SYMBIOSIS INSTITUTE OF TECHNOLOGY, PUNE

Constituent of Symbiosis International (Deemed University), Pune

Course Name: Programming Logic with Java Lab

Course Code:

Faculty: Engineering

Course Credit: 1

Course Level: 3

Sub-Committee (Specialization): UG (Artificial Intelligence and Machine Learning)

Learning Objectives: Students will be able to

- To apply concepts of object-oriented programming for modular and reusable software.
- To design solutions to real-life problems using classes, objects, inheritance, interfaces, and polymorphism.
- To develop hands-on skills using Java for exception-safe, generic, and scalable coding.
- To handle data using files and database connectivity.
- To build small console-based applications demonstrating OOP concepts.

Pre-requisites:

Basics of programming with C or C++.

Course Outline:

Lab No.	Details	Hours	COs
1	Develop a menu-driven calculator using Java, demonstrating operators, control structures, user input handling, and modular programming.	3 hrs	1
2	Create a Vehicle class with attributes like brand, model, year, mileage, and engineCapacity. Add methods to calculate mileage, display details, and update mileage after a trip. Use getters and setters.Extend the program to include an array of vehicles and display summary reports of all vehicles using modular design.	3 hrs	1
3	Implement a Book class with details: title, author, price, stockCount, and ISBN. Create multiple constructors, use exception handling. Implement using List or ArrayList.	3 hrs	2
4	Create a Vector class to represent a 2D or 3D vector. Create functions to add vector, subtract vectors, and dot product. Implement using exceptions.	3 hrs	2
5	Design a Banking application to demonstrate inheritance hierarchy.	3 hrs	3
6	Design an Employee Payroll system to demonstrate different types of inheritance.	3 hrs	3
7	Create Student Record Manager. Store Student details in file. Perform	3 hrs	4

	CRUD operations on file. Also implement exceptions.		
8	Create a application to demonstrate design pattern using Collections.	**3 hrs**	**4**
9	Create a application using Java for Database Connectivity using JDBC.	**3 hrs**	**5**
10	Create a application using JavaFX.	**3 hrs**	**5**
	Total hours	**30**	

Recommended Books:

	Book title	**Authors**	**Publishers**
No.	**Textbooks**		
1.	Java: The Complete Reference	Herbert Schildt	Oracle Press
2.	Head First Java	Kathy Sierra, Bert Bates	O'Reilly
	Reference books		
1.	Let Us Java: Strong Foundation for JAVA Programming (English Edition)	Yashavant Kanetkar	BPB Online
2.	Core Java: An Integrated Approach: Covers Concepts, programs and Interview	R. Nageswara Rao	DreamTech Press

Pedagogy:

- Laboratory Demonstration
- Concept-Based Teaching
- Live Coding Sessions
- Interactive Problem-Solving
- Case Study-Based Learning
- Industry-Level Practices
- Integration of AI Tools

Evaluation:

A. Continuous Assessment

a. Lab Assignments
b. Quiz
c. Mini Project
d. Code Portfolio Submission

B. End Semester Examination

NA

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Course Outcomes:

CO1: Demonstrate the ability to write, debug, and execute basic Java programs using variables, operators, control structures, and modular programming concepts.

CO2: Apply object-oriented programming principles such as classes, objects, constructors and exception handling to build structured Java applications.

CO3: Implement and manage Java applications using inheritance to solve computational problems efficiently.

CO4: Develop applications using Java file handling and Collections mechanisms and apply appropriate design patterns to ensure reusability, modularity, and maintainability of code.

CO5: Build interactive applications integrating JavaFX user interfaces with backend databases using JDBC to perform CRUD operations effectively.

Articulation 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	PSO 1	PSO 2
1	3	2	1	1	1			1		1	2	2		
2	3	2	2	1	1			1		1	2	2		
3	3	2	3	1	2			1		1	2	2		
4	3	2	3	1	3	1	1	2		1	2	2	1	1
5	3	3	3	1	3	1	1	2		2	2	2	1	1

Benchmarked against similar courses in other national/ international universities /organizations:

Sr. No.	Name of the Course	Name of University where it is offered
1.	Object Oriented Programming	SPPU
2.	Programming In Java	IIT Kharagpur
3	Computer Programming	IIT Bombay

Name of the experts designing the course:

Sr. No.	Name	Designation	Organization/ Institute
1.	Mayur Gaikwad	Assistant Professor	SIT Pune