JAVA

Introduction to Java Programming

- History of Java
- Features of Java
- The Java Development Kit (JDK) and Java Runtime Environment (JRE)
- Java Virtual Machine (JVM) and how Java programs are executed
- Java syntax and basic programming structure

2. Basic Java Concepts

- Data types, Variables, and Constants
- Operators (Arithmetic, Logical, Relational, etc.)
- Input/Output using Scanner and System.out
- Control structures:
    - If-else statements
    - Switch-case
    - Loops (for, while, do-while)
- Arrays and Strings

3. Object-Oriented Programming (OOP) in Java

- Classes and Objects
- Constructors and Destructors
- Inheritance
- Polymorphism (Method Overloading and Method Overriding)
- Encapsulation
- Abstraction (Abstract Classes and Interfaces)
- Static keyword (Static Variables, Methods, Blocks)

4.Exception Handling

- Try-catch blocks
- Types of exceptions (Checked vs Unchecked)
- Finally block
- Throw and Throws keyword
- Custom exceptions

5. Java Collections Framework

- Introduction to Collections and its hierarchy
- Lists: ArrayList, LinkedList
- Sets: HashSet, TreeSet
- Maps: HashMap, TreeMap
- Queue and Deque
- Iterators and Looping through Collections
- Comparable and Comparator interfaces

6. Multithreading in Java

- Introduction to Threads
- Thread life cycle
- Creating Threads by extending Thread class and implementing Runnable interface
- Thread synchronization
- Inter-thread communication
- Deadlock and how to avoid it

7. File Handling in Java

- File class and its methods
- Reading and writing files using:
    - FileReader and FileWriter
    - BufferedReader and BufferedWriter
    - Scanner for file reading
    - Serialization and Deserialization
- Working with directories

8. Java I/O Streams

- Byte Streams (InputStream, OutputStream)
- Character Streams (Reader, Writer)
- Object Streams
- Buffered Streams

9. Java GUI Development

- Introduction to Abstract Window Toolkit (AWT)
- Swing components (JFrame, JButton, JLabel, JTextField, etc.)
- Layout Managers
- Event Handling in GUI

10. Java Networking

- Networking basics (Client-Server architecture)
- Sockets and Ports
- Working with URLs
- HTTP requests and responses
- Creating simple client-server applications using Socket and ServerSocket classes

11. Java Database Connectivity (JDBC)

- Introduction to JDBC
- Connecting Java with a database (MySQL, SQLite, etc.)
- CRUD operations (Create, Read, Update, Delete)
- Prepared Statements
- Transactions and batch processing

12. Advanced Java Features

- Lambda Expressions
- Stream API for bulk data operations
- Optional class
- Functional Interfaces (Consumer, Supplier, Predicate, Function)
- Default and Static Methods in Interfaces
- Method References
- Introduction to Java 9 modules

13. Java Frameworks (Optional)

- Spring Framework basics
- Hibernate for ORM (Object-Relational Mapping)
- JavaFX for Rich Client Applications

14. Testing in Java

- Unit testing with JUnit
- Test-driven development (TDD) principles
- Mocking and testing with Mockito

15. Deployment and Build Tools

- Introduction to Maven and Gradle for dependency management and project build
- Packaging Java applications into JAR/WAR files

Running Java applications in different