Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-2 (Diploma)

Subject: Object Oriented Programming using Java-DETCE12202

Type of course: Major (Core)

Prerequisite: Basic Knowledge of C Language

Rationale:

This course is designed to teach object-oriented programming concepts, techniques, and applications using the Java programming language. Object-oriented programming emphasis on the fundamentals of the structured design with classes, including development, testing, implementation and documentation also includes object-oriented programming techniques, classes and objects. Java is a simple, portable, distributive, robust, secure, dynamic, architecture neutral, object-oriented programming language. Java programming language is designed to enable the development of a small, reliable, portable, distributed, real-time operating platform, high- performance applications for the widest range of computing platforms possible as well as cross- platform interaction. By making applications available across heterogeneous environments, businesses can provide more services, boost end-user productivity, communication and collaboration to enterprise and consumer applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-ClassRoom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

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Course Content:

Sr. No	Course Content	Hrs.	% Weightage
1	**Introduction to Java** Overview of Java and its history, setting up the Java development environment (IDEs like Eclipse or IntelliJ IDEA), Writing your first Java program, Java data types and variables, Java operators and tokens.	09	15
2	**Classes and Objects** Introduction to Object-Oriented Programming (OOP) concepts, Classes and objects in Java, Declaring and defining classes, Creating and using objects, Constructors and methods in classes.	15	25
3	**Control Flow and Methods** Decision-making statements (if-else, switch), Introduction to loops (for, while, do-while), Methods and functions in Java, Method parameters and return values, Method overloading, Practical examples and exercises on decision making and loops.	18	30
4	**Arrays and Inheritance** Arrays in Java (single-dimensional and multi-dimensional), Introduction to inheritance and the "extends" keyword, Super classes and Sub classes, Method overriding and super keyword, using inheritance to create a class hierarchy, Practical exercises involving arrays and inheritance.	18	30

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Exploring JDK installation process:** Students have to install JDK software in windows/Linux OS (any one) and make a video of installing steps by using external video software and upload it on GMIU web portal. Make sure students face have to appear in video.	10
2	**Micro project:** Students have to make micro project on theoretical concepts learned in class, after the completion of micro project students have to upload on GMIU web portal.	10
3	**OOP Mastery Challenge:** Subject faculty provide questions to students based on OOP concept which may helpful for job interview and students have to answer it on GMIU web portal.	10
	Total	30

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Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage %	30%	40%	20%	10%	-	-

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the fundamental of Java language, including features, components and libraries of Java.
CO2	Demonstrate how to define and use classes, create objects and methods.
CO3	Understand the control flow and loop in Java.
CO4	Create a program to implement an array.
CO5	Design a program for inheritance with all types in Java.

List of Practical

Sr. No	Description	Unit No	Hrs.
1	Install JDK, write a simple "Hello World" or similar java program, compilation, debugging, executing using java compiler and interpreter.	1	2
2	Create a program that models an employee class with attributes like name, ID, and salary. You can create objects of this class to represent employees and perform operations such as adding, updating, or deleting employee records.	1	2
3	Develop a program that simulates a library catalog system. Define a Book class with attributes like title, author, and ISBN. Create objects of the Book class to represent books in the library and implement functions for checking out, returning, and searching for books.	1	2
4	Build a program for managing bank accounts. Create a Bank Account class with methods for depositing, withdrawing, and checking the balance. Use objects of this class to simulate real bank account transactions.	2	2
5	Design a program for working with geometric shapes. Create a Shape class with subclasses like Circle, Rectangle, and Triangle. These classes can have methods for calculating area and perimeter. Use objects of these classes to perform geometric calculations.	2	2

6	Create a program that calculates the grades of students based on their exam scores. Use control flow statements like if-else and methods to determine and display the grades.	2	4
7	Build a simple calculator program with methods for addition, subtraction, multiplication, and division. Use control flow to let the user choose the operation and input numbers.	3	4
8	Develop a game where the program generates a random number, and the user has to guess it. Use control flow to manage the game loop and methods to handle user input and validate guesses.	3	2
9	Create a program to track personal expenses and income. Implement methods for recording transactions and use control flow to display a summary of the user's financial status.	3	2
10	Design a program for a library that checks when books are due. Use control flow to calculate due dates based on the checkout date and a predefined return period. Implement methods for managing the library's book checkout system.	3	4
11	Create an Employee Management System that uses inheritance to model different types of employees (e.g., full-time, part-time, contractors). Each employee type can have specific attributes and methods. Use arrays to store and manage a list of employees. For example, you can calculate the total salary for all employees and display their details.	4	2
12	Design a program that represents different types of bank accounts (e.g., savings, checking, fixed deposit) using inheritance. Each type of account can have specialized methods and properties. Use arrays to manage multiple customer accounts, allowing them to deposit, withdraw, and check balances. Display account information and perform transactions.	4	2
		Total	30

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

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Reference Books:

[1] Intro to Java Programming, 10th edition, Y. Daniel Liang, Pearson.
[2] Object oriented programming with Java, Rajkumar Buyya, S Thamarai Selvi, XingchenChu, McGrawHill
[3] Programming in Java, Sachin Malhotra, Saurabh Choudhary, Oxford
[4] Programming with JAVA, E Balagurusamy, McGrawHill
[5] CORE JAVA volume -I Cay Horstmann, Pearson