U23CS491	Java Programming	L	T	P	J	C
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1.Course Description:

This course provides a comprehensive understanding of Java programming language and its application development capabilities. Through theoretical discussions and hands-on lab exercises, students will learn the foundational concepts of Java, object-oriented programming principles, advanced features of Java 8, exception handling, multithreading, JavaFX for GUI development, and JDBC for database connectivity. By the end of the course, students will have the knowledge and skills to develop robust Java applications and graphical user interfaces.

2.Course Objectives:

1. To understand object oriented programming concepts and the basics of java programming language
2. To know the principles of packages, inheritance and interfaces
3. To understand strings & collections with java 8 features
4. To develop a Java application with exception handling and threads
5. To develop windows-based applications with jdbc

3.Syllabus:

Unit-I: Foundations of Java

Overview of OOP , Object oriented programming paradigms , Features of Object Oriented Programming , Java Buzzwords ; Overview of Java : JVM , JDK , Programming Structures in Java , Classes & its types in Java , Data Types , Variables , Operators , Keywords , Control Statements , Wrapper Classes , Constructors , Methods , Access specifiers ; Arrays & its types , java.util.Arrays , Java Doc comments , I/O classes

Unit-II: Object Oriented Mechanisms

Association , Aggregation , Composition , Polymorphism , Overloading Vs Overriding , Static and Dynamic Binding , Inheritance: Basics , Types of Inheritance , Super, static & final keywords with inheritance and polymorphism , Abstraction , Abstract Classes and Interfaces , Encapsulation , Packages , Access modifiers

Unit-III: Strings, Collections & Java 8 Features

Strings, creation, declaration of a string, storage structure of a string and its methods, StringBuilder, String Buffer, regex , Collection ; Interface , Generics , List, Set, Map interfaces and classes, Comparable , Comparator , Java lambda expressions , Date & time Object in java 1.8 and its functions , Streams

Unit-IV: Exception Handling and Multithreading

Exception handling , Hierarchy, Types of exception, Mechanisms , try , catch , throw , throws and finally , Exception Propagation - Exception in Inheritance - Introduction to Multiprocessing - threads vs process – threads - Creation of thread - Thread states - Thread Lifecycle and its methods, Executor Framework,

Concurrency API, Synchronization Blocks

Unit-V: Javafx & Jdbc

JAVAFX Events and Controls: Event Basics , Handling Key and Mouse Events ; Controls: Checkbox, ToggleButton , RadioButtons , ListView , ComboBox , ChoiceBox , Text Controls , ScrollPane , Layouts , FlowPane , HBox and VBox , BorderPane , StackPane , GridPane; Menus: Basics , Menu bars , MenuItem , JDBC , drivers, Steps to create a JDBC application , DB Connection Pool

List of Laboratory Experiments / Exercises:

1. Implement class, objects, data types, operators, control statements, wrapper classes and scanner classes using java
2. Implement command line arguments with i/o packages using java
3. Implement sequential search, binary search and quadratic sorting algorithms using java
4. Implement encapsulation, abstraction, polymorphism and inheritance using java
5. Implement interface by accessing super class constructors and methods using java
6. Implement string, string functions, string builder, string buffer and regex using java
7. Implement lambda expression & for each() method using java
8. Implement generics-wildcard expression using java
9. Implement stack and queue data structures using java
10. Implement list, map, set, date and time using java
11. Implement exception handling by creating user-defined exceptions using java
12. Implement multithreading and inter-thread communication using java
13. Develop applications using javafx controls, layouts and menus

Projects:

Develop a Java application for any real word problem

Text Books:

1. Herbert Schildt., “Java: The Complete Reference”, 12th Edition, McGraw Hill Education, New Delhi, 2019
2. Cay S.Horstmann., “Core Java Fundamentals”, Volume 1, 11th Edition, Prentice Hall, 2018

References:

1. Deitel P and Deitel H, "Java: How to Program", 11th Edition, Prentice Hall, 2018.
2. James Gosling, Bill Joy, Guy Steele, Gilad Bracha, Alex Buckley and Daniel Smith, "The Java Language Specification – Java SE", 13th Edition, Oracle America Inc., USA, 2019.
3. Matt Weisfeld, "The Object-Oriented Thought Process", 5th Edition, Addison-Wesley Professional, US, 2019.
4. Daniel Liang L, "Introduction to Java Programming", 10th Edition, Pearson Education, New Delhi, 2015

4. Course Outcomes:

CO. No.	Course Outcome	BTL	POs	PSO's
U23CS491.1	Understand the core concepts of Java programming at a conceptual level.	K2	5 ,8 ,9 ,12	1, 2
U23CS491.2	Explain the principles of object-oriented programming (OOP) and apply them to develop Java applications.	K3	5 ,8 ,9 ,12	1, 2
U23CS491.3	Analyze and apply the concepts of strings, collections, and Java 8 features to solve programming problems efficiently.	K4	5 ,8 ,9 ,12	1, 2
U23CS491.4	Develop Java applications with effective exception handling mechanisms and implement multithreading concepts to improve program efficiency.	K3	5 ,8 ,9 ,12	1, 2
U23CS491.5	Design and develop windows-based applications using JavaFX, incorporating various GUI components and event handling mechanisms.	K3	5 ,8 ,9 ,12	1, 2
U23CS491.6	Demonstrate proficiency in utilizing JDBC for database connectivity in Java applications, including connection management and SQL operations.	K3	4 ,5 ,8 ,9 ,10, 12	1, 2
U23CS491.7	Evaluate and troubleshoot Java code for errors and inefficiencies, demonstrating problem-solving skills.	K4	5 ,8 ,9 ,10, 12	1, 2
U23CS491.8	Create well-structured and maintainable Java code following best practices and coding standards.	K5	5 ,8 ,9 ,10, 12	1, 2
U23CS491.9	Collaborate effectively in teams to develop complex Java projects, demonstrating communication and teamwork skills.	K6	5 ,8 ,9 ,10, 12	1, 2
U23CS491.10	Present and defend Java projects, articulating design choices, implementation strategies, and outcomes effectively.	K6	5 ,8 ,9 ,10, 12	1, 2

5. Course Articulation Matrix:

CO	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
U23CS491.1	-	-	-	-	2	-	-	2	3	-	-	3	2	1	-
U23CS491.2	-	-	-	-	2	-	-	2	3	-	-	3	2	1	-
U23CS491.3	-	-	-	-	2	-	-	2	3	-	-	3	2	1	-
U23CS491.4	-	-	-	-	2	-	-	2	3	-	-	3	2	1	-

CO	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
U23CS491.5	-	-	-	-	2	-	-	2	3	-	-	3	2	1	-
U23CS491.6	-	-	-	2	3	-	-	2	3	2	-	3	3	2	-
U23CS491.7	-	-	-	-	3	-	-	2	3	2	-	3	3	2	-
U23CS491.8	-	-	-	-	3	-	-	2	3	2	-	3	3	2	-
U23CS491.9	-	-	-	-	3	-	-	2	3	2	-	3	3	2	-
U23CS491.10	-	-	-	-	3	-	-	2	3	2	-	3	3	2	-
Course to PO	-	-	-	2	2	-	-	2	3	2	-	3	2	1	-