

<b>Devi Ahilya University, Indore, India Institute of Engineering &amp; Technology</b>			<b>III Year B.E. (Electronics and Instrumentation)</b>				
<b>Subject Code &amp; Name</b>	<b>Instructions Hours per Week</b>			<b>Credits</b>			
<b>6EIRC2 OBJECT ORIENTED PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
<b>Duration of Theory Paper: 3 Hours</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>

## Course Objectives:

The course is designed:

1. To understand the basic concepts of Object oriented programming through Java.
2. To understand the process of object instantiation.
3. To learn about branching mechanism.
4. To illustrate handling of arrays and vectors.
5. To demonstrate the use of different types of conditional statements.
6. To understand the concept of inheritance and different types of inheritance.
7. To learn different exception handling techniques in Java.
8. To learn how to read and write files in Java

**Prerequisites (if any):** basics of computer programming

## COURSE CONTENTS

### UNIT-I

#### **Introduction to Object Oriented Programming:**

Object oriented concepts, Need for object oriented programming, Principles of object oriented programming- Abstraction, Encapsulation, Polymorphism, Inheritance; Procedural language vs OOPs, Salient features of Java, Development of Java programming, Access modifiers, Introduction to object model, concept of object initialization, simple Java program structure,

### UNIT-II

#### **Introduction to Java classes and objects**

Java data types, data type conversions and type casting, operators and their precedence, Types of operators, conditional statements- if—else, switch case, ternary operator, Iteration statements- for loop, while expression, do-while, branching mechanism, introduction to classes-class members and member functions, constructors, constructor overloading, String handling, wrapper classes, Arrays and vectors.

### UNIT-III

#### **Inheritance and Polymorphism**

Inheritance basics, Types of inheritance, merits and demerits, application of keyword Super, method overriding and overloading, Inhibiting inheritance of class using Final, Dynamic method dispatch, runtime polymorphism, abstract classes, Interfaces, implementing interfaces, Packages in Java, importing packages and classes into programs, user defined packages

**UNIT-IV**

**Exception handling and Multi-threading**

Introduction to exceptions, need for exceptions, exception handling techniques, exception types, Using try-catch, finally, throw and throws keywords, user defined exceptions,, Multi-threading in Java, Thread class, the Main Thread, creation of new Threads, Thread states, Thread priority, Thread synchronization.

**UNIT-V**

**Java I/O, Applets and Event Handling**

Basic I/O classes, byte streams and character streams, class File, reading and writing Bytes, Applet basics, Applet architecture, Applet class and methods, Applet life cycle, event handling in Java, Delegation event model, types and sources of events, event listeners.

**Course Outcome:**

Students earned credits will develop ability to

CO No.	CO	PO
CO1	Apply the knowledge of Java data types and data operators	PO1
CO2	Understand and apply conditional statements in Java	PO1
CO3	Understand and using iteration statements in Java statements	PO1
CO4	Apply the extension of Java classes using inheritance.	PO1
CO5	Create user defined customized packages in Java.	PO5
CO6	Implement exception handling in Java applications.	PO5, PO1
CO7	Design and develop applications with threads in Java.	PO3
CO8	Understand and design the Graphical User Interface (GUI) in Java Swing.	PO1, PO3
CO9	Understand and design user interactive Java Swing based applications.	PO3, PO1
CO10	Present the implication and understanding on various topics.	PO10, PO9

**CO-PO Relationship**

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	3												
CO2	3												
CO3	2												
CO4	3												
CO5						2							
CO6	1					3							
CO7						3							
CO8	1		2										
CO9	2		3										
CO10										2	3		

## **BOOKS RECOMMENDED:**

- [1] Herbert Schildt, Java The complete reference, McGraw Hill Education private limited, 2013.
- [2] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.
- [3] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.
- [4] Cay S.Horstmann, Core Java, vol-1,8/E, Pearson Education, 2008.

## **List of Practical Assignments:**

1. Write a program that converts inches to centimeters.
2. Write a program in which the program gives output numbers 1 to 10 along with their square roots.
3. Write a program to find the average of five double numbers.
4. Write a program to determine the area of a sector of circle of radius r and angle subtended by the sector at the centre, a. The values of these variables are entered by the user.
5. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
6. Write a program in which a sample of 8 random numbers is generated and an average value is determined by the user.
7. Make a program which uses a for loop to calculate and display squares and cubes of numbers from 1 to 8.
8. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
9. Write a program in which a sample of 8 random numbers is generated and an average value is determined.
10. Write a program in which a class is declared to deal with the characteristics of regular polygons and declare methods for determining area and perimeter. The length of the side and number of sides are declared public.
11. Write a program in which a method is declared to determine volume of a box with length, width and height as variables. The arguments should be passed on by reference.
12. Create a class Circle. Write a program to calculate:
  - (i) circumCircle() - to compute the circumference of a circle.
  - (ii) arcLength – to compute the length of the arc for a given angle.
13. Within the main method of the class Circle, create an object of the class Circle. Compute Circle's circumference when the radius is 10 and arc length when the angle is 45.

14. Write an applet program to display strings in different colors that declares an array of type double and finds out the square roots of the array elements.
15. Write a program to demonstrate the multiplication of two matrices.
16. Write a program in which method overriding is implemented. The super class declares two instance variables i.e. radius and height, and define a method to determine the volume. The sub class determines the volume of cone and cylinder.
17. Make program to determine the trigonometric functions  $\sin()$ ,  $\cos()$  and  $\tan()$  by using methods of Math class for angles 30, 60, and 90 degrees.
18. Declare an interface with a method to calculate volume with one double parameter. Implement the same for finding volume of sphere and volume of a cube.
19. Make an applet program to display strings in different colors.
20. Make an applet program to draw a filled hexagon in orange color.

