CSE310: PROGRAMMING IN JAVA

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

Course Outcomes: Through this course students should be able to

- Describe basic constructs of Java programming and apply them to solve the real-world problems.
- Illustrate the Object-oriented programming principles to write efficient and reusable codes.
- Examine the concept of inheritance to reuse and extend the features of existing class with access control.
- Discuss the applications of abstract classes, interfaces and Lambda expressions.
- Construct robust java applications to handle environment specific issues at run-time.
- Assess predefined java libraries and in-built data structures to use them for developing efficient java applications.

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: 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 fromthe console, Using streams to read and write files, Writing and read objects using serialization

Unit VI

Generics and Collections: 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 Practical:

- **Creating a Java Main Class:** Program to implement a java class
- **Managing Multiple Items:** Program to demonstrate the use of list of items
- **Manipulating and Formatting the Data in Your Program:** Program to demonstrate the uses of String and StringBuilder
- **Describing Objects and Classes:** Program to demonstrate the instantiation of class and accessing the attributes using object of class
- **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
- **Interfaces and Lambda Expressions:** Program to implement listener using inheritance and Lambda Expressions
- **Threads:** Program to implement multithreading using Lambda Expressions
- **Exceptions and Assertions:** Program to demonstrate the use of all the keywords used for exception handling and need of assertion
- **I/O Fundamentals:** Program to implement read and write operation using console and File
- **Collections:** Program to implement ArrayList, HashMap, TreeSet and Deque

References:

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