| Course Code CSE2006 | Programming in Java | Course Type | Credits |
|---|---|---|---|
| | | LP | 3 |

**Objectives:**

**Objectives**

● To understand the basic concepts of Java and Java flow control
● To create Java technology applications that leverage the object-oriented features of the Java language, such as encapsulation, inheritance, and polymorphism
● To Implement error-handling techniques using exception handling and creating high-performing multi-threaded applications
● To Implement input/output (I/O) functionality to read from and write to data and text files and understand advanced I/O streams
● To Perform multiple operations on database tables using both JDBC and JPA technology and Java Collections framework

**Expected Outcomes:**

**Students who complete this course will be able to**
● Analyze the Java flow control using essentials of Java programming.
● Solve simple business problems using an object-oriented approach
● Demonstrate synchronization among different processes using a multithreading approach and exception handling techniques
● Implement Java Input and Output streaming using Java packages
● Develop and create real-time applications using JDBC and JPA technology

**Student Outcomes (SO):**
a. An ability to apply the knowledge of mathematics, science and computing appropriate to the discipline
b. An ability to analyse a problem, identify and define the computing requirements appropriate to its solution.
c. An ability to design, implement and evaluate a system / computer-based system, process, component or program to meet desired needs.

| Unit No. | Unit Description | No of Hours | SO |
|---|---|---|---|
| 1 | **Java Introduction** | 6 | a, b, c |
| | Java Hello World, Java JVM, JRE and JDK, Difference between C & C++, Java Variables, Java Data Types, Java Operators, Java Input and Output, Java Expressions & Blocks, Java Comment | | |
| | **Java Flow Control** | | |
| | Java if...else, Java switch Statement, Java for Loop, Java for-each Loop, Java while Loop, Java break Statement, Java continue Statement | | |

| 2 | **Java Object-Oriented Programming** | 6 | **a, b, c** |
|---|---|---|---|
| | **Java OOP (Basics)** | | |
| | Java Class and Objects, Java Methods, Java Constructor, Java Strings, Java Access Modifiers, Java this keyword, Java final keyword, Java Recursion, Java instance of Operator, Java Single Class and Anonymous Class, Java enum Class | | |
| | **Java OOP (Inheritance & Polymorphism)** | | |
| | Java Inheritance, Java Method Overriding, Java super Keyword, Abstract Class & Method, Java Interfaces, Java Polymorphism (overloading & overriding), Java Encapsulation | | |
| | **Java OOP (Other types of classes)** | | |
| | Nested & Inner Class, Java Static Class, Java Anonymous Class, Java Singleton, Java enum Class, Java enum Constructor, Java enum String, Java Reflection | | |
| 3 | **Java Exception Handling** | 6 | **a, b, c** |
| | Java Exceptions, Java Exception Handling, Java try...catch, Java throw and throws, Java catch Multiple Exceptions, , Java Annotations Types | | |
| | **Multithreading** | | |
| | Introduction, Thread Creations, Thread Life Cycle, Life Cycle Methods, Java Synchronization methods, User-defined packages | | |
| 4 | **Java List & I/O Streams** | 6 | **a, b, c** |
| | String classes, methods, operations on Strings and 1-D Arrays, 2-D and Jagged Arrays and its operations | | |
| | Java Collections Framework, Java Collection Interface, Java List Interface, Java Array List, Java Vector, Java Stack | | |
| | Introduction to Byte-oriented and Character-oriented streams, Java I/O Streams, and Java Reader/Writer | | |
| 5 | **Database Applications with JDBC** | 6 | **a, b, c** |
| | Database Applications with JDBC: Defining the layout of the JDBC API - Connecting to a database by using a JDBC driver - Submitting queries and getting results from the database - Specifying JDBC driver information externally | | |

| | | Java Persistence API | | |
|---|---|---|---|---|
| | | JPA architecture, ORM COmponents, - Performing CRUD operations using the JDBC API. JPA installation, Java Persistence Query language, Creating JPA entities, Advanced mappings | | |
| 6 | | **Guest Lecture on Contemporary Topics** | 02 | |
| | | **Total Lecture:** | 32 | |

**Mode of Teaching and Learning**:
*Flipped Classroom, Activity-Based Teaching/Learning, Digital/Computer-based models, wherever possible to augment lecture for practice/tutorial and minimum 2 hours lectures by industry experts on contemporary topics.*

**Mode of Evaluation and Assessment:**
*The assessment and evaluation components may consist of unannounced open book examinations, quizzes, student's portfolio generation, and assessment, and any other innovative assessment practices followed by faculty, in addition to the Continuous Assessment Tests and Term End Examination.*

**Text Book(s):**

| 1. | Herbert Schildt, "Java The complete reference", 11th edition, Oracle press , 2018 |
|---|---|

**Reference Book(s):**

| 1. | Oracle University Reference E-Kit |
|---|---|
| 2. | Deitel and Deitel, "Java How to Program (Early objects)",10thedition,Pearson, 2015 |
| 3. | Cay S.Horstmann and Gary Cornell, "Core Java Vol I–Fundamentals",8thedition,Pearson, 2011 |
| 4. | Steven Holzner et al., "Java 2 Black Book", Dreamtech press, Reprint edition 2010 |

| No. | Indicative List of Experiments | SO - i |
|---|---|---|
| 1 | Write a program to implement constructor in java. | |
| 2 | Write a program to implement Class concept in java. | |
| 3 | Write a Program to implement method overloading by using static method in java. | |
| 4 | Write a Program to implement method overloading in single class in java. | |
| 5 | Write a Program to implement simple inheritance in java. | |
| 6 | Write a Program to implement method overriding in java. | |
| 7 | Write a Program to call base class constructor using super keyword in java. | |
| 8 | Write a Program to call base class method using super keyword in java. | |
| 9 | Write a Program to implement run time polymorphism by applying dynamic dispatch method in method overriding. | |
| 10 | Write a java Program to using Array. | |
| 11 | Write a java Program to implement Abstract class. | |
| 12 | Write a java Program to implement Interface. | |
| 13 | Write a java Program to implement multithreading by extending Thread class. | |

| 14 | Write a Java program to fetch data from database using (JDBC-ODBC bridge). | |
|---|---|---|
| 15 | Write a Java program to calculate factorial of any number entered by user using looping statements | |
| 16 | Write a java program using I/O streams | |
| **Recommendation by the Board of Studies on** | | 27.12.2021 |
| **Approval by Academic council on** | | |
| **Prepared By** | | Dr Lakshmi D |
| **Compiled by** | | Dr. M. Ashwin & Dr. Sandip Mal |