

# CSE310:PROGRAMMING IN JAVA

L:3 T:0 P:2 Credits:4

**Course Outcomes:** Through this course students should be able to

CO1 :: explain basic constructs of Java programming and apply them to solve the real-world problems

CO2 :: Illustrate the Object-oriented programming principles to write efficient and reusable codes.

CO3 :: demonstrate the concept of inheritance to reuse and extend the features of existing class with access control

CO4 :: contrast the uses of abstract classes, interfaces and Lambda expressions

CO5 :: use of exception handling and input/output techniques to improve the robustness and reliability of Java applications

CO6 :: integrate collections and generics to ensure clean, robust, and maintainable Java code

## Unit I

**Introduction to Java** : History and Features of Java, Java program structure, Writing simple Java class and main() method, Command-line arguments, Understanding JDK, JRE and JVM

**Data In the Cart** : Using primitive data types, Type conversion, Keywords, Identifiers, Variables, Access modifiers, static keyword, Wrapper class

**Operators** : Working with Bit-wise, arithmetic, logical, and relational operators, Unary, assignment and Ternary operator, Operator precedence

**Conditional Statements** : Using if/else constructs and switch-case statements

## Unit II

**Loops** : Working with for loop, while loop, do-while loop and for-each loop

**Arrays and Enums** : Fundamentals about Arrays, Multi-dimensional arrays, Array Access and Iterations, Using varargs, Enumerations

**OOP Concepts** : Basics of class and objects, Writing constructors and methods, Overloading methods and constructors, this keyword, initializer blocks

**String Class** : Constructors and methods of String and String Builder class

## Unit III

**Inheritance and Polymorphism** : Inheritance, Method overriding, super keyword, Object class and overriding toString() and equals() method, Using super and final keywords, instanceof operator

**Abstract Class and Interface** : Abstract method and abstract class, Interfaces, static and default methods, Using Swing Components to demonstrate inheritance

## Unit IV

**Functional Interface and Lambda Expressions** : Using Lambda expressions, Implementing Threads using Lambda expressions, Implementing Listener using Lambda expressions

**Nested Class** : Understanding the importance of static and non-static nested classes, Local and Anonymous class

**Utility Classes** : Working with Dates

## Unit V

**Exceptions and Assertions** : Exception overview, Exception class hierarchy and exception types, Propagation of exceptions, Using try, catch and finally for exception handling, Usage of throw and throws, handling multiple exceptions using multi-catch, Autoclose resources with try-with resources statement, Creating custom exceptions, Testing invariants by using assertions

**I/O Fundamentals** : Describing the basics of input and output in Java, Read and write data from the console, Using streams to read and write files, Writing and read objects using serialization

## Unit VI

**Collections and Generics** : Creating a custom generic class, Using the type inference diamond to create an object, Using bounded types and Wild Cards, Creating a collection by using generics, Implementing an ArrayList, Implementing TreeSet using Comparable and Comparator interfaces, Implementing a HashMap, Implementing a Deque

## **List of Practicals / Experiments:**

### **Exception Handling**

- Program to demonstrate the use of all the keywords used for exception handling and need of assertion

### **Multithreading**

- Program to implement multithreading using Lambda Expressions.

### **Creating a Java Main Class**

- Program to implement a java class.

### **Managing Multiple Items**

- Program to demonstrate the use of list of items.

### **Describing Objects and Classes**

- Program to demonstrate the instantiation of class and accessing the attributes using object of class.

### **Manipulating and Formatting the Data in Your Program**

- Program to demonstrate the uses of String and StringBuilder

### **Using Inheritance**

- Program to demonstrate the inheritance and its importance using Swing Components.

### **Overriding Methods, Polymorphism, and Static Classes**

- Program to implement polymorphism and using proper access control.

### **Abstract and Nested Classes**

- Program to demonstrate the use of abstract class and nested class.

### **Java IO**

- Program to implement read and write operation using console and File.

### **Text Books:**

1. PROGRAMMING WITH JAVA: A PRIMER, 4E by E. BALAGURUSAMY, MCGRAW HILL EDUCATION

### **References:**

1. INTRODUCTION TO JAVA PROGRAMMING by Y. DANIEL LIANG, PEARSON
2. JAVA THE COMPLETE REFERENCE by HERBERT SCHILDT, MCGRAW HILL EDUCATION