COURSE CODE	COURSE TITLE	L	T	P	C
10211DS204	Programming Using Java	3	0	2	4

A. Preamble

This course provides basic concepts about Object Oriented Programming, Java Packages, Exceptions, Database connectivity, Java Streams, JavaFX and Java Servlets, JSP, Spring and Hibernate. After successful completion of this course learners can able to develop software modules for real world problem.

B. Pre-requisite course

10210CS101 - Problem Solving using C

C.Course Objectives

Learners are exposed to,

- Implement Basic OOP principles to solve problems
- Practice Java basic constructs
- Build efficient Programming practice in Java
- Web application development with DB servers
- Work on Frameworks such as Spring and Hibernate

D.Course Outcomes

Upon the successful completion of the course, students will be able to:

CO No's	Course Outcomes	K - Level
CO1	Explain the fundamentals of Java and Object-Oriented Programming (OOP) concepts to solve problems.	K2
CO2	Apply the concepts of Java inheritance and exception handling mechanisms for real world problem.	K3
CO3	Solve the problems using Java Streams, Collections, UI Design and Threads	K3
CO4	Develop simple web applications using JSP, Servlet with JDBC and Hibernate Framework	K3
CO5	Build the web applications using Spring Framework.	K3
Knowledge Level (Based on revised Bloom's Taxonomy) K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate K6-Create		

D. Correlation of COs with Program outcomes and Programme Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	1											
CO2	1	3	3	1	1								2	1
CO3	1	3	2	2	2								2	2
CO4	1	3	3		2									3
CO5	1	3	3		3									3

3-High; 2-Medium; 1-Low

F. Course contents

Unit 1 Basics of OOP and JAVA **L-9 hours**

Introduction to object-oriented programming - Features of Java - JVM- Keywords- Variables - Data types – Operators - Control statements -Command line arguments - Classes and Methods - Objects –Java Packages – Build-in packages - user-defined package -Access specifiers: private, protected, default, public - Constructors - Method Overloading - Type Casting - this keyword- Static – Arrays, Multi-dimensional Arrays.

Unit 2 Inheritance, Exception Handling and String **L-9 hours**

Basics of Inheritance - Forms of Inheritance - Super keyword – Final - Method Overriding – Abstraction: Abstract Classes - Interfaces. Exception Handling: Java Exception Hierarchy - Exception Types - Throwing and Catching exceptions -Declaring New Exception Types – custom exceptions. String class – Immutable String - String handling methods.

Unit 3 Java Streams, Collections, UI Design, Thread **L-9 hours**

Java Streams: Features, methods – Generic Classes and Methods - Collections Frameworks: List, Queue, Set and Map.JavaFX: Architecture, Effects, Transformation, Animation, Layouts, UI Controls, Event Handling.Threads: Life cycle - Thread states - Thread priority– Thread Synchronization.

Unit 4 Server Programming, Hibernate Framework **L-9 hours**

Introduction to Servlet and JSP, JDBC, Example Web applications with DB - Basics of Java Networking.Introduction to Java Frameworks - Basics of Hibernate – Hibernate Web application - Hibernate Mapping and types – HQL – Annotations – Caching. Integrating Hibernate and Spring.

Unit 5 Java Spring Framework **L-9 hours**

Basics of Spring – Spring in IDE– Dependency Injection – Constructor Injection – Spring ORM: Spring with Hibernate – SPEL -Spring MVC – Spring Web – Spring JDBC – Spring with Angular – Spring Boot.

Total: 45 hours

G. Laboratory Experiments **Total: 30 hours**

PART – 2:

Task 1. Package creation and String.

- Simple Java application with class (Object), Methods
- Developing user defined packages in Java
- Apply String handling methods

Task 2 Inheritance and Interfaces

- To Implement Method overloading, constructor and Method Overriding.
- Use of this, super, static and final keywords
- Developing user-defined interfaces and implementation
- Use of predefined interfaces

Task 3 Exception Handling Mechanism in Java

- Handling pre-defined exceptions
- Handling user-defined exceptions

Task 4 Java Collections

- Handle list of elements using Collection classes (List, Queue, Set, Map)

Task 5. JavaFX

- To Create Different Layouts with JavaFX animation.
- To Design a web application with JavaFX event handling.

Task 6. Threading

- Creation of thread in Java applications
- Multithreading

Task 7. Java-JDBC

- To connect Oracle/ MySQL for Table creation and Data Manipulation.

Task 8. Servlet

- Write a Servlet program to connect Oracle/MySQL for Table creation and Data Manipulation.

Task 9. JSP

- Write a JSP program to connect Oracle/ MySQL for Table creation and Data Manipulation.

Task 10. Spring Standalone and web Application

- Standalone application with data manipulation
- Web application with data manipulation

Task 11. Hibernate Standalone and web Application

- Standalone application with data manipulation
- Web application with data manipulation

PART – 2:
Use cases:

Use case 1: Validated Login for Employee management JSP

Company ABC planned to create a website for maintaining employee details. Login page need to be designed with username, password and captcha. Username is their mail-id and password should contain at-least 1-Uppercase alphabet, 1-special character, 1- lower alphabet. Design the page using front end and server scripting with client / server validation. Use the technologies: HTML5, CSS5, Javascript, JSP.

Use case 2: Event Registration for a University Spring

In a university, they have planned to conduct national level symposium. Students are expected to come from various places from India. University has decided to maintain all participant details such as Participant_name, college name, branch, year, age, and phone. And also generate unique participant ID using ID generator logic. Implement a java application for above scenario with rich user interface and database server. Use the technologies: HTML5, CSS5, Spring framework, MySQL/Oracle.

Use case 3 : E – Applicant System for Student using Spring MVC

E-Applicant system has been planned to implement by an institute. In that, student will be able to request any kind of Certificate like Transfer and Bonafiedetc by applying through this System.The student can check the status through his/her account. There are many users like Internal Staff, HOD, Dean, Registrar and Vice chancellor to verify and approve the request. Above application should be implemented using spring framework with MVC technology with suitable front-end techniques and Database servers. Use the technologies: HTML5, CSS5, Spring framework, MySQL/Oracle.

Use case 4: Stock management with CRUD operations using hibernate

A Pharma Agency decided to manage their business using software. Monitoring Stock entry, sales, shortage, offers, profit and expired medicines are the requirements from the client using the targeted software. Since inserting details, update the offer details and removing expired stock entries, CRUD supported implementation expected to build. Instead of using JDBC API, hibernate suggested to be used for making efficient CRUD operations with database servers. Use the technologies: HTML5, CSS5, Hibernate framework, MySQL/Oracle.

H. Learning Resources

i.Text Books:

1. Herbert Schildt, “Java: The Complete Reference”, Eleventh edition, Tata Mc-Graw Hill, 2019. [unit 1, 2, 3]
2. Jim Keogh, “J2EE: The complete Reference”, First Edition, Tata Mc-Graw Hill, 2017. [unit 4]
3. K. Santosh Kumar, “Spring and Hibernate”, McGraw Hill Education, 2017. [unit 4,5]

ii.Reference Books:

1. H.M. Deitel and P.J. Deitel," Java How to Program", Pearson Prentice Hall Seventh edition, 2018.
2. Balaguruswamy, "Programming in java", Sixth Edition, Tata McGraw Hill, 2019.
3. Jason Hunter, William Crawford, "Java Servlet Programming", Second Edition, O'Reilly-2018.

iii.Online Resources:

1. "Programming in Java", Accessed on: Apr. 20, 2021 [Online], Available: https://nptel.ac.in/courses/106/105/106105191/
2. "Java Tutorial", Accessed on: Apr. 20, 2021 [Online], Available: https://www.javatpoint.com/java-tutorial