Course Code				23BCMAL233			
Title of the Course				**Object Oriented Programming Using Java**			
Offered to: (Programme)				**B. C. A Hons**			
L	**4**	**T**	**0**	**P**	**0**	**C**	**3**
Year of Introduction:	**2024-25**			**Semester:**			**3**
Course Category:	**Major Theory**			**Course Relates to:**	**GLOBAL / NATIONAL / REGIONAL / LOCAL**		
Year of Introduction:	**2024**			**Percentage:**	**NA**		
Type of the Course:				**Skill Development / Employability**			
Crosscutting Issues of the Course :							
Pre-requisites, if any				**Knowledge in any basic programming language**			

Course Description:

This course provides the fundamental components and libraries of the Java programming language, with a strong emphasis on object-oriented programming (OOP) principles. It constitutes as the foundation for Java development, providing the essential building blocks and features for creating robust and scalable applications.

Course Aims & Objectives:

S. No	COURSE OBJECTIVES
1	Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2	Realize fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3	Analyze step by step and develop programs on inheritance and interfaces,arrays and string handling functions
4	Understand the Fundamental features of multi-threaded programs, Exception handling and packages.
5	Understand the principles of applets, I/O streams in java and java database connectivity

Course Outcomes:

At the end of the course, the student will / will be…

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Develop a comprehensive understanding how object-oriented concepts are incorporated into the Java programming language	K2	**1,2**	**1**
CO2	Implementing Object Oriented Programming Concepts(class, constructor, overloading) in java	K3	**1,2**	**1**
CO3	Implementing inheritance and interfaces in a Java program.	K3	**1,2**	**1**
CO4	Implementing Multithreading, exception handling and packages in Java.	K3	**1,2**	**1**
CO5	Implementing Applets, Files and Jdbc Connectivity in Java programs.	K3	**1,2**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**3**	**3**						**2**	
CO2	**2**	**3**						**2**	
CO3	**2**	**3**						**3**	
CO4	**2**	**3**						**2**	
CO5	**2**	**3**						**3**	

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Course Structure:

Unit – I: Introduction to Java Programming (12 Hrs.)

Introduction-Object Oriented paradigm-Basic Concepts of OOP-Benefits of OOP-Applications of OOP- Java features-Simple Java program structure-Java tokens-Java Statements-Implementing a Java Program-Java Virtual Machine-Command line arguments-Constants-Variables-Data Types-Declaration of Variables-Giving Value to Variables-Scope of variables-Symbolic Constants-Type casting-Getting Value of Variables - types of operators with examples-expressions

Description:

This course is tailored to understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.

Examples:

1. Operators concept in java
2. Type casting in java

Exercises:

1. **Design Java program to perform Type Casting in java.**

2. **Develop a Java program for sorting a given list of names in ascending order.**

Learning Outcomes:

By the end of the unit, students will understand the concept and underlying principles of Object-Oriented Programming and object-oriented concepts are incorporated into the Java programming language

Web Resources:
Prof.Debasis Samanta, Dept of Computer science, IIT Kharagpur."Basic Concepts of Java Programming", 2018.

https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1

Unit – II: Control statements, Classes, Objects and Methods (12 Hrs.)

Introduction-Decision making with if statement-Simple if statement-If Else statement-Nesting of if else statements-The else if ladder-The switch statement-The conditional operator-The While statement-The do-while statement-The for statement- Jumps in loops-Defining a class-Adding variables-Adding methods-Creating objects-Accessing class members-Constructors-Method overloading-Static members-Nesting of methods

Description:
This unit provides fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.

Examples:

1. Control statements in java

2. Constructors, Method overloading, Static keyword in java

Exercises:

1.Create a class Rectangle. The class has attributes length and width. It should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user.

2. Construct a Java program that implements method overloading

Learning Outcomes:
By the end of this unit, students will be able to gain knowledge in Implementing Object Oriented Programming Concepts like class, constructor, overloading concepts in java

Web Resources:

Introduction to Classes and Objects in Java , Neso Academy, 7 june 2020

https://www.youtube.com/watch?v=W-D71ZeMixQ&list=PLBlnK6fEyqRiwWLbSXKFtdGV8OVqr9dZr

Unit – III: Arrays, Strings, Inheritance and Interfaces (12 Hrs.)

Extending a class-Overloading methods-Final variables and methods-Final classes-Abstract methods and classes-Arrays- One dimensional arrays- Creating an array – Two dimensional arrays- Strings- Wrapper classes
Multiple Inheritances: Introduction- Defining interfaces- Extending interfaces-Implementing interfaces-Accessing interface variables

Description:

This unit helps in understanding the principles of inheritance and interfaces, array creation and string handling functions

Examples:

1. Types of inheritances.
2. String handling functions and array creation in java

Exercises:

1. **Design a Java program to calculate multiplication of 2 matrices**
2. **Develop a program on Multiple Inheritance.**

Learning Outcomes:
By the end of this unit, students will be able to understand and implement inheritance and interfaces, array creation and string handling functions in a Java program.

Web Resources:
1.Prof.Debasis Samanta, Dept of Computer science, IIT Kharagpur."Inheritance in Java", 2018.

https://www.youtube.com/watch?v=rxsl1TzcEgg

2. Arrays in Java by Neso Academy,2019
https://www.youtube.com/watch?v=kWJHzambtNo&list=PLBlnK6fEyqRiraym3T703apTvEZLaSVtJ
3.What is string in Java **by Lab Mug** ,2023

https://www.youtube.com/watch?v=Vv8ijzbz22s

Unit – IV: Multi-Threading, Exception Handling and Packages (12 Hrs.)

Introduction-Creating Threads-Extending the Threads-Stopping and Blocking a Thread-Lifecycle of a Thread-Using Thread Methods-Thread Exceptions-Thread Priority-Implementing the 'Runnable' Interface-Types of errors-Compile time errors-Run-time errors-Exceptions-Exception handling-Multiple Catch Statements-Using finally statement-Java API Packages-Creating Packages-Accessing a Package- Using a Package.

Description:

This unit helps in understanding and implementing multi-threaded programs, Exception handling and packages.

Examples:
1. Multi-threading in java
2. Types of exception handling mechanisms

Exercises:

1. **Develop a program to create and Import Packages**
2. **Construct Java programs to implement various types of Exception Handling Mechanisms**

Learning Outcomes:

By the end of this unit, students will be able to Implement Multithreading, exception handling and packages in Java

Resources:

1.Prof.Debasis Samanta, Dept of Computer science, IIT Kharagpur."Packages in Java", 2018.

https://www.youtube.com/watch?v=TwU3cv1FFis&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=17

2.Prof.Debasis Samanta, Dept of Computer science, IIT Kharagpur."Exception Handling in Java", 2018.

https://www.youtube.com/watch?v=vUov8EkjZjU&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=23

3. Prof.Debasis Samanta, Dept of Computer science, IIT Kharagpur."Multi Threading in Java", 2018.

https://www.youtube.com/watch?v=6rYOyIGfy3w&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=27

Unit – V: Applets, Streams, I/O Files and Jdbc (12 Hrs.)

Local and remote applets-Applets and Applications-Building Applet code- Applet Life cycle: Initialization state, Running state, Idle or stopped state, Dead state, Display state-Concept of Streams-Stream classes-Byte Stream Classes-Character Stream classes: Reader stream classes, Writer Stream classes-Reading and writing files.

Jdbc introduction-stages in Jdbc program-working with oracle database: inserting, updating and deleting records.

Description:

This unit focuses Understanding the principles of applets, I/O streams in java and java database connectivity

Examples:

1. Applet creation
2. Writing and Reading Files.
3. JDBC Connectivity

Exercises:

1. **Design a program to create an Applet**
2. Create a program for writing and reading Files.

Learning Outcomes:

By the end of this unit, students will be able to implement graphical user interface in Java programs, Input/output Streams in java and java database connectivity with oracle

Resources:

1.Prof.Debasis Samanta, Dept of Computer science, IIT Kharagpur."Applet Programming in Java", 2018.
https://www.youtube.com/watch?v=cC_Ij7WmP_k&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=34

2.Prof.Debasis Samanta, Dept of Computer science, IIT Kharagpur." JDBC", 2018.
https://www.youtube.com/watch?v=ajhWv31oN1k&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=50

3. "File Handling in Java", Learn Coding, 2021.
https://www.youtube.com/watch?v=VJgCjLuU4e8&list=PLqleLpAMfxGDVu5tUmUg9jSQUUB8_5DB0

Specific Resources:

Text Books:

1. E.Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw-Hill Company.

Reference Books:

1. Programming in Java by Sachin Malhotra, OXFORD University Press
2. John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, TATA McGraw-Hill Company.
3. Deitel &Deitel. Java TM: How to Program, PHI (2007)
4. Java Programming: From Problem Analysis to Program Design- D.S Mallik
5. Object Oriented Programming Through Java by P. Radha Krishna, Universities Press (2008)

Web Resources:

Prof.Debasis Samanta, Dept of Computer science, IIT Kharagpur."Basic Concepts of Java Programming", 2018.

https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1

Course Code & Title of the Course:	**23BCMAL233: Object Oriented Programming using Java**
Offered to:	**B. C. A HONS**
Category:	**SEMESTER: 3**
Max. Marks	**70**
Max.Time	**3 Hrs**

Section A: Short Answer Questions (20 Marks)
Answer All questions. Each question carries 4 Marks.

1. a) Discuss about JVM. k2

OR

b) Explain command line arguments with an example k2

2. a) Explain method overloading with an example. k2

OR

b) Discuss concept of static members in java with example. k2

3. a) Discuss about final class k2

b) Illustrate implementing interfaces in java with example. k3

4. a) Describe creating threads in java with an example k4

OR

b) Describe package creation and accessing with example.k4

5. a) Explain character stream classes in java. k2

OR

b) Explain applet creation with example. k2

Section B: Long Answer Questions (50 Marks)
Answer All questions. Each question carries 10 Marks.

6. a) Discuss Object Oriented Programming Principles. k2)

(OR)

b) Discuss Java Buzz words.k2)

7. a) Explain accessing class members with an example. k2

(OR)

b) Explain Constructor with an example. k2

8. a) Illustrate string handling methods in java with examples. k3

(OR)

b) List of different types of inheritance in java and explain with examples. k2

9. a) Explain life cycle of a thread with neat diagram. k2

(OR)

b) Define Exception. Explain Exception handling mechanism in java with examples k2

10. a) Explain life cycle of applet with neat diagram. k2

(OR)

b) Explain different stages in JDBC program with an example.k2