

Code: BCADSEC-VI 4007T(for theory) and 4007P(for practical)	Group-C: Elective – II Web Programming-II Advanced Full-Stack Development	1L+T:4P	3 Credits (15 hours theory and 60 hours practical)
Max Marks: 100; Theory: 100 (Int: 25; Ext: 75); Practical: 100			
Course Outcomes: After completion of the course student will be able to			
CO1: Understand and implement MongoDB as a NoSQL database for scalable applications.			
CO2: Develop a deep understanding of Node.js and Express.js for server-side development.			
CO3: Understand security best practices			
CO4: Equip with modern DevOps practices such as CI/CD, environment variable management, and cloud deployment using Vercel, Netlify, Render, and Heroku			
Unit	Topics	Proposed Lectures	
I	Advanced JavaScript & ES6+ Destructuring, Spread & Rest Operator, Template Literals, Promises and Fetch API, Async/Await, Closures and Scope, Hoisting and the Execution Context, Modules: import/export Advanced React.js useEffect Hook, React Router: BrowserRouter, Routes, Route, Link vs NavLink, Forms in React, Controlled vs Uncontrolled Components, Lifting State Up, Context API for Global State Management, Introduction to Redux (optional)	4	
II	Back-End API Development with Node.js + Express RESTful API Principles, Route Parameters and Query Strings, Request/Response Cycle, Creating APIs with Express, Middleware (Morgan, bodyParser, Helmet), Error Handling Middleware Authentication and Authorization User Registration & Login, Hashing Passwords with bcrypt, JSON Web Tokens (JWT) for Auth, Protecting Routes, Session vs Token-Based Auth, Role-Based Access Control (RBAC)	4	
III	Advanced MongoDB + Introduction to SQL Advanced Queries: \$gt, \$lt, \$in, \$or, Indexing in MongoDB., Aggregation Pipeline Basics, Relational Database Overview, Introduction to MySQL/PostgreSQL, CRUD Operations in SQL, SQL Joins, Group By, Order By, Testing Tools & Practices Postman for API Testing, Writing Unit Tests with Jest (Basics), Test-Driven Development (TDD) Basics, Deployment & Hosting Hosting Front-End on Vercel / Netlify, Hosting Back-End on:Render / Railway / Cyclic, Heroku (if available), CI/CD Concepts (basic Intro only), Using .env for Environment Variables, Connecting Front-End and Back-End in Production	4	
IV	Web Security Basics Common Web Vulnerabilities, XSS, CSRF, SQL Injection, Input Validation and Sanitization, HTTPS, CORS, and Secure Headers, Using Helmet and CORS in Express, Rate Limiting Capstone Project A full-stack application with:Front-End: React, Back-End: Express.js, Database: MongoDB (or with SQL integration), Auth: JWT or Sessions,Deployment: Live and Public Project Ideas: <ul style="list-style-type: none"> E-Commerce Website Job Board Task/Project Management Tool Blogging Platform 	3	

	Real-Time Chat App (using Socket.io)	
Books:	<ol style="list-style-type: none"> Subramanian, Vasan, Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node. Apress, 2019. Hoque, Shama. Full Stack Web Development with MERN. Packt Publishing, 2021. Brown, Ethan. Web Development with Node and Express: Leveraging the JavaScript Stack. 2nd ed., O'Reilly Media, 2019. Casciaro, Mario, and Luciano Mammino. Node.js Design Patterns. 3rd ed., Packt Publishing, 2020. Mardan, Azat. Pro Express.js. Apress, 2014. 	