Java Basics

1. Structure of a Java Program

A Java program consists of:

- **Package declaration** (optional)
- **Import statements** (if required)
- **Class declaration**
- **Main method** (entry point)
- **Statements inside the main method**

Example:

```
// Example Java Program
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello, World!");
    }
}
```

2. Syntax and Keywords

Java Syntax Rules:

- Java is **case-sensitive**.
- Statements end with a **semicolon (;).**
- Code is enclosed in **curly braces `{}`**.
- The main method must be **public static void main(String[] args)**.
- Indentation is recommended for readability.

Java Keywords:

Some common **reserved keywords** in Java:

- Data types: `int`, `double`, `char`, `boolean`
- Control flow: `if`, `else`, `switch`, `while`, `for`, `do`
- Access modifiers: `public`, `private`, `protected`
- Other: `class`, `static`, `void`, `return`, `new`

3. Data Types, Variables, and Constants

Data Types:

Java has **primitive** and **non-primitive** data types:

- **Primitive:** `byte`, `short`, `int`, `long`, `float`, `double`, `char`, `boolean`
- **Non-Primitive:** `String`, `Arrays`, `Classes`

Variables:

A variable stores data and must have a **type and name**.

Example:

```
int age = 25;
String name = "John";
```

```
boolean isJavaFun = true;
```
Constants:
Use `final` keyword to declare a constant.
Example:
```
final double PI = 3.14159;
```

4. Operators
Java provides different types of operators:
Arithmetic Operators
+, -, *, /, %
```
int a = 10, b = 5;
System.out.println(a + b); // Output: 15
```
Relational Operators
==, !=, >, <, >=, <=
```
System.out.println(a > b); // Output: true
```
Logical Operators
&&, ||, !
```
System.out.println(a > 5 && b < 10); // Output: true
```
Bitwise Operators
&, |, ^, ~, <<, >>
```
int x = 5; // 0101 in binary
System.out.println(x << 1); // Output: 10 (Left
shift)
```

5. Control Flow Statements
if-else Statement
Used for decision-making.
Example:
```
if (age >= 18) {
    System.out.println("Eligible to vote");
} else {
    System.out.println("Not eligible to vote");
}
```

switch Statement
Used when there are multiple conditions.
Example:
```
int day = 3;
switch(day) {
    case 1: System.out.println("Monday"); break;
    case 2: System.out.println("Tuesday"); break;
```

```
    case 3: System.out.println("Wednesday"); break;
    default: System.out.println("Invalid day");
}
```

Loops in Java

for Loop

Used when the number of iterations is known.

```
for (int i = 1; i <= 5; i++) {
    System.out.println(i);
}
```

while Loop

Used when the condition is checked first.

```
int i = 1;
while (i <= 5) {
    System.out.println(i);
    i++;
}
```

do-while Loop

Executes at least once before checking the condition.

```
int i = 1;
do {
    System.out.println(i);
    i++;
} while (i <= 5);
```
