Devi Ahilya University, Indore, India Institute of Engineering & Technology				**II Year B.E. (Computer Engineering) (Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
3RIPC1	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
OBJECT ORIENTED PROGRAMMING	**2**	**1**	**2**	**2**	**1**	**1**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide the knowledge of Object-Oriented Programming Paradigm.
2. To learn basic constructs of programming language that are implementing tools for object-oriented program development.
3. To develop skill to analyze and code for problem solution in object-oriented approach.

Pre-requisites: Basic skills of Programming language.

Course Outcomes (CO) and Program Outcomes (PO) Mapping

CO No.	**Course Outcome**	**Program Outcomes (PO)**
CO1	Explain the fundamental object-oriented concepts such as abstraction, encapsulation, information hiding, inheritance, and polymorphism., Identify and describe object model elements (state, behavior, identity, messages) in problem scenarios., Apply constructor concepts, constructor overloading, and access modifiers to create well-structured classes.	PO-1, PO-2, PO-3, PO-5
CO2	Demonstrate the use of Java features, data types, control structures, and operators for program development., Construct Java classes using instance members, methods, arrays, strings, wrapper classes, vectors, etc., Use string handling and array operations to manipulate and process data in Java applications.	PO-1, PO-3, PO-4, PO-5, PO-12
CO3	Illustrate different types of inheritance and class relationships with suitable examples., Implement runtime polymorphism using dynamic method dispatch and method overriding., Develop modular programs using abstract classes, interfaces, nested classes, and packages., Analyze the merits and demerits of inheritance and polymorphism in real-world application design.	PO-4, PO-5, PO-9
CO4	Apply exception handling mechanisms to manage runtime errors in Java programs., Design user-defined exceptions for application-specific error scenarios., Develop multithreaded programs using thread lifecycle, priorities, scheduling, and inter-thread communication., Implement synchronization techniques to avoid race conditions and ensure thread safety.	PO-2, PO-6, PO-12
CO5	Develop interactive applications using SWING, Event handling, and graphics class object. JDBC concepts and file handling to solve engineering or scientific problems.	PO-2, PO-6, PO-9, PO-12

CO-PO Relationship Matrix

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	2	2	3	-	2	-	-	-	-	-	-	-
CO2	2	-	3	2	2	-	-	-	-	-	-	2
CO3	-	-	-	3	3	-	-	-	2	-	-	-
CO4	-	3	-	-	-	3	-	-	-	-	-	3
CO5	-	3	-	-	-	3	-	-	3	-	-	3

COURSE OF CONTENTS

UNIT-I

Introduction to Object Oriented Programming: Object Oriented Concepts, Merits of Object-Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behavior, Identity and messages. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

UNIT-II

Introduction to Java classes and objects: Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

UNIT-III

Inheritance and Polymorphism: Class relationships: Inheritance and its types, Merits and Demerits, Association, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and Packages, Nested classes.

UNIT-IV

Exception Handling and Multithreading: Exceptions: Need for exceptions, Checked Vs Unchecked exceptions, creating custom exceptions. Multithreading: Introduction, Priorities and scheduling, Inter-thread communication, Thread Synchronization and its life cycle.

UNIT-V

Java I/O, Event Handling and JDBC: Basic concept of streams I/O stream & reader-writer classes. File handling, Designing GUI with Components and Layout Managers, Event Handling, Drawing Objects of Graphics class, MySQL Basics and setup installation, JDBC: Java Database Connectivity, JDBC: Characteristics, Types of JDBC Drivers, JDBC Architectures, Connecting to Database.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Analyze and code the solution to problem using object-oriented paradigm.
2. Understand Java language constructs.
3. Apply object model for software development

BOOKS RECOMMENDED:

[1] Cay S.Horstmann, *Core Java, Volume I – Fundamentals* — 14th Edition, 2025

[2] Herbert Schildt, *The Complete Reference* — 13th Edition, 2024 (for Java SE 21**)**

[3] Scott W Amber, *The Object Primer*, 3/e, Cambridge 2004.

[4] Timothy Budd, *Object Oriented Programming*, 3/e, Pearson Education 2009.

[5] Kathy Sierra, Bert Bates, *Head First Java*, 3/e, Oreilly Publications 2021.

List of Practical Assignment:

1. Experiments to understand program development environment for Java language.
2. Writing program to learn basic language constructs like identifier, variables, datatypes and console input/output.
3. Writing program to learn control statements.
4. Writing program to use class and objects to model problem domain entity in program domain.
5. Writing program to use inheritance and polymorphism features.
6. Programs to use exception and handling condition in execution as class and objects.
7. Experiments to learn multi-thread execution.
8. Writing program to code applications needing concurrency and exploring inter-thread communication mechanism.
9. Experiments to understand stream concept and study various stream abstractions and implementation available in the language.
10. Exploring GUI components and understanding GUI objects and their communication-based program to realize object-oriented programming in action.
