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 :: create the uses of abstract classes, interfaces and Lambda expressions.

CO5 :: manage errors and perform multithreaded I/O operations using exception handling and file streams.

CO6 :: utilize collections, generics, and JDBC for advanced 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 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.

Unit IV

Nested Class and Lambda Expressions: : Nested Class, Understanding the importance of static and non-static nested classes, Local and Anonymous class, Functional Interface, Lambda expressions

Utility Classes : Working with Dates

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

Unit V

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

Generics : Creating a custom generic class, Using the type inference diamond to create an object, Using bounded types and Wild Cards.

Multithreading (Threads) : Thread lifecycle., Thread class., Runnable interface, Thread priorities, Synchronization, inter-thread communication

Unit VI

Collections : Creating a collection by using generics, Implementing an ArrayList, Implementing TreeSet using Comparable and Comparator interfaces, Implementing a HashMap, Implementing a Deque.

Unit VI **Java Database Programming** : Introduction to JDBC, JDBC Drivers, CRUD operation Using JDBC, Connecting to non-conventional Databases.

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 by E. BALAGURUSAMY, MCGRAW HILL EDUCATION

References:

1. JAVA THE COMPLETE REFERENCE by HERBERT SCHILDT, MCGRAW HILL EDUCATION

2. INTRODUCTION TO JAVA PROGRAMMING by Y. DANIEL LIANG, PEARSON