

## 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