CSE310: PROGRAMMING IN JAVA

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

Course Outcomes: Through this course students should be able to

- Write Java code that uses variables, arrays, conditional, loop constructs, primitive numeric data, string data and Java operators
- Access the fields and methods of an object, manipulate text data using the methods of the String and StringBuilder classes
- Implement the various override and invoke methods and use casting without losing precision or causing errors
- Access and create static fields and methods, use classes from the java.time and java.time.format packages to format and print the local date and time
- Use access modifiers, overloaded constructors, simple class hierarchy and demonstrate polymorphism by implementing a Java Interface
- Use Predicate Lambda expression as an argument to method, and to handle checked exception in Java

Unit I

Java Platform Overview: Defining how the Java language achieves platform independence, Differentiating between the Java ME, Java SE, and Java EE Platforms, Evaluating Java libraries, middle-ware, and database options, Defining how the Java language continues to evolve

What Is a Java Program?: Introduction to Computer Programs, Key Features of the Java Language, The Java Technology and Development Environment, Running/testing a Java program

Creating a Java Main Class: Java Classes, The main Method

Data In the Cart: Introducing variables, Working with Strings, Working with numbers, Manipulating numeric data

Managing Multiple Items: Working with Conditions, Working with a List of Items, Processing a list of items

Unit II

Manipulating and Formatting the Data in Your Program: Using the String Class, Using the Java API Docs, Using the StringBuilder Class, More about primitive data types, The remaining numeric operators, Promoting and casting variables

More on Conditionals: Relational and conditional operators, More ways to use if/else constructs, Using Switch Statements, Using the NetBeans Debugger

More on Arrays and Loops: Working with Dates, Parsing the args Array, Two-dimensional Arrays, Alternate Looping Constructs, Nesting Loops, The ArrayList class

Describing Objects and Classes: Working with objects and classes, Defining fields and methods, Declaring, Instantiating, and Initializing Objects, Working with Object References, Doing more with Arrays, Introducing the NetBeans IDE, Introducing the Soccer League Use Case

Creating and Using Methods: Using methods, Method arguments and return values, Static methods and variables, How Arguments are Passed to a Method, Overloading a method

Unit III

Using Encapsulation: Access Control, Encapsulation, Overloading constructors

Using Inheritance: Overview of inheritance, Working with subclasses and superclasses, Overriding methods in the superclass, Introducing polymorphism, Creating and extending abstract classes, Modeling business problems using Java classes, Making classes immutable

Overriding Methods, Polymorphism, and Static Classes: Using access levels: private, protected, default, and public, Overriding methods, Using virtual method invocation, Using varargs to specify variable arguments, Using the instanceof operator to compare object types, Using upward and downward casts, Modeling business problems by using the static keyword, Implementing the singleton design pattern

Unit IV

Abstract and Nested Classes: Designing general-purpose base classes by using abstract classes, Constructing abstract Java classes and subclasses, Applying final keyword in Java, Distinguish between top-level and nested classes

Using Interfaces: Polymorphism in the JDK foundation classes, Using Interfaces, Using the List Interface, Introducing Lambda expressions

Interfaces and Lambda Expressions: Defining a Java interface, Choosing between interface inheritance and class inheritance, Extending an interface, Defaulting methods, Anonymous inner classes, Defining a Lambda Expression

Unit V

Exceptions and Assertions: Handling Exceptions: An overview, Propagation of exceptions, Catching and throwing exceptions, Handling multiple exceptions and errors, Defining the purpose of Java exceptions, Using the try and throw statements, Using the catch, multi-catch, and finally clauses, Autoclose resources with a try-with-resources statement, Recognizing common exception classes and categories, 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, Creating a collection by using generics, Implementing an ArrayList, Implementing a TreeSet, Implementing a HashMap, Implementing a Deque, Ordering collections

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

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 demonstrate the inheritance through interfaces and use of 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

Generics: Program to define generic class and creating generic collection

Collections: Program to implement ArrayList, HashMap,TreeSet and Deque

References:

1. JAVA SE 8 FUNDAMENTALS KIT by ORACLE, ORACLE PRESS
2. INTRODUCTION TO JAVA PROGRAMMING by Y. DANIEL LIANG, PEARSON