FAIZ COMPUTER INSTITUTE

Java Programming Syllabus

1. Introduction to Java Programming

- Overview of Java programming language
- Java development environment setup (IDE, JDK installation)
- Basic structure of a Java program (main method, classes)
- Writing and running your first Java program
- Introduction to the JVM (Java Virtual Machine)

2. Basic Syntax and Data Types

- Keywords, identifiers, and data types
- Variables, constants, and literals
- Operators: Arithmetic, Relational, Logical, Assignment
- Input and Output: `System.in`, `System.out`, `Scanner` class
- Type casting and conversions

3. Control Structures

- Conditional Statements: `if`, `else`, `switch`
- Looping Statements: `for`, `while`, `do-while`
- Nested loops and conditional statements
- Break and continue statements

4. Arrays and Strings

- One-dimensional and multidimensional arrays
- Array initialization, manipulation, and traversal
- Passing arrays to methods
- String handling in Java: `String` class, methods like `substring()`, `indexOf()`, `equals()`, etc.
- StringBuilder and StringBuffer

5. Functions (Methods)

- Defining methods (functions) in Java
- Method declaration, definition, and calling
- Method parameters (pass by value, pass by reference)
- Method overloading
- Recursion in Java

6. Object-Oriented Programming (OOP) Basics

- Classes and Objects: Defining classes, creating objects
- Constructors and destructors (Garbage collection in Java)

- Encapsulation: Private, public, and protected access modifiers
- Member functions and data members
- Static members and methods

7. Inheritance

- Introduction to inheritance in Java
- Single, multi-level, and hierarchical inheritance
- Constructor chaining in inheritance
- Method overriding
- `super` keyword

8. Polymorphism

- Introduction to polymorphism
- Static polymorphism: Method overloading
- Dynamic polymorphism: Method overriding and virtual methods
- Abstract classes and interfaces
- The `abstract` keyword and interfaces

9. Exception Handling

- Introduction to exception handling
- `try`, `catch`, `throw`, and `throws`
- Custom exceptions and exception hierarchy
- The `finally` block
- Multi-catch exceptions

10. Collections Framework

- Introduction to Java Collections
- List, Set, Map interfaces and implementations: `ArrayList`, `LinkedList`, `HashSet`, `TreeSet`, `HashMap`, `TreeMap`
- Iterators in Java
- Sorting and searching in Collections
- Generics in collections

11. File Handling

- Introduction to file handling in Java
- File I/O using `FileReader`, `FileWriter`, `BufferedReader`, `BufferedWriter`, `PrintWriter`
- Reading and writing text files
- Working with binary files: `FileInputStream`, `FileOutputStream`
- Serializing and deserializing objects

12. Multithreading and Concurrency

- Introduction to multithreading in Java
- Creating threads using `Thread` class and `Runnable` interface

- Thread synchronization and locking
- Thread life cycle and states
- Inter-thread communication and thread safety

13. GUI Programming with JavaFX (Optional)

- Introduction to JavaFX
- Creating simple graphical user interfaces (GUIs)
- JavaFX components: Buttons, Labels, TextFields, etc.
- Event handling in JavaFX
- Layouts in JavaFX: BorderPane, VBox, HBox

14. Database Connectivity (JDBC)

- Introduction to JDBC (Java Database Connectivity)
- Connecting to a database (MySQL, SQLite, etc.) using JDBC
- Executing SQL queries (SELECT, INSERT, UPDATE, DELETE)
- Working with `ResultSet` and `PreparedStatement`
- Closing connections and resources

15. Final Projects

- **Project Ideas**:
  - Build a simple banking system
  - Develop a student management system with file handling
  - Create an inventory management system using Collections
  - Design a basic e-commerce platform (Product catalog, shopping cart)
  - Implement a multi-threaded file downloader