MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL
(Formerly West Bengal University of Technology)
Syllabus of BCA
(Effective from 2023-24 Academic Sessions)

SEMESTER: VI

DEFINITION OF CREDIT

1 HR LECTURE PER WEEK	1 CREDIT
1 HR TUTORIAL PER WEEK	1CREDIT
2 HR PRACTICAL PER WEEK	1 CREDIT

SUBJECT NUMBERING SCHEME:

CODE FOR THE DEPT. OFFERING SUBJECT	SUBJECT TYPE	SEM	SUBJECT CODE

C	CORE MAJOR

SUBJECT NAME: Advance Java with Web Application **Credit: 5 (3L + 2P)**
SUBJECT CODE: BCAC601

COURSE OBJECTIVE:

The **Advanced Java with Web Application** course aims to provide BCA students with a comprehensive understanding of Java technologies and their application in creating robust, scalable, and dynamic web applications. The course focuses on advanced Java concepts, including servlets, JSP, JDBC, and frameworks, to bridge the gap between core programming and real-world web solutions.

Students will learn to design and develop interactive web applications using Java technologies, emphasizing modular programming, database integration, and web standards. The course explores client-server architecture, multi-threading, session management, and MVC patterns, enabling students to build high-performance, secure, and maintainable web solutions.

This course equips students with practical skills, and problem-solving abilities to address modern challenges in web development and software engineering. It also fosters an understanding of emerging technologies and best practices in Java-based web application development.

Course Outcome	
	DESCRIPTION
CO1	Design and develop interactive, dynamic, and scalable web applications using advanced Java concepts like Servlets, JSP, and JDBC.
CO2	Implement client-server communication, session management, and the MVC architecture for structured web development.
CO3	Integrate database connectivity using JDBC to perform CRUD operations and ensure efficient and secure data handling.
CO4	Deploy web applications on servers (e.g., Apache Tomcat), incorporate RESTful services, and ensure robust application security.

DETAILED SYLLABUS:

Module	**Topics Covered**	**Hours**	**Marks**
M1	Introduction to Java EE: Overview of Java EE Architecture; Difference between Java SE and Java EE; Role of JDBC, JSP, and Servlets in Web Applications; Role of JDBC, JSP, and Servlets in Web Applications	3	5
M2	JDBC (Java Database Connectivity): Introduction to JDBC; JDBC Drivers and Architecture; JDBC Drivers and Architecture; Connecting to Databases; Executing SQL Queries (SELECT, INSERT, UPDATE, DELETE); Use of Statement and Prepared Statement; Result set and Metadata; Transaction management; Batch Processing; commit, rollback, save point	9	12
M3	Java Sever Pages: Introduction to JSP; JSP Lifecycle; JSP syntax and directives; Scriplet, Expression and declaration; JSP Implicit objects; JSP directives; JSP Action Element; Java Beans in JSP; Introduction to JSP Expression Language; Introduction to JSTL Core Tags(<c:if>, <c:choose>, <c:when>, <c:otherwise>, <c:forEach>, <c:forTokens>, <c:param>) and JSTL Functions; Custom Tag Library	12	15
M4	servlet: Introduction to Servlets; Servlet Life cycle; Handling HTTP request and Responses; Purpose and use Servlet Deployment descriptor File; ServletContext and ServletConfig ; Session Management and Cookie; Servlet chaining and Filters; File Upload and download in servlet	12	15

M5	JSP and Servlet : Combining JSP and Servlets; Model View controller Architecture; Forwarding requests between JSP and Servlet	4	12
M6	Overview of Hibernate Framework; Advantages of ORM over JDBC; Hibernate Architecture and Core Components; Setting Up Hibernate in a Java Application; Mapping Java Classes to Database Tables; Hibernate Configuration (XML and Annotations); Basic CRUD Operations: Save, Update, Delete, Retrieve Hibernate Query Language (HQL) Basics	5	11
	INTERNAL EXAMINATION	3	30
	TOTAL	48	100

Practical:

SUBJECT NAME: Advance Java with Web Application Lab Credit: 2
SUBJECT CODE: BCAC691

The practical instruction ought duly to encompass the theoretical curriculum in its entirety, and shall further entail the execution of a modest project, thereby affording the scholar an opportunity to apprehend the principles in earnest, and to apply such knowledge toward the resolution of problems encountered in the affairs of the real world.

Suggested Lab question:
Case Study 1: Online Bookstore Application
Scenario:
You are tasked to develop an Online Bookstore web application. The application should allow users to browse books, search for books by title or author, view details, and place orders. Admin users should be able to add, update, or delete book records.
Lab Questions:

1. **Servlet Basics**
   Create a servlet to display the list of books from a database on a web page.
   Implement a servlet to handle user searches by book title or author.
2. **Session Management**
   Implement session tracking to maintain the user's cart.
   Use HttpSession to store the list of books added to the cart.
3. **JDBC Integration**
   Write a Java program to connect to a database and fetch book records.
   Use Prepared Statement to insert, update, and delete book details securely.
4. **JSP for Dynamic Pages**
   Create a JSP page to display the shopping cart's content dynamically.
   Use JSTL (Java Server Pages Standard Tag Library) for iteration and conditional rendering.
5. **MVC Architecture**

Implement the Model-View-Controller pattern for the application.
Separate business logic (Model) from the presentation (View) and control logic (Controller).

6. **Form Validation and Error Handling**
   Create a user registration form with validation (e.g., email, password strength) using JSP and servlets.
   Implement error handling for invalid user input or database connection issues.

Case Study 2 : Employee Management System

Scenario:

Develop a web-based Employee Management System where employees can log in to view their profiles, and administrators can manage employee records.

Lab Questions:

1. **Login Authentication**
   Create a login servlet to authenticate users based on username and password stored in a database.
   Redirect users to different pages based on their roles (e.g., Employee or Admin).
2. **CRUD Operations with JDBC**
   Write servlets to add, update, view, and delete employee records in a database.
   Ensure proper validation and error handling for all database operations.
3. **Pagination and Sorting**
   Implement pagination to display employee records on the admin dashboard.
   Add sorting functionality for columns like Name, Department, and Salary.
4. **Email Notification**
   Use JavaMail API to send an email notification to employees upon record creation or updates.
5. **Deployment on Apache Tomcat**
   Package the application as a WAR file and deploy it on the Apache Tomcat server.
   Test the application's functionality in a live environment.

SUGGESTED READING:

- Kogent Learning Solutions, JDBC 4.0, Dreamtech Press, 1st Edition
- R. S. Gohil, JDBC Programming, Laxmi Publications, 1st Edition
- S. G. T. Raghavan, Java and JDBC, Oxford University Press, 2nd Edition
- K. S. Shankar, Java Database Programming with JDBC, Wiley India, 1st Edition
- Kogent Learning Solutions, Java Server Programming (JSP, Servlets) Black Book, Dreamtech Press, 1st Edition
- Budi Kurniawan, Java Servlet & JSP, Wrox Press, 2nd Edition
- Hans Bergsten, JavaServer Pages, O'Reilly Media, 3rd Edition
- S. R. S. Sharma, Servlet & JSP Programming, PHI Learning, 1st Edition
- Ramesh F. Gujjula, Mastering Hibernate, BPB Publications, 1st Edition