garbage Collection Basics
- g) Access Modifiers (public, private, protected)

## 4. Inheritance & Polymorphism

- a) Single, Multilevel, Hierarchical Inheritance
- b) Abstract Class & Abstract Methods
- c) Interface & Multiple Inheritance
- d) Polymorphism (Compile-Time & Run-Time)
- e) Final Keyword

## 5. Arrays, Strings & Wrapper Classes

- a) One-Dimensional & Multi-Dimensional Arrays
- b) String Class & Methods
- c) StringBuffer & StringBuilder
- d) Wrapper Classes (Integer, Float, etc.)

## **6. Packages & Exception Handling**

- a) Built-in Packages (java.lang, java.util)
- b) User-Defined Packages
- c) Exception Types in Java
- d) Try-Catch, Finally, Throw/Throws
- e) Custom Exceptions

## **7. Java Collection Framework**

- a) Overview of Collections
- b) List, Set, Map Interfaces & Implementations
- c) Iterators & Enhanced For Loop
- d) Generics & Type Safety

## **8. Multithreading**

- a) Thread Life Cycle
- b) Creating Threads (Thread Class & Runnable Interface)
- c) Synchronization & Thread Safety
- d) Concurrency Basics

## **9. I/O & Streams**

- a) File Handling (java.io)
- b) InputStream & OutputStream
- c) Reader & Writer Classes
- d) Buffering & Character Streams

## **10. Advanced Concepts**

- a) JDBC – Database Connectivity
- b) Basics of Servlets & JSP (for Web)
- c) Lambda Expressions & Streams (Java 8+)
- d) Introduction to Swing / AWT
- e) REST APIs with Java (Servlet / Spring basics)

### **Projects:**

- a) Mini Projects (Console / GUI)
- b) Real-World Problem Solving
- c) Code Optimization & Debugging
- d) Industry Case Studies