GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Information Technology

Subject Code: DI04016071

Subject Name: Advanced Java Programming

w. e. f. Academic Year:	2025-26
Semester:	4th
Category of the Course:	Professional Elective - II

Prerequisite:	Core Java (OOP, exceptions, collections, file handling) and basic SQL (CRUD, keys, relationships).
Rationale:	To develop dynamic web applications using Java technologies like Swing, JDBC, Servlets, and JSP. It builds skills to design applications with database connectivity and MVC architecture, matching industry needs.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Develop a GUI application using swing components.	Apply
02	Apply JDBC based Methodology for Application Development.	Apply
03	Develop Web Applications using Servlets and deploy in popular servers like Tomcat.	Apply
04	Develop JSP based applications with database connectivity.	Apply
05	Apply MVC architecture in real world java application.	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
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**JAVA SWING** 1.1 Introduction: AWT vs. Swing. 1.2Basic Swing Components: JFrame, JLabel, JTextField, JButton, JCheckBox, JRadioButton and JComboBox. 1.3 Layouts**:** FlowLayout, BorderLayout and GridLayout. 1.4 Events and Listeners**:** Event Delegation Model, ActionEvent (ActionListener), MouseEvent (MouseListener and MouseMotionListener) and KeyEvent (KeyListener).	08	20
2.	**Java Database Connectivity** 2.1 JDBC architecture and API 2.2 JDBC drivers 2.3 DriverManager, Connection, Statement, PreparedStatement, ResultSet. 2.4 Database CRUD operations with JDBC	08	18
3.	**Servlets** 3.1 Servlet architecture & container 3.2 Servlet lifecycle (init, service, destroy) 3.3 Request & Response objects 3.4 Form data handling (GET/POST) 3.5 RequestDispatcher & SendRedirect 3.6 Session management (cookies & HttpSession) 3.7 Servlet with CRUD operations with JDBC.	12	22
4.	**Java Server Pages** 4.1 JSP basics and lifecycle. 4.2 Components: Declaration, Scriptlets, Expressions tag. 4.3 Directives, Implicit objects (request, response, session, application). 4.4 JSP with session. 4.5 JSP with CRUD operations with JDBC.	12	22

5.	**Web MVC Architecture** 5.1 Introduction to MVC Architecture. 5.2 Model layer, View layer and Controller layer 5.3 Advantages of MVC in web applications 5.4 Implementing MVC using Servlet (Controller), JSP (View), and JDBC (Model).	05	18
	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**
30	**40**	**30**	**-**	**-**	**-**

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

References/Suggested Learning Resources:
(a) Books:

Sr. No.	**Title of Book**	**Author**	**Publication with place, year and ISBN**
1	Black Book " Java server programming" J2EE	Kathy walrath	Dream Tech Publishers
2	Complete Reference J2EE	James Keogh	McGraw Publication
3	Java: The Complete Reference	Herbert Schildt	McGraw-Hill ISBN: 9781260440249
4	JSP: The Complete Reference	Phillip Hanna	McGraw Hill Education ISBN: 0072224371

(b) Open source software and website:

1. JDK (Java Development Kit – OpenJDK 8 or higher): https://openjdk.org/
2. Eclipse IDE: https://www.eclipse.org/
3. Apache Tomcat: https://tomcat.apache.org/
4. MySQL Community Edition: https://dev.mysql.com/downloads

Suggested Course Practical List:

The following practical outcomes (PrOs) are the subcomponents of the COs. These PrOs need to be attained to achieve the COs.

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Environment Setup: Install JDK, configure PATH, and run the first Java program in IDE (Eclipse /NetBeans).	**1**	**2**
2	Create a JFrame login form with a label (Enter Username), a textbox (JTextField), and a button (Login).	**1**	**2**
3	Create a JFrame login form with a label (Enter Username), a textbox (JTextField), and a button (Login) using FlowLayout.	**1**	**2**
4	Event HanExtend the previous login window program. When the Login button is clicked, the program should read the username entered in the textbox and then update the label to display the message:	**1**	**2**
5	Configure MySQL database, create database CollegeDB, and test connection from Java.	**2**	**2**
6	JDBC CRUD Operations: Write a program to insert, update, delete, and display student records.	**2**	**2**
7	Take user input (name, email, phone) from the console and store it in the database.	**2**	**2**
8	Install Apache Tomcat, configure with IDE, run a “Hello Servlet”.	**3**	**2**
9	Create a login form (username & password) and process in servlet.	**3**	**2**
10	Session & Cookies in Servlet: •Use HttpSession to store user info.	**3**	**2**

	•Use Cookies to remember last login time.		
11	Create a registration form (name, email, and password) and store/retrieve data from DB using servlet.	**3**	**2**
12	JSP with Session (Shopping Cart): •Select products on the JSP page. •Use session to store items.	**4**	**2**
13	Create a registration form (name, email, and password) and store/retrieve data from DB using JSP.	**4**	**2**
14	Develop a student management system where the database and Student model store details, and a servlet is used to create and list student records.	**5**	**2**
15	Create JSP pages and extend the servlet logic so faculty can view, edit, update, and delete student information.	**5**	**2**
	Total		**30**

Note:-
More Practical Exercises can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.

List of Laboratory/Learning Resources Required:

Sr. No.	Laboratory/Learning Resources/Equipment Name with Broad Specifications	PrO. No.
1	JDK (Java 8 or higher), IDE (Eclipse/NetBeans/IntelliJ)	**All**
2	Apache Tomcat Server, MySQL Database	

Suggested Activities for Students:

Other than the classroom and laboratory learning, following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Explore & Present: Research real-world Java web applications and present case studies.
- Mini Projects: Build small apps like login system, student record manager, or shopping cart.
- Seminars/Group Discussions: Share insights on JDBC, Servlets, or MVC concepts.
- MOOCs/Online Learning: Java-related courses (NPTEL, Coursera).
- Code Practice: Regularly solve Java coding problems on platforms like HackerRank.

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