



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Computer Engineering / Computer Science & Engineering

Subject Code : DI05000101

Subject Name : Advanced Java Programming

W.E. F. Academic Year:	2026-27
Semester:	5 th
Category of the Course:	PEC-03

Prerequisite:	Basic knowledge of Core Java, OOP concepts, HTML, and databases.
Rationale:	This course provides knowledge and skills in web-based Java programming, covering key technologies like JDBC, Hibernate, Servlets, JSP, WebSockets, and Web Services. It focuses on developing enterprise-level applications using client-server architecture. The course also highlights how advanced Java overcomes limitations of basic Java and enables efficient database interaction, dynamic web development, real-time communication, and platform-independent application integration.

Course Outcome:

After Completion of the Course, Student will be able to:

No	Course Outcomes	RBT Level
01	Implement basic database operations using JDBC.	Apply
02	Develop database-driven Java applications using Hibernate ORM framework.	Apply
03	Develop server-side programs using Servlets.	Apply
04	Develop a Java Server Pages application using JSP tags.	Apply
05	Develop distributed applications using Java networking, socket programming, and web services technologies.	Apply

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Unit No.	Content	No. of Hours	% of Weightage
1.	Java Data Base Connectivity (JDBC) Introduction, JDBC Architecture – 2 tier, 3 tier, JDBC Components, advantages and disadvantages. JDBC API Interfaces: Statement, PreparedStatement, CallableStatement, ResultSet, Transaction processing – commit, rollback, savepoint. Creating simple JDBC Application – (CRUD operations.) JDBC Drivers Types of JDBC drivers, advantages and disadvantages of JDBC drivers.	08	18
2.	Hibernate Introduction to Hibernate, Exploring the Hibernate Architecture. Installation and Setup Downloading, installing and setting up development environment for hibernate, Exploring HQL. ORM Understanding O/R Mapping in Hibernate, Working with Hibernate O/R Mapping – Developing Hibernate configuration file, Hibernate mapping file and Java Beans.	08	18
3.	Servlets Introduction to Servlets, Life Cycle of Servlet. Creating, configuring and deploying echo servlet on Tomcat Server. Servlet Interfaces Parameters and Attributes – HttpServletRequest Interface, ServletContext and ServletConfig Interface, Request Delegation – RequestDispatcher Interface. Session Tracking Mechanisms Types: Cookies, URL Rewriting, Hidden Form Fields, HttpSession (Server-side session) Database Connectivity using Servlet Connecting and reading database/table records and displaying them using servlet, Advantages and Disadvantages of Servlet.	10	22



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4.	Java Server Pages Introduction to JSP, Architecture of JSP, JSP Lifecycle. JSP Elements Directives, Scripting Elements (Declarations, Expressions, and Scriptlets), Action Tags. Database Connectivity with JSP Simple JSP program to fetch database records. Compare JSP and Servlets	10	22
5.	Network Programming with Java Network Programming With java.net Package- InetAddress class, URL class, URLConnection class. Client-Server Communications Establishing two-way communication between Server and Client - TCP/IP client sockets, TCP/IP server sockets. Java Web Services Introduction to Web Services, Web Service Architecture, and Functions of Web Services. Components of Web Service SOAP, UDDI, WSDL Web Service Implementation Implement Hello World SOAP web service using Eclipse.	09	20
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
27	31	42	0	0	0

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



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References/Suggested Learning Resources:

(a) Books:

1. Java Server Programming Java EE 7 (J2EE 1.7), Black Book, Platinum Edition, Kogent Learning Solutions Inc., Dreamtech Press (an imprint of Wiley India Pvt. Ltd.), January 1, 2014, ISBN-10: 9789351194170
2. J2EE: The Complete Reference, Jim Keogh, McGraw-Hill Education, 2002, ISBN-10: 0072224375
3. The Complete Reference: JSP 2.0, Phil Hanna, McGraw-Hill Education, 2003, ISBN-10: 0072229830
4. Java 2: The Complete Reference, Herbert Schildt, McGraw-Hill Education, 1999, ISBN-10: 0072122661

(b) Open source software and website:

1. Hibernate
<https://www.tutorialspoint.com/hibernate/index.htm>
<https://www.javacodegeeks.com/hibernate-tutorials>
2. JDBC Database Access
<https://docs.oracle.com/javase/tutorial/jdbc/>
<https://www.javacodegeeks.com/jdbc-tutorials>
3. Servlet Technologies
<http://www.oracle.com/technetwork/java/index-jsp-135475.html>
<https://www.javacodegeeks.com/java-servlet-tutorials>
4. Java Server Pages
<http://www.oracle.com/technetwork/java/javaee/jsp/index.html>
<https://www.javacodegeeks.com/jsp-tutorials>
5. Networking with java
<https://www.geeksforgeeks.org/socket-programming-in-java/>
<https://examples.javacodegeeks.com/java-socket-programming/>
6. Web services
<https://www.geeksforgeeks.org/what-are-web-services/>
<https://java2blog.com/soap-web-service-example-in-java-using/>
7. The Java EE 6 Tutorial
<https://docs.oracle.com/javaee/6/tutorial/doc/bnafd.html>

Suggested Course Practical List:

- 1) Develop a database application that uses any JDBC driver.
- 2) Develop a program to present a set of choices for the user to select a product and display the price of the selected product.



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- 3) Develop a simple Hibernate web application that displays all records stored in a student table having attributes student_id, student_name and student_branch.
- 4) Develop a simple Hibernate web application that displays total number of employees in an organization with its maximum, minimum, total and average salary of employees.
- 5) Write an HTML code to create a login form having one submit button and two textboxes labeled as Login Name and Password, respectively. Write a Servlet class named ReadParameter to read these parameters and display entered values using doGet() or doPost() method.
- 6) Create a Java application to call one servlet from another servlet.
- 7) Create a web form that processes servlet and demonstrates the use of cookies and sessions. Develop a simple JSP program for user registration and transfer control to the second page.
- 8) Develop a simple JSP program for user registration, and then the control will be transfer it into second page.
- 9) Develop a JSP program to display the grade of a student by accepting the marks of five subjects.
- 10) Develop a JSP application to insert, update and display records in a MySQL database.
- 11) Develop a student login application using MVC architecture and display whether the student is successfully logged in or not.
- 12) Write a client-server program where the client sends two numbers and the server responds with their squares.
- 13) Develop a chat application using socket programming.
- 14) Develop a SOAP web service that prints your name using Eclipse..

List of Laboratory/Learning Resources Required:

1. Computer with latest configuration with Windows/Linux/Unix Operating System.
2. JDK (Java Development Kit) Version 8 or above
3. Apache Tomcat Version 8 or above
4. Any editor - Notepad++, Visual Studio Code, Eclipse IDE, NetBeans IDE

Suggested Project List:

1. Online Chatbot for Customer Support
2. Car Rental System
3. Online Doctor Appointment System
4. Online Food Ordering System
5. Social Networking System
6. Library Management System
7. Online Pharmacy System
8. Online Art Gallery System
9. Online Plant Nursery System
10. Online Crime Reporting System
11. Chat Application
12. Online Weather Forecasting System



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13. Online Hospital Management System
14. Online Legal Services Platform
15. Online Personalized Nutrition System

Suggested Activities for Students:

- a) Undertake micro-project web development in teams.
- b) Discover various advancement in technologies of java with their new features
- c) Prepare charts to explain use/process of the identified topic.
- d) Students are encouraged to register themselves in various MOOCs such as: Swayam, edX, Coursera, Udemy etc. to further enhance their learning.
- e) Encourage students to form a coding club at institute level and can help the slow learners.
- f) Encourage students to interact with the industry person to discuss and gather information of current trends, models, documentation, testing methods and different tools used in industry.