Semester- III

Web Development using Full Stack Open			
Course Code	**MMCB311A**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- Understand the structure and styling of web pages.
- Develop interactive web applications using React.
- Integrate databases for dynamic content.
- Integrate front-end and back-end components.
- Deploy full-stack applications on cloud services.

Module-1

Basics of Web Technologies: Overview of HTML: structure, elements, and semantics, CSS basics: styling, layouts, and responsiveness, avaScript fundamentals: variables, functions, and DOM manipulation, Integrating HTML, CSS, and JavaScript for a basic web page.

Module-2

Front-End Development with React: Introduction to React: Why use React?, JSX and how it differs from HTML, Components: functional vs. class components, Creating dynamic user interfaces with conditional rendering, Handling user events and form submission, React Hooks: useState, useEffect, useContext, and custom hooks, Introduction to Redux: Setting up a Redux store, actions, reducers.

Module-3

Back-End Development with Node.js: Introduction to Node.js: Features and Architecture, Working with npm and package management, Building a basic server using Express, Middleware functions: Logging, authentication, and error handling, Introduction to MongoDB: NoSQL database concepts, CRUD Operations: Creating, reading, updating, and deleting data, Querying and filtering data using Mongoose, Handling database errors.

Module-4

Full-Stack Integration: concept of full-stack applications, RESTful APIs: Principles and best practices, Data exchange using JSON: Serialization and parsing, Connecting React front-end to Node.js back-end, Introduction to authentication and authorization concepts, Implementing user authentication using JWT (JSON Web Token),, Managing user sessions and tokens.

Module-5

Deployment and Maintenance: Setting up Continuous Integration and Continuous Deployment (CI/CD) pipelines, Automating tests and builds using Jenkins, GitHub Actions, or similar tools, Deploying back-end services using AWS EC2, Heroku, and Docker, Deploying back-end services.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Two Unit Tests each of **25 Marks**
2. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

1. Full Stack Open 2023 by University of Helsinki (Online Course Material)
2. Learning React by Alex Banks and Eve Porcello
3. MongoDB: The Definitive Guide by Shannon Bradshaw, Eoin Brazil, and Kristina Chodorow
4. Node.js Design Patterns by Mario Casciaro and Luciano Mammino

Weblinks and Video Lectures (e-Resources):

- https://youtu.be/Vi9bxu-M-ag?si=OK1-w5YqlKJ5oYh7
- https://youtu.be/nu_pCVPKzTk?si=DOAiec3IorQtKmjA
- https://youtu.be/4EjKroJCpFA?si=gR3jzPn3rgvYwHsl

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the fundamentals of web development using modern technologies.	L1
CO2	Develop full-stack web applications using JavaScript,	L2
CO3	Develop full-stack web applications using React, Node.js	L3
CO4	Develop full-stack web applications using and MongoDB.	L3
CO5	Analyze and solve real-world problems by building scalable web applications.	L4

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3							
CO2	3							
CO3							2	
CO4	3	3						
CO5	3	3		3	2	2		

Semester- III

Rich Internet Application Development			
Course Code	**MMCB311B**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

1. To provide knowledge of rich internet technologies using modern frameworks.
2. To understand and apply client-side scripting, AJAX, and advanced UI/UX.
3. To develop responsive, dynamic, and interactive web applications using frameworks like Angular or React.
4. To learn how to integrate backend services with frontend interfaces.
5. To enable deployment and testing of web applications in real-world environments.

Module-1

Introduction to Rich Internet Applications (RIA) and JavaScript Enhancements: Definition, Evolution, Architecture, RIA vs Traditional Web Applications.Modern JavaScript (ES6+): Let/Const, Arrow functions, Classes, Modules, Promises

Module-2

Client-Side Frameworks and Single Page Applications (SPA): Introduction to SPA – Concepts, Routing, Lifecycle. React.js Basics – Components, Props, State, JSX, Event Handling.

Module-3

AJAX, REST APIs and Asynchronous Communication: AJAX & Fetch API – XMLHttpRequest, Fetch, Axios, Error Handling. Interfacing with REST APIs – JSON, HTTP methods, Postman Testing.

Module-4

Advanced UI Development & State Management: React Advanced – Hooks (useState, useEffect), Context API.UI/UX Libraries – **Material** UI / Bootstrap, Responsive Design Techniques.

Module-5

Deployment, Security and Testing of Web Applications: Deployment – Hosting on Firebase/Vercel, Build & Environment Configuration. Web Application Security & Testing – XSS, CSRF, Linting, Unit Testing with Jest.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Two Unit Tests each of **25 Marks**
2. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- **Learning React:** *Modern Patterns for Developing React Apps*,**Authors:** Alex Banks & Eve Porcello **Publisher:** O'Reilly Media **Edition:** 2nd Edition, 2020
- **Rich Internet Applications with Ajax** Author: **Harwani, B.M.** Publisher: **Dreamtech Press**
- **Modern Full-Stack Development: *Using TypeScript, React, Node.js,* Webpack, *and* Docker** Author: **Frank Zammetti** Publisher: **Apress**

Weblinks and Video Lectures (e-Resources):

- https://youtu.be/BrjWObZ13AU?si=CUlH3FUfU2F2ujbt
- https://youtu.be/-ZO3QVgs-sk?si=wpOnaHacgL1SxOtF

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the architecture and role of Rich Internet Applications in modern web systems.	L1
CO2	Develop single-page applications using frameworks like React.	L2
CO3	Implement AJAX and RESTful services for interactive client-server communication.	L3
CO4	Design responsive, user-friendly interfaces with advanced UI/UX techniques.	L3,L4
CO5	Secure, test, and deploy scalable rich internet applications on modern platforms.	L4,L5

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1					
CO2	2		3					
CO3	2		3	2	3			
CO4	1	2	3		3			
CO5	2	2	2	2	3	2		1

Semester- III

Web Development Using PHP and MySQL			
Course Code	**MMCB311C**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- Understand the fundamentals of web technologies.
- Develop dynamic web pages using HTML, CSS, JavaScript.
- Work with MySQL for database-driven applications
- Apply security and validation in web forms.
- Deploy basic web applications.

Module-1

Introduction to Web Technologies: Internet and WWW,Basics of JavaScript and client-side scripting,HTTP, Web Servers, Client-Server Architecture,HTML5 and CSS3 – Forms, Tables, Layout, and Responsive Design.

Module-2

PHP Basics:PHP syntax and variables,Control structures,Functions and Arrays,File Handling, Sessions, and Cookies,Error handling,Introduction to OOP in PHP,Working with Forms.

Module-3

JavaScript for Web Interactivity: JavaScript Basics – Variables, Operators, Functions, DOM, Events,Form Validation, and Integration with HTML/CSS.

Module-4

MySQL and PHP Integration: Introduction to MySQL,Database Concepts, SQL Queries (CRUD), Table Design,Connecting PHP to MySQL, Prepared statements and data handling.

Module-5

Web Application Features: Form validation (Client-side and Server-side),User authentication and session management,File uploads and downloads,Security practices (SQL Injection, XSS, CSRF),Hosting and deployment basics.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Two Unit Tests each of **25 Marks**
2. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- **Luke Welling and Laura Thomson**, PHP and MySQL Web Development, 5th Edition, Addison-Wesley, 2016.
- **"PHP & MySQL: Novice to Ninja"** (6th Edition) **Author**: Tom Butler and Kevin Yank Publisher: SitePoint, 2022
- **"Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5" (5th Edition)** Author: Robin Nixon Publisher: O'Reilly Media, 2018

Weblinks and Video Lectures (e-Resources):

- https://www.youtube.com/live/s-iza7kAXME?si=cIV2baX4EjkzBGel
- https://youtu.be/btoVIlr7rAQ?si=PYiphzXfd0pij0op
- https://youtu.be/cGwSm8xDSwI?si=-ZTkFmBTVlUB0eOL

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Describe the structure and components of web technologies.	L1
CO2	Develop web pages using HTML, CSS, and JavaScript.	L2
CO3	Design and interact with MySQL databases from PHP.	L3
CO4	Implement form validation and apply security measures in web apps.	L3,L4
CO5	Deploy a basic PHP-MySQL-based web application.	L4,L5

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2						
CO2	3	3	2					
CO3	3	3	2	2				
CO4	3	3	3	2	2			
CO5	3	3	3	3	3	2		

Semester- III

Enterprise Application Programming			
Course Code	**MMCB311D**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- Understand the architecture of enterprise applications.
- Develop server-side applications using Java EE/Spring.
- Work with databases and persistence layers using ORM tools.
- Design and implement secure, scalable, and distributed applications.
- Explore deployment strategies and enterprise application testing.

Module-1

Introduction to Enterprise Applications: Definition, Characteristics, types (ERP, CRM, SCM, etc.), and challenges,Enterprise application architecture and layers,Overview of Java EE, Spring Boot introduction,Ccomparison of monolithic vs micro services architecture.

Module-2

Web Development with Spring: Spring MVC and Controller,Dispatcher Servlet, Handler Mapping, Controller classes,Request Mapping, View Resolvers, Model And View, RESTful Web Services,REST API design, JSON processing,Creating REST controllers with Spring Boot.

Module-3

Business Logic and Dependency Injection: Spring Core & Bean Life cycle, Inversion of Control (IoC), Bean scopes, Configuration (XML/Java-based), Application Context, Service Layer and Transactions, Creating service classes, transaction management, AOP for business concerns (logging, security).

Module-4

Database Access and Persistence:JDBC and Spring JDBC Template,Data Source, connection pooling, querying with templates,Exception handling in JDBC,JPA and Hibernate with Spring,Entity classes, annotations, persistence context,Repositories and query methods.

Module-5

Security, Testing, and Deployment: Spring Security Fundamentals, Authentication, authorization, custom login forms, Securing REST APIs, Testing and Deployment:Unit testing (JUnit, Mockito), integration testing, WAR/JAR packaging, deploying on Tomcat, Docker basics.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Two Unit Tests each of **25 Marks**
2. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- Spring in Action **Author:** Craig Walls**Edition:** 6th Edition (or latest available) **Publisher:** Manning Publications
- Enterprise Java Microservices: Building Scalable and Resilient Distributed Systems Author: **Ken Finnigan** Publisher: **O'Reilly Media**

Weblinks and Video Lectures (e-Resources):

- https://youtu.be/If1Lw4pLLEo?si=B3F-MHZ8q4N9vh_b
- https://youtu.be/UgX5lgv4uVM?si=GJLcXH9jior1_4pp

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand architecture and layers of enterprise applications.	L1
CO2	Build web applications using Spring MVC and REST.	L2
CO3	Implement service layers and apply dependency injection.	L3
CO4	Integrate database operations using JDBC, JPA, and Hibernate.	L3,L4
CO5	Secure, test, and deploy enterprise applications efficiently.	L4,L5

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**3**	**2**						
CO2	**3**	**3**	**2**					
CO3	**3**	**3**	**2**					
CO4	**3**	**3**	**2**					
CO5	**2**	**2**		1				

Semester- III

Advances in Web Technologies			
Course Code	**MMCB311E**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- Understand the syntax and usage of PHP for server-side scripting and develop basic web applications.
- Develop web applications using Ruby and Ruby on Rails with database integration.
- Design rich internet applications using AJAX and asynchronous communication principles.
- Implement AJAX patterns and manage complex XML Http Request scenarios.
- Apply responsive design principles using Bootstrap to create modern web interfaces.

Module-1

Introduction to PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching. Building Web applications with PHP: Form handling, Files, Tracking users, cookies, sessions, Using databases, Handling XML.

Module-2

Introduction to Ruby and Introduction to Rails: Origins and uses of Ruby, Scalar types and their operations ,Simple input and output, Control statements, Arrays, Hashes, Methods, Classes, Code blocks and iterates, Pattern matching. Overview of Rails, Document requests, Processing forms, Layouts. Rails applications with Databases.

Module-3

Rich Internet Applications With Ajax: Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX; Asynchronous communication and AJAX application model. Ajax with XML HTTP object: Part 1 Creating Ajax Applications: An example, Analysis of example ajax.html, Creating the JavaScript, Creating and opening the XML Http Request object, Data download, Displaying the fetched data, Connecting to the server, Adding Server-side programming, Sending data to the server using GET and POST.

Module-4

Ajax with XMLHTTP object: Part 2 Handling multiple XML Http Request objects in the same page, Using two XML Http Request objects, Using an array of XML Http Request objects, AJAX Patterns – Predictive Fetch, Multi-stage download, Periodic Refresh and Fall-back patterns, Submission throttling.

Module-5

Introduction to Bootstrap: What Is Bootstrap? Bootstrap File Structure, Basic HTML Template, Global Styles, Default Grid System, Basic Grid HTML, Offsetting Columns, Nesting Columns, Fluid Grid System, Container Layouts, Responsive Design. Typography, Emphasis Classes, Lists, Code, Tables, Optional Table Classes, Table RowClasses, Forms, Buttons, Images, Icons.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Two Unit Tests each of **25 Marks**
2. Two assignments each of **25 Marks**or **oneSkill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

1. obertW.Sebesta: Programming the Worldwide Web, 4thEdn, Pearson, 2012
2. Professional AJAX – Nicholas C Zakas et al, Wrox publications, 2008.
3. Steven Holzner: Ajax: A Beginner's Guide, Tata McGraw Hill, 2014.
4. Jake Spurlock: "Bootstrap: Responsive Web Development", O'Reilly Media, 2014.
5. Thomas A. Powel: Ajax The Complete reference, McGraw Hill,2008.
6. AravindShenoy, Ulrich Sossou: Learning Bootstrap, Packt, Dec 2014.
7. Dana Moore, Raymond Budd, Edward Benson: Professional Rich Internet Applications: AJAX andBeyond, Wiley 2012.

Weblinks and Video Lectures (e-Resources):

- https://www.php.net/manual/en/
- https://www.ruby-lang.org/en/documentation/
- https://guides.rubyonrails.org/
- https://developer.mozilla.org/en-US/docs/Web/Guide/AJAX
- https://getbootstrap.com/docs/5.3/getting-started/introduction/

Skill Development Activities Suggested

- Build a blog application with database interaction.
- Build a TODO web app using Ruby on Rails.Create a basic blog with CRUD operations using Rails and ActiveRecord. Handle form inputs and layouts dynamically in Rails.
- Develop a live search feature using AJAX. Create a weather info retriever using XMLHttpRequest and an API.
- Build a multi-tabbed interface with AJAX loading each tab's content. Use AJAX to periodically update a dashboard.
- Design a responsive portfolio website. Convert a static HTML form into a responsive Bootstrap-styled form. Style tables and buttons dynamically with Bootstrap classes.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Explain and use PHP for server-side scripting and web application development	L1,L2
CO2	Develop and deploy web applications using Ruby and Rails with database support	L3
CO3	Explain AJAX technology and build AJAX-enabled web applications	L3
CO4	Implement advanced AJAX functionalities using multiple XMLHttpRequest objects and AJAX patterns	L3,L4
CO5	Design responsive and styled web interfaces using Bootstrap framework	L5

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1							
CO2			2		3			
CO3	1			2				
CO4		2					3	
CO5					3			3

Semester- III

Web Programming using Java			
Course Code	**MMCB311F**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- To understand web technologies and develop dynamic, interactive web applications using Java.
- To build client-server-based applications using Java Servlets and JSP.
- To integrate backend databases with web front-ends.
- To explore the MVC architecture in web development using Java frameworks.

Module-1

Introduction to Web Development and Java Web Technologies: Basics of Web Programming - HTTP, HTML, CSS, JavaScript overview. Introduction to Java EE, Architecture of Java Web Applications.

Module-2

Java Servlets**:** Servlet Lifecycle, Writing a basic Servlet, Deployment using web.xml, Servlet Config and Servlet Context, Request and Response Handling, Session Management, Cookies, and URL Rewriting, Redirecting requests (sendRedirect vs forward), Status codes and response headers.

Module-3

JavaServer Pages (JSP): Introduction to JSP and its advantages over Servlets,JSP Architecture, Implicit Objects, Scripting Elements, JSP Directives, Error Handling, JSTL (JSP Standard Tag Library), Advanced JSP Features.

Module-4

JDBC and Database Connectivity: Introduction to JDBC and its architecture, JDBC Drivers, Connection, Statement, ResultSet. Integrating JDBC with JSP and Servlets.

Module-5

MVC Architecture and Java Frameworks: MVC Architecture Pattern in Web Applications, Introduction to Spring MVC Framework -Controllers, Views, Models.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Two Unit Tests each of **25 Marks**
2. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- *Web Programming using Java* **Author:** Uttam K. Roy **Publisher:** Oxford University Press **Edition:** Latest.
- **Java Web Programming and Web Services** Author: **David E. Flanagan** Publisher: **O'Reilly Media** Edition: **2nd Edition**
- **Head First Servlets and JSP** Authors: **Bryan Basham, Kathy Sierra, Bert Bates** Publisher: **O'Reilly Media** Edition: **2nd Edition.**

Web links and Video Lectures (e-Resources):

- https://youtu.be/BGTx91t8q50?si=PT8zIooy3p2J_awp
- https://youtu.be/Js4FlB0zTbg?si=XJNOQYzdpcTCLSdT
- https://youtu.be/r4EqfjMsP48?si=p9PbgbqebXYsqV_u

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the fundamentals of web development and Java web technologies.	L1
CO2	Develop Java Servlet-based web applications.	L2
CO3	Create dynamic websites using JavaServer Pages (JSP).	L3
CO4	Integrate databases with Java web applications using JDBC.	L3
CO5	Apply MVC architecture for scalable Java web applications using frameworks.	L4

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3							
CO2	3							
CO3					2	2		
CO4	2	2	2					
CO5	2							2